



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

Component 10: Fundamentals of Health Workflow Process Analysis & Redesign

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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Component Overview

This component covers fundamentals of health workflow process analysis and redesign as a necessary component of complete practice automation. Process validation and change management are also covered.

Component Objectives

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

- Identify the elements involved in providing patient care within a complex health care setting that must be taken into consideration when examining and proposing changes in workflow processes.
- Create diagram of processes in the healthcare setting that support workflow analysis and re-design.
- Critically analyze the workflow processes in a selected health care setting to determine their effectiveness from the perspective of those being served (i.e., patients), those providing the services (i.e., professional and non-professional staff), and the organization's leadership (i.e., decision makers).
- Propose ways in which quality improvement methods, tools and health IT can be applied within a healthcare setting to improve workflow processes.
- Suggest approaches that would ensure the success of workflow re-design from development and presentation of the implementation plan, to facilitation of decision making meetings, implementation of the changes, evaluation of the new processes, sustainability of new workflow processes, and continuous quality improvement efforts to achieve meaningful use.
- Apply to these activities an understanding of health IT, meaningful use, and the challenges practice settings will encounter in achieving meaningful use.

Each Learning Unit includes 1-4 contact (or instructional) hours and an additional 3-12 hours of independent or team work on the part of the student. Each unit contains more material than would likely be used in any one teaching so that the instructor can pick and choose material most applicable to local workforce needs.

Unit 1 Concepts of Processes and Process Analysis

Unit 2 Process Mapping Theory and Rationale

Unit 3 Interpreting and Creating Process Diagrams

Unit 4 Acquiring Clinical Process Knowledge

Unit 5 Process Analysis

Unit 6 Process Re-design

Unit 7 Facilitating Meetings for Implementation Decisions

Unit 8 Quality Improvement Methods

Unit 9 Leading and Facilitating Change

Unit 10 Process Change Implementation and Evaluation

Unit 11 Maintaining and Enhancing the Improvements

This entire Component (units 1-11) is estimated to provide 20 total contact/instructional hours plus 40-60 additional hours of independent or team work, depending on the learning activities and assessments used within each unit.

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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).

Component 10/Unit 1

Unit Title

Concepts of Processes and Process Analysis

Unit Description

This unit focuses on the six aims for health care process improvement. In this unit, students are helped to understand the concepts of systems, systems thinking and health care processes. Such understanding provides a foundation for the study of clinical process analysis and redesign.

Unit Objectives

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

1. Describe the purpose for process analysis and redesign in the clinical setting
2. Describe the role of a Practice workflow and information management redesign specialist and contrast it with other roles such as technical support and implementation management
3. Explain how health care process analysis and redesign and meaningful use are related
4. Analyze a health care scenario and identify the components of clinical workflow.
5. Given a scenario of a health care analysis and redesign, analyze the responsibilities of each participant in the process and how the roles complement or overlap with one another
6. Describe how the workflow processes used by a health care facility might differ depending on the type of facility

Unit Topics / Lecture Titles

1a The Concepts of Health Care Processes and Process Analysis

1b Clinical Workflow

Unit References

(All links accessible as of 1/26/2012)

Lecture 1a

1. Analysis. 2011. In Merriam-Webster.com. Retrieved December 21, 2011. from <http://www.merriam-webster.com/dictionary/analysis>

*Indicates this link is no longer functional.

2. Committee on Engaging the Computer Science Research Community in Health Care Informatics, National Research Council. (2009). Computational technology for effective health care: immediate steps and strategic directions. (W. Stead, & H. S. Lin, Eds.) Cambridge: National Academies Press.
3. Committee on Quality of Health Care in America and Institute of Medicine. (2001). Crossing the quality chasm: A new health system for the 21st century 2001. Washington: National Academies Press.
4. Committee on Quality of Health Care in America; Institute of Medicine. (2000). To err is human: building a safer health system. (L. T. Kohn, J. M. Corrigan, & M. S. Donaldson, Eds.) Washington: National Academies Press.
5. DeMarco, T. (1979). Structured analysis and system specification. New Jersey : Yourdon Press, Prentice-Hall.
6. Deming, W. E. (1982). Out of crises. Cambridge: MIT Press.
7. Department of Health and Human Services; Centers for Medicare & Medicaid Services. (2010, December 29). Medicare and Medicaid programs- electronic health record incentive program. Retrieved from <http://edocket.access.gpo.gov/2010/pdf/2010-32861.pdf>
8. Department of Health and Human Services; Centers for Medicare & Medicaid Services. (2010, July 28). Medicare and Medicaid programs- electronic health record incentive program. Retrieved from <http://edocket.access.gpo.gov/2010/pdf/2010-17207.pdf>
9. Eligible professional meaningful use core measures measure 1 of 15 -stage 1. (2010, November 7). Retrieved December 21, 2011, from http://www.cms.gov/EHRIncentivePrograms/Downloads/1_CPOE_for_Medication_Orders.pdf
10. Eligible professional meaningful use core measures measure 3 of 15 -stage 1. (2010, November 7). Retrieved December 21, 2011, from http://www.cms.gov/EHRIncentivePrograms/Downloads/3_Maintain_Problem_ListEP.pdf
11. Procedure. 2011. American Society for Quality Glossary. Retrieved December 21, 2011, from <http://asq.org/glossary/p.html>
12. Process improvement. 2011. In American Society for Quality Glossary. Retrieved December 21, 2011, from <http://asq.org/glossary/p.html>.
13. Process re-engineering. 2011. In American Society for Quality Glossary. Retrieved December 21, 2011, from <http://asq.org/glossary/p.html>

*Indicates this link is no longer functional.

14. Process. 2011. In American Society for Quality Glossary. Retrieved December 21, 2011, from <http://asq.org/glossary/p.html>
15. Process. 2011. In Merriam-Webster.com. Retrieved December 21, 2011, from <http://www.merriam-webster.com/dictionary/process>
16. Redesign. 2011. In Merriam-Webster.com Retrieved December 21, 2011, from <http://www.merriam-webster.com/dictionary/redesign>
17. White, S. A., & Miers, D. (2008). BPMN modeling and reference guide. Lighthouse Pt: Future Strategies, Inc
18. Workflow. In Wikipedia. Retrieved December 21, 2011, from <http://en.wikipedia.org/wiki/Workflow>
19. Workflow. 2011. In Concise Oxford English Dictionary. Retrieved December 21, 2011, from <http://www.wordreference.com/definition/workflow>

Lecture 1a Charts, Tables and Figures

1.1 Figure: Meaningful Use Criteria. [Public domain] Retrieved from <https://www.cms.gov>

Lecture 1a Images

Slide 10: Bart Everson, photographer. 2011. Doctor's Office [Public Domain], Retrieved from: http://commons.wikimedia.org/wiki/File:Doctor%27s_Office_in_New_Orleans.jpg

Slide 18: National Academy Press. 2000. To Err is Human book cover. [Public Domain], Retrieved from: http://www.nap.edu/catalog.php?record_id=9728

Slide 18: National Academy Press. 2001. Crossing Quality Chasm book cover. [Public Domain]. Retrieved from: http://www.nap.edu/catalog.php?record_id=10027

Slide 18: National Academy Press. 2009. Computational Technology for Effective Health care. [Public Domain]. Retrieved from: http://www.nap.edu/catalog.php?record_id=12572

Slide 19: National Academy Press. 2001. Crossing Quality Chasm book cover. [Public Domain]. Retrieved from: http://www.nap.edu/catalog.php?record_id=10027

Lecture 1b

1. Allied health professionals. (n.d.). Retrieved December 29, 2011, from Association of Schools of Allied Health Professions: http://www.asahp.org/definition.htm*

*Indicates this link is no longer functional.

2. Committee on Quality of Health Care in America and Institute of Medicine. (2001). Crossing the quality chasm: A new health system for the 21st century 2001. Washington: National Academies Press.
3. Eligible provider meaningful use core measures measure 3 of 15 -Stage 1. (2010, November 7). Retrieved December 29, 2011, from http://www.cms.gov/EHRIncentivePrograms/Downloads/5_Active_Medication_List.pdf

Lecture 1b Charts, Tables and Figures

(None in this unit)

Lecture 1b Images

(None in this unit)

Unit Required Readings

(None in this unit)

Unit Suggested Readings

1. Institute of Medicine. Crossing the quality chasm: A new health system for the 21st century, [Internet]. 2001. Available from: http://www.nap.edu/openbook.php?record_id=10027&page=R1
2. Just Enough Structured Analysis (Chapter 1) [Internet]. Available from: http://yourdon.com/strucanalysis/wiki/index.php?title=Chapter_1
3. Just Enough Structured Analysis (Chapter 2) [Internet]. Available from: http://yourdon.com/strucanalysis/wiki/index.php?title=Chapter_2
4. Hood S, Mcintosh E. Clinical workflow keys, Eclipsys Practice Newsletter [Internet]. No date. [cited 2010 Aug 4].;2(2) Available from: <http://www.getvitalized.com/Newsletters/allscripts/v2i2/page1.aspx>

Student Application Activities

comp10_unit1_activity.doc
 comp10_unit1_activity_key.doc
 comp10_unit1_self_assess.doc
 comp10_unit1_self_assess_key.doc

External Resources

How Life Should Be After You've Implemented Electronic Medical Records

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Filmed visit scheduling and patient encounter scenario in small pediatric practice with technology assisted workflow. Produced by a commercial sponsor; 7 minutes and 16 seconds long.

http://www.youtube.com/watch?v=97v5p9Nk2_I&feature=related

Texas Health Heart Attack Transfer

This video shows a cardiac transfer protocol from a community hospital to a large tertiary care center. The scenario demonstrates an optimized clinical workflow, and illustrates the positive impact on saving lives. The video is produced by Texas Health Resources a non-profit organization. The video is 2 minutes and 52 seconds long.

http://www.youtube.com/watch?v=HEALTH_CAREMCqI5ylh9VA

http://www.youtube.com/watch?v=0bPJs_sgb6s

If Air Travel Worked like Health care

This video presents a not-so-funny comical scenario about a man trying to purchase airline tickets to fly across the country. He runs into problems faced by patients in health care today. Produced by individuals, sponsorship not disclosed, seven minutes and 1 second in length.

<http://www.youtube.com/watch?v=5J67xJKpB6c>

What if There Was No Technology

This video presents a comical series of vignettes demonstrating what the YMCA would be like with no information technology. Sponsorship not disclosed. The video is 3 minutes and 8 seconds in length.

<http://www.youtube.com/watch?v=fA58QHHWXfk&feature=channel>

The EMR Experience: Visiting Paperless Physician's Offices

Film of providers and practice staff in practices post-implementation of electronic medical records. Presents their actual experiences with implementation and use.

Produced by Hawaii Independent Physician's Association; 9 minutes and 21 seconds long.

<http://www.youtube.com/watch?v=3sBe3rdisRo&feature=related>

New England Women's Clinic Parts 1-4:

This two part video features Dr. Pablo Rodriguez, CEO of Women's Care, one of the largest women's health care practices in southern New England. At a recent event for area physicians, he shared his experience with his recent EHR implementation and his insight on how his colleagues can take full advantage of the incentives available through The American

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Recovery and Reinvestment Act (ARRA) and meaningful use. The video was produced by a commercial sponsor; the videos are from 5-6 minutes long each.

Part 1: <http://www.youtube.com/watch?v=fJpQImEVj0U&feature=channel>

Part 2: <http://www.youtube.com/watch?v=Eee8w9VtrmE&feature=channel>

Part 3:

<http://www.youtube.com/watch?v=QYXQRA3zggM&feature=channel>

Part 4: <http://www.youtube.com/watch?v=-neNYYP1o4&feature=related>

Project UPSTART

This is an educational video about Project UPSTART -The Utilization of Procedural Standardization to Reduce Recognition to Reperfusion Time in STEMI (www.projectupstart.com). The video shows the operations of data collection for a quality improvement project within the Health care setting. The video is produced by a non-profit organization and is 8 minutes and 42 seconds in length.

<http://www.youtube.com/watch?v=1SVq2D-U2rU&feature=related>

NOVE PBS documentary: Doctor's Diaries

This is a documentary that follows seven medical students through medical school and the first two decades of their careers. While it does not provide a lot of information about clinical workflows, viewing the two hour documentary may provide context for students about what physicians do, and how physicians think. This two part 2 hour documentary is produced by a non-profit organization, NOVA PBS. It is available free on the web at <http://www.pbs.org/wgbh/nova/doctors/>

Patient Care Requires Teamwork

This short 71 second video clip discusses some of the factors that make the clinical environment complex. The video was produced by a non-profit organization called Safer Health care. It is available free at

<http://www.youtube.com/watch?v=4kW4bIrYqPY>

Pharmacy Medication Error

This short two and a half minute video clip exemplifies complexities in an emergency department. The clip is a headshot of a nurse describing the genesis and resolution of a medication error. The video was produced by a non-profit organization called Safer Health Care. It is available free at

http://www.youtube.com/profile?user=Saferhealth_care#p/u/4/jmh4FWapa80

*Indicates this link is no longer functional.

Rural Health IT Adoption Toolbox

This website compiles information about Health IT adoption with a focus on rural settings. This is a government website that is sponsored and maintained by the U.S. Department of Health and Human Services (HHS) Health Resources and Services Administration (HRSA).

<http://www.hrsa.gov/healthit/toolbox/RuralHealthITtoolbox/>

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Component 10/Unit 2

Unit Title

Process Mapping Theory and Rationale

Unit Description

In two parts, Fundamentals of Health Workflow Process Analysis and Redesign: Process Mapping Theory and Rationale, Lecture a, and Process Mapping Diagramming Tools, Lecture b, covers the background necessary for graphically representing processes. It uses flowcharts and basic flowchart symbols to provide an introduction to graphical process representation, also called process diagramming. Separate units cover complete symbol sets and conventions for different types of process diagrams.

Unit Objectives

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

1. Articulate the value of process mapping.
2. Describe standard process mapping symbols and conventions.
3. Analyze an existing workflow process chart in terms of the information that could be generated, and the sequence of steps that are being communicated.
4. Choose the correct scope and detail level for a process map.
5. Choose an appropriate process mapping methodology.
6. Create a process map for a health care system (or system component) using correct symbols and conventions.

Unit Topics / Lecture Titles

2a Process Mapping Theory and Rationale

2b Process Mapping Diagramming Tools

Unit References

(All links accessible as of 3/04/12)

Lecture 2a

1. "Flowchart." Merriam-Webster Online Dictionary. 2010. Merriam-Webster Online. 23 June 2010
<http://www.merriam-webster.com/dictionary/flowchart>

*Indicates this link is no longer functional.

2. Gall, J. (1978). *Systematics: how systems work and especially how they fail*. London: Wildwood House Ltd.
3. ISO/ANSI 5807 Information processing - Documentation symbols and conventions for data, program and system flowcharts, program network charts and system resources charts. 1985.
4. Juran Joseph M, Gryna Frank M. (eds.) *Juran's Quality Control Handbook*. 1988 McGraw-Hill, Inc. New York.
5. The American Heritage® Dictionary of the English Language, Fourth Edition copyright ©2000 by Houghton Mifflin Company. Updated in 2009. Published by [Houghton Mifflin](#)
6. Wickens CD, Hollands JG. *Engineering Psychology and Human Performance*. 3rd ed. Upper Saddle River, NJ: Prentice Hall, Inc; 1999.
7. Wikipedia contributors. "Flowchart." Wikipedia, The Free Encyclopedia. Wikipedia, The Free Encyclopedia, 22 Jun. 2010. Web. 23 Jun. 2010.

Lecture 2a Charts, Tables and Figures

(None in this Unit)

Lecture 2a Images

Slide 4: Caveman [Engraver]. (~17000 years ago). Lascaux Cave: felids gallery, Retrieved February 23, 2012 from: <http://commons.wikimedia.org/wiki/File:Lascaux-diverticule-f%C3%A9lins.jpg>

Slide 5: *DOT-9892: Poison 6*. (n.d.). Retrieved February 23, 2012, from ComplianceSigns.com website:

<http://www.compliancesigns.com/DOT-9892.shtml>

Slide 5: *Manual on Uniform Traffic Control Devices (MUTCD) - Chapter 2B. Regulatory Signs*. (n.d.). Retrieved February 23, 2012, from United States Department of Transportation - Federal Highway Administration website:

<http://mutcd.fhwa.dot.gov/htm/2003r1r2/part2/part2b1.htm#figure2B3>

Slide 5: *W1-13 Truck Turn Over Black on Yellow Diamond Warning Sign*. (n.d.). Retrieved February 23, 2012, from Centerline Supply website

Slide 6: *Washington DC VA Medical Center-Metro Subway Map*. (n.d.).

Retrieved February 23, 2012, from U.S.Department of Veterans Affairs website: <http://www.washingtondc.va.gov/about/metro.asp>

Slide 20: Nahm M. Duke University, 2012.

Slide 21: Nahm M. Duke University, 2012.

*Indicates this link is no longer functional.

Slide 22: *File:LampFlowchart.png*. (n.d.). Retrieved February 23, 2012, from Wikimedia Commons website:

<http://commons.wikimedia.org/wiki/File:LampFlowchart.png>

Slide 25: Flowchart of patient intake diagram. Nahm, M. Duke University, 2012.

Slide 26: Continuation of Flowchart of patient intake diagram. Nahm, M. Duke University, 2012.

Lecture 2b

1. Box, G. Improving almost anything. Ideas and essays. 2006.
2. Coiera, E. (2003). *Guide to Health Informatics* (2nd ed.). London: Hodder Arnold Publishers.
3. EMR/Practice Management Evaluation Project for Local Public Health Clinics & Case Management. (n.d.). Retrieved February 23, 2012, from Cabarrus health alliance website:
http://www.cabarrushealth.org/CommonGround/*
4. ISO/ANSI 5807 Information processing - Documentation symbols and conventions for data, program and system flowcharts, program network charts and system resources charts. 1985.
5. Juran, JM, Gryna, FM. (eds.) *Juran's Quality Control Handbook*. 1988 McGraw-Hill, Inc. New York.
6. Public Health Institute, 2006. Taking Care of Business: A Collaboration to Define Local Health Department Business Processes. Decatur, GA: Public Health Informatics Institute. Available online at www.phii.org
7. Yourdon E. Just Enough Structured Analysis. 2006 revision. Chapter 9, available free at <http://yourdon.com/strucanalysis/wiki/>

Lecture 2b Charts, Tables and Figures

Table 2.1 Physical and Mental Process Steps. Nahm, M (2012)

Table 2.2 Methods for Diagramming Processes. Nahm, M (2012)

Lecture 2b Images

Slide 3: *George Box* [Photograph]. Retrieved February 23, 2012 from:

http://en.wikipedia.org/wiki/George_Box

Slide 4: Grobe, H. [Photographer]. *Elgin pocket watch* [Photograph]. (1930?). Retrieved February 23, 2012 from:

http://commons.wikimedia.org/wiki/File:Watch-ancre-open_hg.jpg

*Indicates this link is no longer functional.

Slide 4: Bananenfalter. [Photographer]. *Pocket Watch* [Photograph].

Retrieved February 23, 2012 from:

http://commons.wikimedia.org/wiki/File:Watch-ancre-open_hg.jpg

Slide 5: Kravtchenko, I. [Photographer]. *Dairy Farm* [Photograph]. (2010).

Retrieved February 23, 2012 from: [http://commons.wikimedia.org/wiki/](http://commons.wikimedia.org/wiki/File:MaplesFarmBedAndBreakfast.jpg)

[File:MaplesFarmBedAndBreakfast.jpg](http://commons.wikimedia.org/wiki/File:MaplesFarmBedAndBreakfast.jpg)

Slide 5: (Right) blueprint, obtained from

<http://commons.wikimedia.org/wiki/>

Slide 14: Source: Nahm, M. (2012)

Unit Required Readings

(None in this Unit)

Unit Suggested Readings

1. Public Health Informatics Institute. Taking Care of Business: A Collaboration to Define Local Health Department Business Processes. [homepage on the Internet]. 2006 Available from: Public Health Informatics Institute. Web site: http://www.maine.gov/dhhs/btc/PDF/PHII-Taking_Care_of_Business.pdf*
2. Just Enough Structured Analysis (Chapter 9) [Internet]. Available from: http://yourdon.com/strucanalysis/wiki/index.php?title=Chapter_9
3. Wikipedia: Flowchart [Internet]. Available from: <http://en.wikipedia.org/wiki/Flowchart>
4. Wikipedia: UML [Internet]. Available from: http://en.wikipedia.org/wiki/Unified_Modeling_Language
5. UML Resource Page. [Internet]. Object Management Group. Available from. Web site: <http://www.uml.org/>
6. Wikipedia: Entity Relationship topic: http://en.wikipedia.org/wiki/Entity_relationship_diagram
7. Colligan, L., Anderson, J. E., Potts, H. W. W., Berman J., Does the process map influence the outcome of quality improvement work? A comparison of a sequential flow diagram and a hierarchical task analysis diagram. BMC Health Services Research 2010, 10:7. Available from <http://www.biomedcentral.com/1472-6963/10/>
8. Rural Health IT Adoption Toolbox. This website compiles information about Health IT adoption with a focus on rural settings. This is a government website that is sponsored and maintained by the U.S. Department of Health and Human

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Services (HHS) Health Resources and Services Administration (HRSA).

<http://www.hrsa.gov/healthit/toolbox/RuralHealthITtoolbox/>

Student Application Activities

comp10_unit2_activity.doc
comp10_unit2_activity_key.doc
comp10_unit2_self_assess.doc
comp10_unit2_self_assess_key.doc

External Resources

Any of the videos from Unit 1 or the clinic scenarios from the Appendix can be used for learning applications in this section.

Microsoft Word flowchart how-to tutorials

<http://learngen.org/resources/leobjects/lg0013ta.html>*

<http://office.microsoft.com/en-us/word-help/draw-flowcharts-with-word-and-powerpoint-HA001055266.aspx>*

YouTube Visio demonstrations: There are many Visio demonstration videos on YouTube. They are of variable quality, but they do show screen capture and can help a new visio user learn the software. A link to example videos is below.

<http://www.youtube.com/watch?v=ynOhfMI-VD4&feature=fvw>

Visio Demonstrations for ISO 5807 Flowcharts

<http://www.youtube.com/watch?v=ynOhfMI-VD4&feature=fvw>

NHS Institute for Innovation and Improvement is part of the National Health Service in the UK. The NHS Institute for Innovation and Improvement hosts and maintains web resources, including the link below about process mapping.

http://www.institute.nhs.uk/quality_and_service_improvement_tools/quality_and_service_improvement_tools/process_mapping_-_an_overview.html

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Component 10/Unit 3

Unit Title

Interpreting and Creating Process Diagrams

Unit Description

Unit 3 is composed of several lectures, one for each diagramming method. Lecture a, Interpreting and Creating Process Diagrams: Introduction - provides an introduction to these concepts and reviews information from Unit 2, Lecture b. Based on feedback from practitioners, we recommend using two methods (data flow diagrams in Yourdon notation, and flowcharts). In Lecture a, we review the process aspects that each diagram type covers. In separate presentations, we cover each diagram type. For the two recommended methods, the presentation covers concepts and skills from reading and interpreting the diagrams to actually creating them. For the rest of the diagrams, we cover only background, use, and notation, i.e., the presentation prepares the student to read and interpret the diagram but not to create them.

Unit Objectives

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

1. Create a process flowchart for a health care system (or system component) using appropriate ISO 5807 symbols and conventions,
2. Create context and data flow diagrams for a health care system (or system component) using appropriate Yourdon symbols and conventions,
3. Choose the correct scope and detail level for a process flowchart and data flow diagram,
4. Read and interpret Gane-Sarson data flow diagram,
5. Read and interpret an entity relationship diagram in crow's foot notation, and
6. Read and interpret UML class, activity, and state diagrams

Unit Topics / Lecture Titles

1. Key process aspects that may require analysis and diagramming
2. Types of process diagrams
3. Standard ISO 5807 process diagramming symbols and conventions
4. Reading an ISO 5807 flowchart in terms of the information that could be generated and the workflow steps that are being communicated

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5. Create ISO 5807 flowcharts for a health care system (or system component) using correct symbols and conventions
6. Yourdon data flow diagram symbols and conventions
7. Creating data flow diagrams (DFDs) for a given a health care scenario
8. Gane-Sarson symbols and conventions for process mapping
9. Reading Gane-Sarson data flow diagrams
10. Understand the background of how Entity-Relationship Diagrams (ERDs) are used and maintained, the symbol set used in producing ERDs, and process aspects covered by them
11. Understand the notation conventions and be able to read (not create) a simple Entity Relationship Diagram (ERD)
12. Purpose, symbols, and conventions for UML
 - a. Class,
 - b. Activity and
 - c. State machine diagram
13. Reading and interpreting the diagrams
 - 3a Interpreting and Creating Process Diagrams: Introduction
 - 3b Process Mapping: ISO 5807
 - 3c Process Mapping: Yourdon Notation for Data Flow Diagrams
 - 3d Process Mapping: Gane-Sarson Notation
 - 3e Process Mapping: Entity-Relationship Diagrams
 - 3f Process Mapping: Unified Modeling Language (UML)

Unit References

(All links accessible as of 3/12/2012)

Lecture 3a

1. Public Health Informatics Institute. (2006). Taking Care of Business: A Collaboration to Define Local Health Department Business Processes. Decatur, GA: Public Health Informatics Institute.

Lecture 3a Charts, Tables and Figures

3.1 Table. Nahm, Meredith (2012).

Lecture 3a Images

Slide 7: Nahm, Meredith (2012).

Lecture 3b

1. ISO/ANSI 5807 Information processing - Documentation symbols and conventions for data, program and system flowcharts, program network charts and system resources charts. 1985.

*Indicates this link is no longer functional.

Lecture 3b Charts, Tables and Figures

3.2 Table: Nahm, M., Duke University, 2012.

Lecture 3b Images

Slide 7: Image of Symbols used in standard flowcharting. Nahm M. Duke University, 2012

Slide 8: Basic process symbol utilization in a flowchart. Nahm M. Duke University, 2012

Slide 9: Flowchart showing decision tree about drug testing. Nahm M. Duke University, 2012

Slide 10: Use of the Terminator symbol in workflow process diagramming. Nahm M. Duke University, 2012

Slide 11: Vikrant (own work). 2006). *A flowchart about testing lamp working*. [flowchart], Retrieved February 27, 2012 from <http://commons.wikimedia.org/wiki/File:LampFlowchart.png>

Slide 12: Flowchart of decision tree for patients coming into a hospital. Nahm M. Duke University, 2012

Slide 13: Example of document symbol use. Nahm M. Duke University, 2012

Slide 14: Definition of manual input versus manual operation. Nahm M. Duke University, 2012

Slide 15: Example: Manual Operation and Manual Input. Nahm M. Duke University, 2012.

Slide 16: Symbols for Data and stored data. Nahm M. Duke University, 2012

Slide 17: Data symbol example. Nahm M. Duke University, 2012.

Slide 18: Example of the Display symbol. Nahm M. Duke University, 2012

Slide 19: Example of the Connector symbol. Nahm M. Duke University, 2012

Slide 20: The Delay symbol. Nahm M. Duke University. 2012.

Slide 22: Annotations or “call outs”. Nahm M. Duke University, 2012.

Slide 23: Example of Detail Level in flow charts. Nahm M. Duke University, 2012.

Slide 24: Example of appropriate and incorrect Flow in a chart. Nahm M. Duke University, 2012.

Slide 25: Flow: From top to bottom or R to L. Nahm M. Duke University, 2012.

Slide 26: Use of line in flow diagrams. Nahm M. Duke University, 2012.

*Indicates this link is no longer functional.

Lecture 3c

Yourdon, E. (2006). Just Enough Structured Analysis (Rev ed.). Retrieved from <http://yourdon.com/strucanalysis/wiki>

Lecture 3c Charts, Tables and Figures

3.3 Table. Nahm, M, Methods for diagramming processes, 2012.

Lecture 3c Images

Slide 7: Context Diagram Example. Nahm ,M., Duke University, 2012.

Slide 8: Example DFD for Patient visit. Nahm, M. Duke University, 2012.

Slide 9: Yourdon Symbols or dataflow diagrams. Nahm, M., Duke University, 2012.

Slide 10: The “Entity” symbol in Yourdon notation. Nahm, M., Duke University, 2012.

Slide 11: The “Process” symbol in Yourdon notation. Nahm, M., Duke University, 2012.

Slide 12: The “Flow” symbol in Yourdon notation. Nahm M., Duke University, 2012.

Slide 13: “Data Store” symbol utilization in Yourdon notation. Nahm, M., Duke University, 2012.

Slide 21: Diagram showing relationships of software processes in public health departments. Cabarrus Health Alliance.

<http://www.cabarrushealth.org/>

Slide 23: Example prescription refill context diagram. Nahm, M., Duke University, 2012.

Lecture 3d

1. Gane, C., & Sarson, T. (1979). *Structured Systems Analysis: Tools and Techniques*. Englewood Cliffs, NJ: Prentice Hall.
2. Ken Hopkins, *Curriculum Council – Suggested Standards for Information Systems 2006: 238/7*, Newman College, 2001 available at:
http://portal.newman.wa.edu.au/technology/12infsys/html/KWH2003/*
3. Information Systems Teachers, Consensus Meetings 2005. (eds.). 2006, January). *INFORMATION SYSTEMS, Suggested Standards for Information Systems Tools* (Year 12 E238/7R). Retrieved from Trinity College website: http://www.trinity.wa.edu.au*

*Indicates this link is no longer functional.

Lecture 3d Charts, Tables and Figures

3.4 Table. Methods for diagramming processes. Nahm, M, Duke University, 2012.

Lecture 3d Images

Slide 7: Simplified on-line appointment scheduling example using Gane-Sarson notation. Nahm M., Duke University, 2012.

Slide 8: Gane-Sarson symbols. Nahm M., Duke University, 2012.

Slide 9: Entities symbol in Gane-Sarson notation. Nahm M., Duke University, 2012.

Slide 10: Process symbol in Gane-Sarson notation. Nahm M., Duke University, 2012.

Slide 11: Flow symbol in Gane-Sarson notation. Nahm M., Duke University, 2012.

Slide 12: Data Store symbols in Sane-Garson notation. Nahm M., Duke University, 2012.

Lecture 3e

1. Bachman, C. W. (1969, Summer). Data Structure Diagrams. *DataBase: A Quarterly Newsletter of SIGBDP*, 1(2), 4-10.
2. Chen, P. P. (1969, March). The Entity-Relationship Model: Toward a Unified View of Data. *ACM Transactions on Database Systems*, 1(1), 9-36.
3. Codd, E. F. (1969, August 19). Derivability, Redundancy and Consistency of Relations Stored in Large Data Banks. *IBM Research Report*, RJ599.
4. Bernat, J, *Crows Foot Notation*, University of Regina, Department of Computer Science, Regina, Saskatchewan, Canada. Available from <http://www2.cs.uregina.ca/~bernatja/crowsfoot.html>

Lecture 3e Charts, Tables and Figures

(None in this Unit)

Lecture 3e Images

Slide 10: ERD Example. Adapted with permission from Bernat, J. *Crows Foot Notation*, University of Regina, Department of Computer Science, Regina, Saskatchewan, Canada. Available from <http://www2.cs.uregina.ca/~bernatja/crowsfoot.html>

Slide 11: Entity. Nahm, M, Duke University, 2012.

Slide 12: Relationship use in E-R notation. Nahm, M., Duke University, 2012.

*Indicates this link is no longer functional.

Slide 14: Cardinality Symbols. Nahm, M., Duke University, 2012.
Slide 15: Modality Symbols. Nahm, M., Duke University, 2012.
Slide 16: Reading Modality and Cardinality. Nahm, M., Duke University, 2012.

Lecture 3f

1. *Watson, A. (n.d.). Visual Modeling: past, present and future. Retrieved February 27, 2012, from OMG website: http://www.uml.org/Visual_Modeling.pdf*

Lecture 3f Charts, Tables and Figures

3.5 Table: Methods for diagramming processes. Nahm, M., Duke University, 2012.

Lecture 3f Images

Slide 9: Class Diagram Example. Nahm, M., Duke University, 2012.
Slide 10: Class Diagram Notation. Nahm, M., Duke University, 2012.
Slide 11: Class Diagram – Larger View. Nahm, M., Duke University, 2012.
Slide 13: Activity Diagram Symbols. Nahm, M., Duke University, 2012.
Slide 14: Activity Diagram Example. Nahm, M., Duke University, 2012.
Slide 16: State Diagram Symbols. Nahm, M., Duke University, 2012.
Slide 17: State Diagram Example. Nahm, M., Duke University, 2012.

Unit Required Readings

(None in this unit)

Unit Suggested Readings

1. Wikipedia, Flowchart [Internet]. Available from: <http://en.wikipedia.org/wiki/Flowchart>
2. Public Health Informatics Institute. Taking Care of Business: A Collaboration to Define Local Health Department Business Processes. [homepage on the Internet]. 2006 Available from: Public Health Informatics Institute. Web site: http://www.maine.gov/dhhs/btc/PDF/PHII-Taking_Care_of_Business.pdf*
3. Just Enough Structured Analysis (Chapter 9) [Internet]. Available from: http://yourdon.com/strucanalysis/wiki/index.php?title=Chapter_9
4. Wikipedia: UML [Internet]. Available from: http://en.wikipedia.org/wiki/Unified_Modeling_Language
5. UML Resource Page. [Internet]. Object Management Group. Available from. Web site: <http://www.uml.org/>

*Indicates this link is no longer functional.

6. Wikipedia: Entity Relationship [Internet] Available from:
http://en.wikipedia.org/wiki/Entity_relationship_diagram
7. Codd, E.F., A relational model of data for large shared databanks. Communications of the ACM, vol 13 no 6. 1970.
<http://www.seas.upenn.edu/~zives/03f/cis550/codd.pdf>

Student Application Activities

comp10_unit3_activity.doc
comp10_unit3_activity_key.doc
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External Resources

Any of the videos from Unit 1 or the clinic scenarios from the Appendix can be used for learning applications in this section.

How Life Should Be After You've Implemented Electronic Medical Records
Filmed visit scheduling and patient encounter scenario in small pediatric practice with technology assisted workflow. Produced by a commercial sponsor; 7 minutes and 16 seconds long.

http://www.youtube.com/watch?v=97v5p9Nk2_I&feature=related

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Component 10/Unit 4

Unit Title

Acquiring Clinical Process Knowledge

Unit Description

In three lectures, this unit covers the concepts and methods for Acquiring Clinical Process Knowledge in the health care setting needed by the health care Workflow Analysis and Redesign Specialist

Unit Objectives

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

1. Identify how the strategic goals and stakeholders for a given health care facility can influence workflow processes in that facility,
2. Create an agenda for an opening meeting to discuss workflow processes in a health care facility, in light of that facility's strategic goals and stakeholders,
3. Compare and contrast different types of knowledge and their impact on organizations,
4. Analyze a health care scenario according to CMMI levels,
5. Identify the workflow processes that are likely to be used by a health care facility,
6. Identify the workflow processes that are essential to observe in order to determine how best to streamline the operations in a given health care facility, and
7. Identify key individuals with whom the Practice Workflow and Information Management Redesign Specialist should meet or observe in order to gain an understanding of the nature and complexity of their work.
8. Given a process observation scenario, formulate the questions that would facilitate a productive discussion of the workflow of information, activities and roles within that facility,
9. Suggest ways to successfully respond to common challenges encountered in knowledge acquisition,
10. Given a practice scenario, choose an appropriate knowledge acquisition method,

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11. Given a process analysis scenario including list of observations, create agenda for visit closing meeting and an initial meeting report, and
12. Given a set of diagrams and observations from an information gathering meeting, draft a summary report.

Unit Topics / Lecture Titles

1. Knowledge Acquisition (KA) goals in health care,
 2. Importance of KA,
 3. Categories of knowledge, and
 4. Knowledge and the Capability Maturity Model (CMM).
 5. Clinic information such as mission, stakeholders and goals that can help inform the analysis,
 6. Common clinic processes, and
 7. Creating a process inventory.
 8. Knowledge sources,
 9. Process information that should be considered in the analysis,
 10. Methods to obtain the information,
 11. Knowledge acquisition plan, and
 12. Initiating a relationship with a clinic.
- 4a Acquiring Clinical Process Knowledge
 4b Acquiring Clinical Process Knowledge
 4c Acquiring Clinical Process Knowledge

Unit References

(All links accessible as of 3/04/12)

Lecture 4a

1. Gaines, Brian R. (n.d.) *Organizational Knowledge Acquisition*. Accessed August 1, 2010. Available free from <http://pages.cpsc.ucalgary.ca/~gaines/reports/KM/OKA/index.html>*
2. Milton, N. R. (2007). *Knowledge Acquisition in Practice: A Step-by-step Guide* (Decision Engineering). London: Springer-Verlag.

Acknowledgement: Material used in this lecture comes from the following source:

1. Passive Knowledge Versus Active Knowledge, March 4, 2010. Accessed on August 2, 2010, available from <http://www.beyonduni.com/2010/03/passive-knowledge-versus-active-knowledge/>

Lecture 4a Charts, Tables and Figures

(None in this Unit)

*Indicates this link is no longer functional.

Lecture 4a Images

Slide 9: Gaines, Brian R. (n.d.) *Organizational Knowledge Acquisition*. Accessed August 1, 2010. Available free from

<http://pages.cpsc.ucalgary.ca/~gaines/reports/KM/OKA/index.html>*

Slide 11: Gaines, Brian R. (n.d.) *Organizational Knowledge Acquisition*. Accessed August 1, 2010. Available free from

<http://pages.cpsc.ucalgary.ca/~gaines/reports/KM/OKA/index.html>*

Slide 12: Gaines, Brian R. (n.d.) *Organizational Knowledge Acquisition*. Accessed August 1, 2010. Available free from

<http://pages.cpsc.ucalgary.ca/~gaines/reports/KM/OKA/index.html>*

Slide 13: Source: Meredith Nahm, PhD.

Lecture 4b

Acknowledgement: Material used in this lecture comes from the following sources

1. Gaines, Brian R. (n.d.) *Organizational Knowledge Acquisition*. Accessed August 1, 2010. Available free from <http://pages.cpsc.ucalgary.ca/~gaines/reports/KM/OKA/index.html>*
2. Milton, N. R. (2007). *Knowledge Acquisition in Practice: A Step-by-step Guide (Decision Engineering)*. London: Springer-Verlag.
3. Passive Knowledge Versus Active Knowledge, March 4, 2010. Accessed on August 2, 2010, available from <http://www.beyonduni.com/2010/03/passive-knowledge-versus-active-knowledge/>*

Lecture 4b Charts, Tables and Figures

(None in this Unit)

Lecture 4b Images

Slide 7: Source: Meredith Nahm, PhD.

Lecture 4c

Acknowledgement: Material used in this lecture comes from the following sources

1. Gaines, Brian R. (n.d.) *Organizational Knowledge Acquisition*. Accessed August 1, 2010. Available free from <http://pages.cpsc.ucalgary.ca/~gaines/reports/KM/OKA/index.html>*
2. Milton, N. R. (2007). *Knowledge Acquisition in Practice: A Step-by-step Guide (Decision Engineering)*. London: Springer-Verlag.
3. Passive Knowledge Versus Active Knowledge, March 4, 2010. Accessed on August 2, 2010, available from <http://www.beyonduni.com/2010/03/passive-knowledge-versus-active-knowledge/>*

*Indicates this link is no longer functional.

Lecture 4c Charts, Tables and Figures

(None in this Unit)

Lecture 4c Images

(None in this Unit)

Unit Required Readings

(None in this Unit)

Unit Suggested Readings

1. Milton NR. Knowledge acquisition in practice: A step by step guide. 1st ed. London: Springer; 2007.
2. Wikipedia: Capability Maturity Model [Internet] Available from: http://en.wikipedia.org/wiki/Capability_Maturity_Model

Student Application Activities

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External Resources

Any of the videos from Unit 1 can be used for learning applications in this section.

Knowledge Acquisition web resource:

<http://www.epistemics.co.uk/Notes/63-0-0.htm>*

This resource is considerably broader than the content for this unit; therefore, not recommended for students. This resource is provided for the instructor to place the material in this unit in the broader context of Knowledge Acquisition. This resource was created and is maintained by a commercial organization, Epistemics.

Gaines, Brian R. (n.d.) Organizational Knowledge Acquisition. Accessed August 1, 2010. This is a free article from a recognized Knowledge Acquisition expert from the University of Calgary. This resource is quite philosophical and theoretical, and thus, is provided as a resource for instructors rather than students. The resource is provided because it provides a solid exploration of the concept of Knowledge Acquisition.

*Indicates this link is no longer functional.

Available free from

<http://pages.cpsc.ucalgary.ca/~gaines/reports/KM/OKA/index.html>*

Milton NR. Knowledge acquisition in practice: A step by step guide. 1st ed. London: Springer; 2007

Wikipedia: Capability Maturity Model [Internet] Available from:

http://en.wikipedia.org/wiki/Capability_Maturity_Model

Example process diagrams for many common clinic processes. Accessible from the AHRQ website. This resource has pdf documents of many different clinical processes. They can be used as examples, or as materials for exercises and quiz questions.

<http://healthit.ahrq.gov/#Question>

Rural Health IT Adoption Toolbox

This website compiles information about Health IT adoption with a focus on rural settings. This is a government website that is sponsored and maintained by the U.S. Department of Health and Human Services (HHS) Health Resources and Services Administration (HRSA).

<http://www.hrsa.gov/healthit/toolbox/RuralHealthITtoolbox/>

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Component 10/Unit 5

Unit Title

Process Analysis

Unit Description

In two lectures, Fundamentals of Health Workflow Process Analysis and Redesign: Process Analysis covers the background and methodology for process analysis.

Unit Objectives

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

1. Describe the purpose of process analysis,
2. Describe skills and knowledge necessary for process analysis,
3. Perform a process analysis for a given clinic scenario,
4. Given results of a process analysis draft a summary report, and
5. Given results of a process analysis, identify desired EMR functionality

Unit Topics / Lecture Titles

1. Objectives of Process Analysis
2. Relevant concepts for process analysis
3. Steps for process analysis
4. Starting with process inventory and diagrams
5. For each process, listing
 - a. Variations applicable to the clinic
 - b. Exceptions
6. And Reporting findings
7. Process Variations for common clinic processes
 - a. Patient check-in
 - b. Patient visit
 - c. Prescription
 - d. Received documentation
 - e. Labs & diagnostic tests
 - f. Referral and consults
 - g. Disease management
 - h. Billing
8. Identifying EHR functionality from Process Analysis

*Indicates this link is no longer functional.

5a Process Analysis

5b Process Analysis

Unit References

(All links accessible as of 3/04/12)

Lecture 5a

1. Analysis. (n.d.). In *Merriam-Webster Online Dictionary*. Retrieved February 27, 2012 from <http://www.merriam-webster.com/dictionary/>
2. Deming, W. E. (1982). *Out of Crisis*. Cambridge, MA: MIT Press.
3. Procedure. (n.d.). In *American Society of Quality Glossary*. Retrieved February 27, 2012 from <http://asq.org/glossary/p.html>
4. Process. (n.d.). In *Merriam-Webster Online Dictionary*. Retrieved February 27, 2012 from <http://www.merriam-webster.com/dictionary/>

Lecture 5a Charts, Tables and Figures

(None in this Unit)

Lecture 5a Images

Slide 4: FDA. (n.d.). *W. Edwards Deming*. Retrieved February 27, 2012, from <http://commons.wikimedia.org/>

Slide 13: Practice Functions. Nahm, M., Duke University, 2012.

Lecture 5b

(None in this Unit)

Lecture 5b Charts, Tables and Figures

(None in this Unit)

Lecture 5b Images

Slide 17: Role-Based Flowchart. Nahm, M. (2012)

Slide 19: Translating Analysis Results to EHR Functionality. Nahm, M. (2012)

Unit Required Readings

(None in this Unit)

*Indicates this link is no longer functional.

Unit Suggested Readings

1. A systems approach to operational redesign workbook. Massachusetts: Masspro [cited 2010 Aug 4] Masspro, the Medicare Quality Improvement Organization for Massachusetts, under contract to CMS. [p. 1-50]. Available free from <http://www.masspro.org/HIT/docs/tools/DOQIT%20WB%20for%20WEB.pdf>*
2. Bacjer, LA. In search of a super superbill, Family Practice Management. [Internet] 2006 Sep; 13(8): [p. 43-44]. Available from <http://www.aafp.org/fpm/2006/0900/p43.html>

Student Application Activities

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External Resources

Any of the videos from Unit 1 can be used for learning applications in this section.

Family Practice Management Toolbox: created and maintained by American Academy of Family Physicians (AAFP). Most items in the toolbox are from published articles in Family Practice Management. Articles more than one year old are free, articles less than a year require a membership to access. Available at: <http://www.aafp.org/online/en/home/publications/journals/fpm/fpmtoolbox.html>

Article: Case Study of Patient Flow Analysis

Potisek, N. M., Malone, R. M., Shilliday, B. B., Ives, T. J., Chelminski, P. R., DeWalt, D. A., Pignone, M. P., Use of patient flow analysis to improve patient visit efficiency by decreasing wait time in a primary care-based disease management programs for anticoagulation and chronic pain: a quality improvement study. BMC Health Serv Res. 2007; 7: 8. PMID: PMC1784086 available free from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1784086/>

EHR Adoption tools were created and are maintained by Health Insight. *HealthInsight* is a private, non-profit community based organization dedicated to improving the healthcare systems of Nevada and Utah.

*Indicates this link is no longer functional.

Particularly of interest is the workflow analysis template. These tools are freely available at:

http://www.healthinsight.org/Internal/EHR_AdoptionProcess.html

A Systems Approach to Operational Redesign Workbook. Produced by Masspro, the Medicare Quality Improvement Organization for Massachusetts, under contract to CMS. (n.d.) accessed on August 4, 2010. This resource includes brief text descriptions, best practices, and practice examples and problems. Available free from <http://www.masspro.org/HIT/docs/tools/DOQIT%20WB%20for%20WEB.pdf>

Rural Health IT Adoption Toolbox

This website compiles information about Health IT adoption with a focus on rural settings. This is a government website that is sponsored and maintained by the U.S. Department of Health and Human Services (HHS) Health Resources and Services Administration (HRSA).

<http://www.hrsa.gov/healthit/toolbox/RuralHealthITtoolbox/>

The Agency for Healthcare Research and Quality (AHRQ) has a website with workflow analysis tools. Many of the tools are hosted by other organizations, but all can be accessed for free through the AHRQ site. Accessed August 4, 2010, available from <http://healthit.ahrq.gov>

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Component 10/Unit 6

Unit Title

Process Re-design

Unit Description

This unit, Process Design, consists of 5 lectures and covers the background and methodology for process redesign in the health care facility

Unit Objectives

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

1. Identify the factors that optimize workflow processes in health care settings.
2. Describe how information technology can be used to increase the efficiency of workflow in health care settings.
3. Identify aspects of clinical workflow that are improved by EHR.
4. Propose ways in which the workflow processes in health care settings can be re-designed to ensure patient safety and increase efficiency in such settings.
5. Use knowledge of common software functionality and meaningful use objectives to inform a process redesign for a given clinic scenario

Unit Topics / Lecture Titles

1. Objectives and goals of Process Redesign,
2. Unproductive work,
3. Twenty seven strategies for optimizing processes, and
4. An example of each optimization strategy.
5. Describe how information technology can be used to increase the efficiency of workflow in health care settings
6. Identify aspects of clinical workflow that are improved by EHR
7. Objectives, Skills and Knowledge for Process Redesign,
8. Common process problems,
9. Solutions to process problems, and
10. Human-Centered Design Framework as applied to Process Redesign.
11. Matching common clinic system functionality to solve process problems.
12. Objectives, skills and knowledge for Process Redesign,

*Indicates this link is no longer functional.

13. Human-Centered Design framework applied to Process Redesign,
14. Common process problems,
15. Solutions to process problems,
16. Matching common clinic system functionality to solve process problems, and
17. Process redesign for Meaningful Use.

- 6a Process Redesign
- 6b Process Redesign
- 6c Process Redesign
- 6d Process Redesign
- 6e Process Redesign

Unit References

(All links accessible as of 3/04/12)

Lecture 6a

1. Aviña, C (2010). *Community Health Clinic Ole, Case Study. Process Mapping & Documentation, Pre and Post EMR.* [PowerPoint slides]. Retrieved from <http://www.rhc.net/Public/OHIT/ClinicProcessRedesign-PPT.pdf>
2. Deming, W. E. (1982). *Out of Crisis*. Cambridge, MA: MIT Press.
3. Lee, B. (n.d.). *Manager/Leader Comments*. Retrieved February 27, 2012, from Virginia Commonwealth University website: <http://www.people.vcu.edu/~rsleeth/ManagerLeaderQuotes.htm>
4. Mansar, S. L., & Reijers, H. A. (2005). Best practices in business process redesign: validation of a redesign framework. *Computers in Industry*, 56, 457-471. Retrieved from http://is.tm.tue.nl/staff/hreijers/H.A.%20Reijers%20Bestanden/Mansar_2005_Computers-in-Industry.pdf*

Lecture 6a Charts, Tables and Figures

(None in this Unit)

Lecture 6a Images

Slide 4: FDA. (n.d.). *W. Edwards Deming*. Retrieved February 27, 2012, from <http://commons.wikimedia.org/>

Slide 6: Aviña, C (2010). *Community Health Clinic Ole, Case Study. Process Mapping & Documentation, Pre and Post EMR.* [PowerPoint slides]. Retrieved from <http://www.rhc.net/Public/OHIT/ClinicProcessRedesign-PPT.pdf>*

*Indicates this link is no longer functional.

Lecture 6b

1. Butler, K., Bahrami, A., Esposito, C, Hebron, A. (2000). Conceptual models for coordinating the design of user work with the design of information systems. . *Data & Knowledge Engineering*, 33(2), 191-198.
2. Butler A. (2011, May). *Human Center for Design & Engineering, University of Washington, MATH Method & Tools for Evidence-based Health IT*, Presentation at Duke University, Durham, NC.
3. ISO 9241-210:2010(E) Ergonomics of human–system interaction — Part 210:Human-centred design for interactive systems. Retrieved from http://www.iso.org/iso/iso_catalogue/catalogue_ics/catalogue_detail_ics.htm?csnumber=52075
4. Mansar, S. L., & Reijers, H. A. (2005). Best practices in business process redesign: validation of a redesign framework. *Computers in Industry*, 56, 457-471. Retrieved from http://is.tm.tue.nl/staff/hreijers/H.A.%20Reijers%20Bestanden/Mansar_2005_Computers-in-Industry.pdf*

Lecture 6b Charts, Tables and Figures

(None in this Unit)

Lecture 6b Images

Slide 7: ISO HCD Framework. ISO 9241-210:2010(E) Ergonomics of human–system interaction —Part 210:Human-centred design for interactive systems. Retrieved from http://www.iso.org/iso/iso_catalogue/catalogue_ics/catalogue_detail_ics.htm?csnumber=52075

Slide 8: Integrating Process and information. Image used with permission. Butler et al. (2000)

Lecture 6c

(None in this Unit)

Lecture 6c Charts, Tables and Figures

(None in this Unit)

Lecture 6c Images

Slide 5: Clinical Practice EMR interfaces. Nahm, M., Duke University. (2012).

Slide 8: Chart showing whether a clinic may want to interface with a lab's LIMS. Nahm, M., Duke University. (2012).

*Indicates this link is no longer functional.

Slide 14: *Healthview Patient Login*. (n.d.). Retrieved February 28, 2012, from DukeMedicine website:

http://www.dukehealth.org/patients_and_visitors/healthview/index

Slide 18: Q1: Context Diagram. Nahm, M., Duke University. (2012).

Lecture 6d

1. CMS EHR Meaningful Use Overview. (n.d.). Retrieved February 29, 2012, from Centers for Medicare & Medicaid Services website: https://www.cms.gov/EHRIncentivePrograms/30_Meaningful_Use.asp
2. Electronic Specifications, Eligible Professionals (EPs). (n.d.). Retrieved February 29, 2012, from Centers for Medicare & Medicaid Services website: https://www.cms.gov/QualityMeasures/03_ElectronicSpecifications.asp
3. Eligible Professional Meaningful Use Core Measures Measure 1 of 15, CPOE for Medication Orders. (2010, November 7). Retrieved from Centers for Medicare & Medicaid Services website: http://www.cms.gov/EHRIncentivePrograms/Downloads/1_CPOE_for_Medication_Orders.pdf
4. Eligible Professional Meaningful Use Core Measures Measure 2 of 15, Drug Interaction Checks. (2010, November 7). Retrieved from Centers for Medicare & Medicaid Services website: http://www.cms.gov/EHRIncentivePrograms/Downloads/2_Drug_Interaction_ChecksEP.pdf
5. Eligible Professional Meaningful Use Core Measures Measure 3 of 15, Maintain Problem List. (2010, November 7). Retrieved from Centers for Medicare & Medicaid Services website: http://www.cms.gov/EHRIncentivePrograms/Downloads/3_Maintain_Problem_ListEP.pdf
6. Eligible Professional Meaningful Use Core Measures Measure 4 of 15, e-Prescribing (eRx). (2010, December 21). Retrieved from Centers for Medicare & Medicaid Services website: http://www.cms.gov/EHRIncentivePrograms/Downloads/4_e-prescribing.pdf
7. Eligible Professional Meaningful Use Core Measures Measure 5 of 15, Active Medication List. (2010, November 7). Retrieved from Centers for Medicare & Medicaid Services website: http://www.cms.gov/EHRIncentivePrograms/Downloads/5_Active_Medication_List.pdf

*Indicates this link is no longer functional.

8. Eligible Professional Meaningful Use Core Measures Measure 6 of 15, Medication Allergy List. (2010, November 7). Retrieved from Centers for Medicare & Medicaid Services website: http://www.cms.gov/EHRIncentivePrograms/Downloads/6_Medication_Allergy_List.pdf
9. Eligible Professional Meaningful Use Core Measures Measure 7 of 15, Record Demographics. (2010, November 7). Retrieved from Centers for Medicare & Medicaid Services website: http://www.cms.gov/EHRIncentivePrograms/Downloads/7_Record_Demographics.pdf
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*Indicates this link is no longer functional.

Lecture 6d Charts, Tables and Figures

(None in this Unit)

Lecture 6d Images

Slide 5: Meaningful Use Stages. Available at <http://www.cms.gov/ehrincentiveprograms/>

Slide 6: What are the requirements for Stage 1 of Meaningful Use (2011 and 2012)? *CMS EHR Meaningful Use Overview*. (n.d.). Retrieved February 29, 2012, from Centers for Medicare & Medicaid Services website: https://www.cms.gov/EHRIncentivePrograms/30_Meaningful_Use.asp#BOOKMARK4

Slide 7: Image adapted from Centers for Medicare & Medicaid Services (2010). *Medicare & Medicaid EHR Incentive Program Meaningful Use Stage 1 Requirements Overview [PowerPoint slides]* Retrieved from https://www.cms.gov/EHRIncentivePrograms/Downloads/MU_Stage1_ReqOverview.pdf

Lecture 6e

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5. *Eligible Professional Meaningful Use Core Measures Measure 12 of 15, Electronic Copy of Health Information*. (2010, November 7). Retrieved from Centers for Medicare & Medicaid Services website: http://www.cms.gov/EHRIncentivePrograms/Downloads/12_Electronic_Copy_of_Health_Information.pdf

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7. *Eligible Professional Meaningful Use Core Measures Measure 14 of 15, Electronic Exchange of Clinical Information*. (2010, November 7). Retrieved from Centers for Medicare & Medicaid Services website: http://www.cms.gov/EHRIncentivePrograms/Downloads/14_Electronic_Exchange_of_Clinical_Information.pdf*
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Lecture 6e Charts, Tables and Figures

(None in this Unit)

Lecture 6e Images

Slide 5: Meaningful Use Stages. Available at <http://www.cms.gov/ehrincentiveprograms/>

Slide 6: What are the requirements for Stage 1 of Meaningful Use (2011 and 2012)? *CMS EHR Meaningful Use Overview*. (n.d.). Retrieved February 29, 2012, from Centers for Medicare & Medicaid Services website: https://www.cms.gov/EHRIncentivePrograms/30_Meaningful_Use.asp#BOOKMARK4

Slide 7: Image adapted from Centers for Medicare & Medicaid Services (2010). *Medicare & Medicaid EHR Incentive Program Meaningful Use Stage 1 Requirements Overview [PowerPoint slides]* Retrieved from https://www.cms.gov/EHRIncentivePrograms/Downloads/MU_Stage1_ReqOverview.pdf

Unit Required Readings

(None in this Unit)

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Unit Suggested Readings

1. Wikipedia: Practice Management Software. [Internet]. Available from http://en.wikipedia.org/wiki/Practice_management_software
2. Wikipedia: Picture Archival and Communication System. [Internet]. Available from http://en.wikipedia.org/wiki/Picture_archiving_and_communication_system
3. Wikipedia: Patient Portals. [Internet]. Available from http://en.wikipedia.org/wiki/Patient_portal
4. Wikipedia: Laboratory Information System. [Internet]. Available from http://en.wikipedia.org/wiki/Lab_information_system

Student Application Activities

comp10_unit6_activity.doc
comp10_unit6_activity_key.doc
comp10_unit6_self_assess.doc
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External Resources

“Using the Patient Portal”. This video is produced by a clinic as a tutorial for their patients on how to use their portal. Available on YouTube at <http://www.youtube.com/watch?v=Oqf2vWCQhHQ>

Rural Health IT Adoption Toolbox

This website compiles information about Health IT adoption with a focus on rural settings. This is a government website that is sponsored and maintained by the U.S. Department of Health and Human Services (HHS) Health Resources and Services Administration (HRSA). <http://www.hrsa.gov/healthit/toolbox/RuralHealthITtoolbox/>

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Component 10/Unit 7

Unit Title

Facilitating Meetings for Implementation Decisions

Unit Description

In one lecture, this unit, Facilitating Meetings for Implementation Decisions, covers a method and the associated logistics for conducting meetings in which health care facility decision makers review options for major process and implementation related decisions and make decisions. The purpose of the meetings is to outline the decisions that need to be made, to assure that decision makers have the necessary information for decision making, and to facilitate decision making. This unit provides the Practice Workflow and Information Management Redesign Specialist with tools for conducting decision making meetings. There are many methods for conducting and facilitating meetings. Here, we provide one method, discuss key concepts, and provide references to resources that you can use as you develop your skills and portfolio of tools for meeting facilitation

Unit Objectives

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

1. Describe major health care facility decisions in process redesign that includes EHR technology
2. Draft an agenda and facilitation plan for a decision making meeting,
3. Prepare a presentation to communicate findings of a workflow analysis or process redesign to health care facility decision makers,
4. Document those decisions that are made and actions identified in a decision making meeting, and
5. Critique a decision making meeting agenda, facilitation plan or scenario to identify problems and how they could have been prevented

Unit Topics / Lecture Titles

1. Coordinating a decision making meeting
2. Using appropriate group methods to discuss and make decisions on inefficiencies
3. Identifying opportunities for streamlining manual and computer-aided processes, and the
4. Transition from analysis and redesign to implementation planning, and we will also give examples of the plan content.

*Indicates this link is no longer functional.

5. Facilitating Optimization Decisions

Unit References

(All links accessible as of 1/26/2012)

Lecture 7

1. Bolea, A., & Scott, B. (2010). *Creating effective meetings*. Retrieved 2011, from Business advisors.net: http://business-advisors.net/files/dwnld/Creating_Effective_Meetings_a.pdf*
2. Group decision making. 2011. In Wikipedia.org. Retrieved December 21, 2011, from http://en.wikipedia.org/wiki/Group_decision_making

Lecture 7 Charts, Tables and Figures

7.1 Table: Courtesy of Dr. M Nahm, 2012.

7.2 Figure: Permission for use by eQHealth Solutions (formerly Louisiana Health Care Review) and the Mississippi Regional Extension Center. 2012

Lecture 7 Images

(None in this unit)

Unit Required Readings

(None in this unit)

Unit Suggested Readings

1. Wikipedia: Facilitating Productive Meetings [Internet]. Available from: [http://en.wikipedia.org/wiki/Facilitation_\(business\)](http://en.wikipedia.org/wiki/Facilitation_(business))
2. Kabcenell AI, Langley J, Hupke C. Innovations in planned care. IHI Innovation Series white paper. Cambridge, MA: Institute for Health care Improvement; 2006. Available from: <http://www.ihl.org/IHI/Results/WhitePapers/InnovationsinPlanned+CareWhitePaper.htm>
3. Delbecq AL, and Van de Ven AH. A group process model for problem identification and program planning. *The Journal of Applied Behavioral Sciences* 1971; 7(4): 467-492
4. Haynes SC. The facilitators perspective on meetings and implications for group support systems design. *The Database for Advances in Information Systems*. 1999 Sum-Fall; 30, (3,4) [p. 72-90]. doi: [10.1145/344241.344246](https://doi.org/10.1145/344241.344246). Available from: <http://portal.acm.org/citation.cfm?id=344241.344246>

Student Application Activities

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Component 10/Unit 8

Unit Title

Quality Improvement Methods

Unit Description

This unit covers Quality Improvement Methods recommended for use in the Health Care Setting. Many different approaches to quality improvement have been used in the health care arena. The workflow analysts will encounter organizations and people with experience with a multitude of proven methods and fads. Thus, an awareness of the history, methods, and tools of quality improvement is critical. This unit introduces students to these elements of QI, as well as categories of mistakes seen in these methods. It is not intended to teach the student how to use these methods and tools.

Unit Objectives

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

1. Describe strategies for quality improvement
2. Describe the role of Leadership in Quality Improvement
3. Describe the local clinic improvement capabilities
4. Describe and recommend tools for quality improvement
5. Compare and contrast the quality improvement methodologies and tools and their appropriate uses in the health care setting

Unit Topics / Lecture Titles

1. Foundations of Quality Improvement
 2. Methods for Quality Improvement
 3. Tools for performing Quality Improvement
 4. A culture of Quality Improvement
 5. Mistakes in Quality Improvement
- 8a Quality Improvement Methods
8b Quality Improvement Methods

Unit References

(All links accessible as of 3/04/12)

*Indicates this link is no longer functional.

Lecture 8a

1. Califf, R. M. (2006). Translating Clinical Trials into Practice (keynote). *Tex Heart Inst J.*, 33(2), 192-196.
2. Chang, R. Y. (1999). *Continuous Process Improvement* (Rev ed.). San Francisco, CA: Jossey-Bass Pfeiffer.
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4. Ransom, S. B., Joshi, M. S., & Nash, D. (Eds.). (2004). *The Healthcare Quality Book: Vision, Strategy, and Tools* (1 ed.). Chicago, IL: Health Administration Press.
5. *The Duke Databank for Cardiovascular Disease - Overview*. (n.d.). Retrieved February 9, 2012, from Duke Medical Center Library & Archives website:
<http://digitaldukemed.mc.duke.edu/databank/overview.html>

Lecture 8a Charts, Tables and Figures

(None in this Unit)

Lecture 8a Images

Slide 5: Dr. Eugene A Stead, Jr. [photo]. Retrieved February 09, 2012 from: http://digitaldukemed.mc.duke.edu/databank/Images/stead_eugene_thumbnail.jpg

Slide 5: Hardware Configuration [image]. Retrieved February 09, 2012 from: http://digitaldukemed.mc.duke.edu/databank/Images/hardware_configuration_1971.jpg

Slide 11: DSP-user. (2010). Plan-Do-Check-Act Deming circle, Retrieved February 8, 2012, from http://commons.wikimedia.org/wiki/File:Deming_PDCA_cycle.PNG

Lecture 8b

1. De Bono, E. (1985). *Six Thinking Hats*. Little Brown and Company.
2. *Health Care Criteria for Performance Excellence*. (n.d.). Retrieved February 23, 2012, from The National Institute of Standards and Technology (NIST) website:
http://www.nist.gov/baldrige/publications/hc_criteria.cfm
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5. *NIST, Baldrige Performance Excellence Program, The Malcolm Baldrige National Quality Improvement Act of 1987, Public Law 100-107.* (1987, August 20). Retrieved February 8, 2012, from National Institute of Standards and Technology (NIST), U.S. Department of Commerce website:
http://www.nist.gov/baldrige/about/improvement_act.cfm
6. Øvretveit, J, Quality and safety in health care, 2002
7. Ransom, S. B., Joshi, M. S., & Nash, D. (Eds.). (2004). *The Healthcare Quality Book: Vision, Strategy, and Tools* (1 ed). Chicago, IL: Health Administration Press.
8. Tague, N. R. (2004). [The Quality Toolbox](#) (2nd ed.). Milwaukee, WI: ASQ Quality Press.

Lecture 8b Charts, Tables and Figures

(None in this Unit)

Lecture 8b Images

Slide 16 – *Six Sigma DMAIC* [diagram]. Retrieved February 9, 2012 from:

URL: <http://www.orielstat.com/lean-six-sigma/six-sigma-dmaic/overview>

Slide 17 – Measuring your Success. [image]. Retrieved February 9, 2012

from WRL: <http://www.istockphoto.com/stock-photo-4185175-measuring-your-success.php?st=5efaaf5>

Unit Required Readings

(None in this Unit)

Unit Suggested Readings

1. Agency for Healthcare Research and Quality (AHRQ). [Internet] Improving healthcare quality fact sheet. Available from:
<http://www.ahrq.gov/news/qualfact.htm>
2. Wikipedia: Quality Improvement Topic [Internet] Available from:http://en.wikipedia.org/wiki/Quality_improvement
3. Califf RM. Translating clinical trials into practice. *Texas Heart Institute Journal* [Internet] 2006;33(2) 192-196. Available from:
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1524693/>
4. Varkey P, Reller KR, Roger K. Basics of quality improvement in health care. *Mayo Clinic Proceedings* [Internet]. doi: 10.4065/82.6.735. 2007 Jun; 82(6) 735-739. Available from: [http://www.mayoclinicproceedings.org/article/S0025-6196\(11\)61194-4/fulltext](http://www.mayoclinicproceedings.org/article/S0025-6196(11)61194-4/fulltext)

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5. Batalden, PB., Davidoff F. What is “quality improvement” and how can it transform healthcare? Qual Saf Health Care.[Internet] 2007;16:2-3 doi:10.1136/qshc.2006.022046 Available from: <http://qshc.bmj.com/content/16/1/2.extract>
6. Chang RY. Continuous process improvement, Richard Chang Associates. Irvine: CA, 1994.
7. Ransom SB, Joshi MS, and Nash DB. ed. The healthcare quality book: Vision, strategy, and tools. Health Administration Press: Chicago, AUPHA Press: Washington, 2005.

Student Application Activities

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- comp10_unit8_self_assess.doc
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External Resources

Institute for Health care Improvement website. Available at <http://www.ihj.org/ihj>

American Health Quality Association, <http://www.ahqa.org/>

American Society for Quality, Learn About Quality web resource. Available free from: <http://asq.org/learn-about-quality/>

Reading: Overview and Resources for Quality Improvement sections (left-hand menu selections) of the Centers for Medicare & Medicaid Services (CMS) website, Overview of Health care Quality Improvement Organizations (QIOs) <http://www.cms.gov/QualityImprovementOrgs/>

Reading: Patient Safety and Quality Improvement website, Duke University Health System: Seven Chapters on left-hand navigation menu include Overview, Introduction, Measurement Process and Outcome indicators, Methods of QI, Things QI is Not, Summative experience and Summary. Available free from: http://patientsafetyed.duhs.duke.edu/module_a/measurement/measurement.html

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Suggested Reading: Introduction to Continuous Quality Improvement
Techniques for Healthcare Process Improvement, Stratit Software Inc.
Available free from <http://www.statit.com/services/CQIOverview.pdf>

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Component 10/Unit 9

Unit Title

Leading and Facilitating Change

Unit Description

This unit, Leading and Facilitating Change, introduces the concepts of change and the impact of such change on the providers and staff within a health care facility. It enhances the understanding that workflow analysts must be sensitive to the human component as they examine and propose modifications in processes. This unit prepares the student to recognize and address common change management problems, and to work with individuals and groups to facilitate change.

Unit Objectives

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

1. Explain concerns expressed by participants in a process analysis & redesign scenario in terms of common change management concepts.
2. Propose strategies to gain acceptance of changes in work processes.
3. Create and critique a facilitation plan, including appropriate facilitation tools for a given process analysis & redesign scenario, and
4. Given a health care change management scenario, explain outcomes in terms of common change management concepts

Unit Topics / Lecture Titles

1. Change Management concepts
2. Tools for Facilitating change
3. Facilitation Planning

Unit References

(All links accessible as of 3/04/12)

Lecture 9

1. Axelrod, R. H. (2000). *Terms of engagement: Changing the way we change organizations*. San Francisco: Berrett-Koehler.

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2. Block, P. (2002). *The answer to how is yes: Acting on what matters*. San Francisco: Berrett-Koehler.
3. Block, P., & Nowlan, J. (1999). *Stewardship, Flawless Consulting: A guide to getting your expertise used*. San Francisco: Jossey-Bas/Pfeiffer.
4. Gall, J. (1978). *Systemantics: How systems really work and how they fail*. New York: Pocket.
5. Janssen, C. F. (n.d.). *About The Four Rooms of Change*. Retrieved February 29, 2012, from Quarternity The Home of Claes F Janssen website: <http://www.claesjanssen.com/four-rooms/about-the-four-rooms-of-change/index.shtml>
6. Senge, P., Kleiner, A., Roberts, C., Ross, R., & Smith, B. (1994). *The Fifth Discipline Fieldbook: Strategies and tools for building a learning organization*. New York: Crown Business.

Acknowledgement: Material used in this lecture comes from the following sources

1. Koestenbaum, P. (1991). *Leadership: The Inner Side of Greatness*. San Francisco: Jossey-Bass, Inc.
2. Senge, P., Kleiner, A., Roberts, C., Roth, G., Ross, R., Smith, B., (1999). *The Dance of Change*. New York: Doubleday

Lecture 9 Charts, Tables and Figures

(None in this Unit)

Lecture 9 Images

Slide 5: Diagram showing organizational changes. Fendt, K. Rowan-Cabarrus Community College, 2011.

Slide 6: Janssen, C. F. (n.d.). *About The Four Rooms of Change*. Retrieved February 29, 2012, from Quarternity The Home of Claes F Janssen website: <http://www.claesjanssen.com/four-rooms/about-the-four-rooms-of-change/index.shtml> and Nahm, M. Duke University, 2011.

Slide 11: Photograph of stepping stones through a garden. [Stock Photography] Retrieved from istockphoto.com/nahm001

Slide 13: Picture of a hand stretching a rubber band. [Stock Photography] Retrieved from istockphoto.com/nahm001

Slide 14: Picture of a person's hands in a "Chinese Finger Trap"[Stock Photography] Retrieved from istockphoto.com/nahm001

Slide 17: Organizational chart of employees and CEO. Fendt, K. Rowan-Cabarrus Community College, 2011.

*Indicates this link is no longer functional.

Slide 17: Image of a Steering committee reporting to the CEO. Fendt, K., Smith, C. Rowan-Cabarrus Community College, 2012.

Slide 22: Diagram showing alternating work sessions and communication events. Nahm M. Duke University, 2012.

Unit Required Readings

(None in this Unit)

Unit Suggested Readings

1. Wikipedia: Change Management [Internet]. Available from: http://en.wikipedia.org/wiki/Change_management
2. Chapman A. Change management: organizational and personal change management, process, plans, change management and business development tips [Internet] c2005. 2010. Available from: <http://www.businessballs.com/changemanagement.htm>
3. Chambers R. Fun with 21's: a sourcebook for workshop facilitators: 21 sets of 21 ways to approach participatory events. [Internet] 2000. Available from http://portals.wi.wur.nl/files/docs/ppme/Chambers_21s_workshops.pdf

Student Application Activities

comp10_unit9_activity.doc
comp10_unit9_activity_key.doc
comp10_unit9_self_assess.doc
comp10_unit9_self_assess_key.doc

External Resources

Wikipedia: Wisdom of the Crowd Topic. Available at http://en.wikipedia.org/wiki/Wisdom_of_the_crowd

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Component 10/Unit 10

Unit Title

Process Change Implementation and Evaluation

Unit Description

This Unit focuses on helping students develop skills needed to implement and evaluate the effectiveness of changes designed to improve workflow processes and the quality of care in health care facility. This Unit prepares the student to implement a process change by covering three key skill sets: 1) develop a process change plan (implementation plan), 2) communicate a process change plan, and 3) to develop an evaluation plan.

Unit Objectives

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

1. Develop a Process Change Implementation Plan for a health care facility that includes tasks to be accomplished, responsible parties for various tasks, a timeline, and the human and material resources needed
2. Identify management tracking and measurement opportunities for the process change
3. Outline elements of an evaluation plan that will help determine the success of a workflow process change implemented in a health care facility
4. Describe how the workflow analyst can help a health care facility continually improve its workflow processes, based on results of ongoing evaluations

Unit Topics / Lecture Titles

1. Common process changes
1. Implementation plan components
2. Communication for implementation
3. Common implementation problems
4. Evaluating the new process

Unit References

(All links accessible as of 1/26/2012)

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Lecture 10

(None in this unit)

Lecture 10 Charts, Tables and Figures

(None in this Unit)

Lecture10 Images

Slide 5: Map Image [Stock photography]. Available from:

http://www.istockphotography.com/na hm0001*

Slide 16: Checklist Pad Image [Stock photography]. Available from:

<http://www.istockphotography.com>

Slide 18: IT Professional Troubleshooting Image [Stock photography].

Available from: <http://www.istockphotography.com>

Slide 19: Chalkboard Image [Stock photography]. Available from:

<http://www.istockphotography.com>

Unit Required Readings

(None in this Unit)

Unit Suggested Readings

1. A systems approach to operational redesign workbook (Appendix A). Massachusetts: Masspro [cited 2010 Aug 4] Masspro, the Medicare Quality Improvement Organization for Massachusetts, under contract to CMS. [p. 71+]. Available free from <http://www.masspro.org/HIT/docs/tools/DOQIT%20WB%20f or%20WEB.pdf>
2. Varkey P, Reller KR, Roger K. Basics of quality improvement in health care. Mayo Clinic Proceedings [Internet]. doi: 10.4065/82.6.735. 2007 Jun; 82(6) 735-739. Available from: [http://www.mayoclinicproceedings.org/article/S0025-6196\(11\)61194-4/abstract](http://www.mayoclinicproceedings.org/article/S0025-6196(11)61194-4/abstract)
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Student Application Activities

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Component 10/Unit 11

Unit Title

Maintaining and Enhancing the Improvements

Unit Description

This Unit focuses on helping the student develop the skills to recognize and access changes that can be maintained, develop alternative processes and methods needed to keep the practice running if the EHR system fails and apply to these activities an understanding of health IT, meaningful use, and the challenges practice settings will encounter in achieving, sustaining and enhancing meaningful use.

Unit Objectives

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

1. Design control strategies to maintain performance of clinic processes
2. Develop and present a sustainability and continuous improvement plan for a health care setting
3. Work with practice staff to develop a set of plans to keep the practice running (to the extent necessary and practical) if the EHR system fails
4. Work with practice staff to evaluate the new processes as implemented and identify problems and changes that are needed

Unit Topics / Lecture Titles

1. Monitoring processes to maintain performance gains
2. Continuing to improve process performance
3. Contingency planning for EHR downtime
 - a. providing patient care when the EHR is down
 - b. maintaining availability of health information to providers and patients in major emergencies

11a Maintaining and Enhancing the Improvements

11b Maintaining and Enhancing the Improvements

Unit References

(All links accessible as of 1/26/2012)

*Indicates this link is no longer functional.

Lecture 11a

1. Continuous quality improvement. 2012. In American Society for Quality Glossary. Retrieved January 3, 2012, from <http://asq.org/glossary/p.html>.
2. Harrington, J. H. (1982). You can't control what you can't measure. In T. DeMarco, Controlling software projects: management, measurement and estimation (p. 3). New York: Yourdon Press.
3. In-control process. 2011. In American Society for Quality Glossary. Retrieved December 31, 2011, from <http://asq.org/glossary/p.html>.
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5. Institute on Medicine, Committee on Quality of Health Care in America. (2000). To Err is Human: Building a Safer Health System. (L. T. Kohn, J. M. Corrigan, & M. S. Donaldson, Eds.) Washington, DC: National Academy Press.
6. Kaizen. 2012. In American Society for Quality Glossary. Retrieved January 3, 2012, from <http://asq.org/glossary/p.html>.
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8. Process control. 2011. In American Society for Quality Glossary. Retrieved December 31, 2011, from <http://asq.org/glossary/p.html>.
9. Shewhart, W. A. (1931). Economic Control of Quality of Manufactured Product. ASQ Quality Press.
10. Shortell, S. M., Bennett, C. L. and Byck, G. R. (1998), Assessing the Impact of Continuous Quality Improvement on Clinical Practice: What It Will Take to Accelerate Progress. Milbank Quarterly, 76:593–624. doi:10.1111/1468-0009.00107
11. Statistical process control. 2011. In American Society for Quality Glossary. Retrieved December 31, 2011, from <http://asq.org/glossary/p.html>.
12. Thomson, W. (1883). Electrical Units of Measurement. Popular Lectures , 73.

Lecture 11a Charts, Tables and Figures

11.1 Chart: Penfield, Daniel. 2007. Control Chart. [Public domain]
Retrieved 2011 from <http://en.wikipedia.org/wiki/File:ControlChart.svg>

*Indicates this link is no longer functional.

Lecture 11a Images

(None in this unit)

Lecture 11b

(None in this unit)

Lecture 11b Charts, Tables and Figures

(None in this unit)

Lecture 11b Images

Slide 4: Ikeda, Masaki. 2008. Lightening at Saitama [Creative Commons]. Retrieved 201d from

http://commons.wikimedia.org/wiki/File:Thunder_at_Saitama.jpg

Slide 4: Pedneault, Sylvain. 2006. A fire in Massueville [Creative Commons]. Retrieved 201dfrom

<http://en.wikipedia.org/wiki/File:FirePhotography.jpg>

Slide 4: Tegtmeier, Steve. Union City Oklahoma [Creative Commons].

Retrieved 2012 from <http://commons.wikimedia.org/>

Slide 8: FEMA Community Relations Team (CR) in a meeting in Georgia.

[Public domain] Retrieved 2012 from <http://commons.wikimedia.org>

Unit Required Readings

(None in this unit)

Unit Suggested Readings

1. Melum, MM. [How to make CQI work for you - continuous quality improvement of health care](#). Physician Executive. FindArticles.com. Available from: http://findarticles.com/p/articles/mi_m0843/is_n6_v17/ai_11647230/
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3. Developing a contingency plan for ehr downtime and data loss [Internet] Center for Health IT at AAFP. Available from: <http://www.centerforhit.org/online/chit/home/cme-learn/tutorials/networking/network201/contingency.html>
4. Fahrenholz, CG, Smith, LJ; Tucker, K, Warner, D. Plan B: A practical approach to downtime planning in medical practices. Journal of AHIMA. 2009 Nov-Dec;80:(11) 34-38. Available from: http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1_045486.hcsp?dDocName=bok1_045486

*Indicates this link is no longer functional.

5. Mohammed, MA, Worthington, P, Woodall, WH. Plotting basic control charts: tutorial notes for health care practitioners. Qual Saf Health Care. 2008 Apr;17(2):137-45.
6. Erratum in: Qual Saf Health Care. 2009 Feb;18(1):80.

Student Application Activities

comp10_unit11_activity.doc
comp10_unit11_activity_key.doc
comp10_unit11_self_assess.doc
comp10_unit11_self_assess_key.doc

External Resources

Todd Smith podcast on measurement, available from <http://www.littlethingsmatter.com/blog/2010/08/23/You-Cant-Improve-What-you-Dont-Measure/>, You Can't Improve What You Don't Measure. Posted August 23rd 2010. This 6 minute 17 second podcast is accompanied by a written transcript. It is from a commercial source and is posted on a website marketing Todd Smith's latest book.

On-line one page summary of Dr. Walter A. Shewhart. American Society for Quality website. Accessed December 31, 2011. Available from http://asq.org/about-asq/who-we-are/bio_shewhart.html

On-line Deming Funnel Experiment Simulator. Available on a commercial website through a free trial. <http://www.symphonytech.com/funnelexp.htm>

YouTube video of the Deming Funnel Experiment being conducted, followed by discussion and summary. This is a 4 minute and 56 second publically available video posted by Rumba Training Ltd. a commercial source. Accessed January 1, 2012, available from <http://www.youtube.com/watch?v=9Z3o64FAtvA>

YouTube video, W. Edwards Deming Part 1. A 9 minute and 53 second publically available video about the work of Dr. Deming. Accessed January 1, 2012, available from <http://www.youtube.com/watch?v=GHvnlm9UEoQ>

YouTube video, W. Edwards Deming Part 2. An 8 minute and 52 second publically available video about the work of Dr. Deming,

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Accessed January 1, 2012, available from <http://www.youtube.com/watch?NR=1&feature=endscreen&v=mKFGj8sK5R8>

YouTube video, W. Edwards Deming Part 3. A 9 minute and 45 second publically available video about the work of Dr. Deming, Accessed January 1, 2012, Available from <http://www.youtube.com/watch?v=6WeTaLRb-Bs&feature=related>

*Indicates this link is no longer functional.

Component Acronym Glossary

DCHI Acronym Guide (January 2011)

Acronym	Name
AAFP	American Academy of Family Physicians
ABIM	American Board of Internal Medicine
ACK	Acknowledgment (Data networks)
ACLs	Access Control Lists
ACM	Association for Computing Machinery
ACMI	American College of Medical Informatics
ACR	American College of Radiology
ADaM	Analysis Data Model (ADaM)
ADA	American Dental Association
ADEs	Adverse Drug Events
ADR	Adverse Drug Reaction
ADT	Admissions, Discharge, Transfer
AHIC	American Health Information Community
AHIMA	American Health Information Management Association
AHIP	America's Health Insurance Plans
AHRQ	Agency for Healthcare Research and Quality
AM	Amplitude Modulation
AMA	American Medical Association
AMIA	American Medical Informatics Association
ANSI	American National Standards Institute
API	Application Programming Interfaces
ARRA	American Recovery and Reinvestment Act
ASC X12	Accredited Standards Committee
ASTM	American Society for Testing And Materials
ASQ	American Society for Quality
ATA	American Telemedicine Association
ATCB	Authorized Testing and Certification Bodies
ATM	Asynchronous Transfer Mode

AUP	Acceptable Use Policy
BCMA	Bar Code Medication Administration
BCP	Business Continuity Planning
BIS	Bispectral Index
BMI	Body Mass Index
bps	Bits Per Second
BRIDG	Biomedical Research Integrated Domain Group
BSA	Body Surface Area
BSLM	Bioinformatic Sequence Markup Language
CA	Certificate Authority
CaDSR	Cancer Data Standard Repository
CAP	College of American Pathologists
CBA	Cabarrus Health Alliance
CCD	Continuity of Care Document
CCHIT	Certification Commission for Healthcare Information Technology
CCOW	Clinical Context Object Workgroup (HL7)
CCR	Continuity of Care Record
CDA	Clinical Document Architecture
CDASH	Clinical Data Acquisition Standards Harmonization
CDC	Centers for Disease Control and Prevention
CDE	Common Data Elements
CDISC	Clinical Data Interchange Standards Consortium
CDM	Chronic Disease Management
CDS	Clinical Decision Support
CDSR	Cochrane Database of Systematic Reviews
CDSS	Clinical Decision Support System
CEN	European Committee for Standardization
CG	Clinical Genomics
CHF	Congestive Heart Failure
CHI	Consumer Health Informatics
CICA	Context Inspired Component Architecture

CIS	Clinical Information System
CMET	Common Message Element Type
CMM	Capability Maturity Model
CMMI	Capability Maturity Model Integration
CMS	Centers for Medicare and Medicaid Services
COPD	Chronic Obstructive Pulmonary Disease
COTS	Commercial Off-the-Shelf
CPM	Common Product Model
CPOE	Computerized Provider Order Entry
CPT	Current Procedural Terminology
CQI	Consumer Quality Initiatives
CRL	Certificate Revocation List
CRT	Cathode Ray Tube
CSI	Computable Semantic Interoperability
CSMA/CA	Carrier Sense Multiple Access/Collision Avoidance
CSMA/CD	Carrier Sense Multiple Access / Collision Detection
CT	Computed Tomography
CTA	Center for Technology and Aging
CTSA	Clinical Translational Science Act
CWM	Common Warehouse Model
DAC	Discretionary Access Control
DAM	Domain Analysis Model
DFDs	Data Flow Diagrams
DHCP	Dynamic Host Configuration Protocol
DHHS	Department of Health and Human Services
DICOM	Digital Imaging and Communications in Medicine
DMAIC	Define, Measure, Analyze, Improve, Control
DMIM	Domain Message Information Model
DNS	Domain Name Service
DoD	Department of Defense
DoS	Denial of Service
DRG	Diagnosis-related Group

DSL	Digital Subscriber Line
DSS	Decision Support System
DSTU	Draft Standard for Trial Use
DTD	Document Type Definition
DURSA	Data Use and Reciprocal Support Agreement
EA	Enterprise Architecture
EBM	Evidence Based Medicine
ECG	Electrocardiography
ED	Emergency Department
EDI	Electronic Data Interchange
EDMS	Electronic Document Management System
EEG	Electroencephalogram
EHR	Electronic Health Records
EHR-FM	Electronic Health Record-Systems Functional Model
EHR-S	Electronic Health Record-Systems
EHRVA	Electronic Health Record Vendors Association
eMAR	Medication Administration Records
EMEA	European Medicines Agency
EMI	Electromagnetic Interference
eMR	Electronic Medical Records
EMR	Electronic Medical Records/ Patient Management
EMR/PM	Electronic Protected Health Information
ePHI	Enterprise Master Patient Index
EPMI	Electronic Prescribing
E-R	Entity-Relationship
ERDs	Entity-Relationship Diagrams
eRX	Electronic Prescribing
EVS	Enterprise Vocabulary Service
FACA	Federal Advisory Committee Act
FDA	Food and Drug Administration
FDDI	Fiber Data Distributed Interface
FERPA	Family Educational Rights and Privacy Act

FM	Frequency Modulation
FMEA	Failure Mode and Effects Analysis
FTP	File Transfer Protocol
FQHC	Federally Qualified Health Center
GDSN	Global Data Synchronisation Network
GELLO	an object-oriented expression language for clinical decision support
GEM	Guideline Elements Model
GIN	Generic Incident Notification
GIS	Geographic Information System
GLIF	GuideLine Interchange Format
HCD	Human Centered Design
HCIS	Health Care Information System
HDC	Health Disparities Collaborative
HDF	Hierarchical Data Format
HHS	U.S. Department of Health and Human Services
HIE	Health Information Exchange
HIM	Health Information Management
HIMSS	Health Information and Management Systems Society
HIPAA	Health Insurance Portability and Accountability Act
HIS	Health Information System or Hospital Information Systems
HISPC	Health Information Security and Privacy Collaboration
HIT	Health Information Technology
HITECH	Health Information Technology for Economic and Clinical Health
HITPC	Health Information Technology Policy Committee
HITSC	Health Information Technology Standards Committee
HITSP	Health Information Technology Standards Panel
HL7	Health Level Seven
HMD	Hierarchical Message Descriptions
HRSA	Health Resources and Services Administration

HSSP	Healthcare Services Specification Project
HTTP	Hypertext Transfer Protocol
HW	Hardware
Hz	Hertz
IANA	Internet Assigned Numbers Authority
ICD	International Classification of Diseases
ICD-10-CM	International Classification of Diseases, 10th Revision, Clinical Modification
ICH	International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use
ICMP	Internet Control Message Protocol
ICPC	International Classification of Primary Care
ICSR	Individual Case Safety Report
ICT	Information and Communication Technologies
ICU	Intensive Care Unit
IDS	Intrusion Detection System
IE	Internet Explorer
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
IG	Implementation Guide (HL7)
IHE	Integrating the Healthcare Enterprise
IHS	Indian Health Services
IHTSDO	International Health Terminology Standards Development Organisation
IIS	Internet Information Services
INR	International Normalized Ratio
IOM	Institute of Medicine
IP	Internet Protocol
IP/OP	Inpatient/Outpatient
IS	Information System

ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization
ISO/TC	International Organization for Standardization's (ISO) Technical Committee (TC) on health informatics
IT	Information Technology
ITS	Implementable Technology Specifications (HL7)
JIC	Joint Initiative Council
LAB	Laboratory Data Model
LAN	Local Area Network
LDAP	Lightweight Directory Access Protocol
Leapfrog Group	Consortium of major companies and other large private and public healthcare purchasers
LIMS	Lab Information Management System
LLC	Logical Link Control
LOINC	Logical Observation Identifiers Names and Codes
MAC	Mandatory Access Control
MAR	Medication Administration Record
MD	Medical Doctor
MDA	Model Driven Architecture
MDE	Master Data Element
MDF	Methodology Development Framework
MDM	Master Data Management
MEDCIN	System of standardized medical terminology developed by Medcomp Systems
MedDRA	Medical Dictionary for Regulatory Activities
MICR	Multipurpose Internet Mail Extensions
MIME	Magnetic Ink Character Recognition
MIS	Management Information System
MLM	Medical Logic Module
MLLP	Minimal Lower Layer Protocol
MMA	Medicare Prescription Drug, Improvement, and Modernization Act or Medicare Modernization Act

MMIS	Medicaid Management Information System
MOTS	Modifiable Off-the-Shelf
MPI	Master Patient Index
MSH	Message Header Segment
MU	Meaningful Use
NAHIT	National Alliance for Health Information Technology
NAT	Network Address Translation
NCPDP	National Council for Prescription Drug Programs
NCI	National Cancer Institute
NCI-CBIIT	National Committee on Vital Health Statistics
NCVHS	National Cancer Institute Center for Bioinformatics and Information Technology
NDC	National Drug Codes
NDF	National Drug File
NDF-RT	National Drug File-Reference Terminology
NEMA	National Electrical Manufacturers Association
NEDSS	National Electronic Disease Surveillance System
NETSS	National Electronic Telecommunications System for Surveillance
NetBUI	NetBios Extended User Interface
NGC	National Guideline Clearinghouse
NHIMG	National Health Information Management Group
NIC	Network Interface Cards
NIH	National Institutes of Health
NIST	National Institute for Standards and Technology
NIST-ATL	National Institute for Standards and Technology-Advanced Technology Laboratories
NHIN	Nationwide Health Information Network
NLB	Network Load Balancing
NLM	National Library of Medicine
NPI	National Provider Identifier
NRZ	Non Return to Zero

NTFS	New Technology File System
NQF	National Quality Forum
OASIS	Organization for the Advancement of Structured Information Standards
OCC	Office of Care Coordination
OCL	Object Constraint Language
OCR	Office of Civil Rights
ODM	Operational Data Model or Optical Character Recognition
OID	Object Identifier
OLAP	Online Analytical Processing
OMG	Object Management Group
ONC	Office of the National Coordinator for Health Information Technology
ONC-ATCB	Office of the National Coordinator Authorized Testing and Certification Body
OOD	Operating Room
OR	Object Oriented Design
OS	Operating System
OSI	Open Systems Interconnection
OTP	One-Time Passwords
OUI	Organizational Unique Identifier
OWL	Web Ontology Language
PACS	Picture Archiving and Communication Systems
PBMS	Pharmacy Benefit Managers
PCI	Peripheral Component Interconnect
PCT	Primary Care Trust
PDAs	Portable Digital Assistants or Personal Digital Assistants
PDCA	Plan–Do–Check–Act
PDSA	Plan-Do-Study-Act
PDUs	Protocol Data Units
PHDSC	Public Health Data Standards Consortium

PHER	Public Health Emergency Response
PHI	Protected Health Information
PHII	Personal Health Record
PHR	Pubic Health Informatics Institute
PHR-FM	Personal Health Record-Functional Model
PIC	Process Improvement Committee (HL7)
PIX	Patient Identifier Cross-Referencing
PKI	Public Key Infrastructure
PM	Project Management
PMH	Past Medical History
PMI	Patient Master Index
PMS	Practice Management System
POP	Post Office Protocol
PPP	Point-to-Point Protocol
QAP	Quality Assurance Project
QFD	Quality Function Deployment
QI	Quality Improvement
RA	Registration Authority
R-ADT	Reservation/Registration-Admission, Discharge, Transfer
RAID	Redundant Array of Independent Disks
RAM	Random Access Memory
RBAC	Role Based Access Control
RCRIM	Regulated Clinical Research Information Management
RELMA	Regenstrief LOINC Mapping Assistant
RF	Radio Frequency
RFI	Radio Frequency Interference
RFID	Radio Frequency Identifiers
RFP	Request For Proposal
RHIOs	Regional Health Information Organizations
RIM	Reference Information Model
RIS	Radiology Information Systems

RMIM	Refined Message Information Model
RMPI	Registry Master Patient Index
ROI	Return On Investment
RPM	Remote Patient Monitoring
RPS	Regulated Product Submission
RSNA	Radiological Society of North America
RX	Prescription
SAEAF	Services-Aware Enterprise Architecture Framework
SAIF	Services Aware Interoperability Framework
SAN	Storage Area Network
SATA	Serial Advanced Technology Attachment
SCO	SDO Charter Organization
SCSI	Small Computer System Interface
SDLC	Software Development Life Cycle
SDM	Systems Development Method
SDO	Standard Development Organization
SDTM	Study Data Tabulation Model
SEI	Subject Matter Expert
SME	Software Engineering Institute
SMTP	Simple Mail Transport Protocol
SNOMED	Systematized Nomenclature of Medicine
SNOMED CT	Systematized Nomenclature of Medicine--Clinical Terms
SNOMED RT	Systematized Nomenclature of Medicine--Reference Terminology
SNOP	Systematized Nomenclature of Pathology
SOA	Service Oriented Architecture
SOAP	Simple Object Application Protocol
SOP	Structured Product Labeling
SPC	Statistical Process Control
SPL	Standard Operating Procedure
SSA	Social Security Administration

SSID	Service Set Identifier
SSL	Secure Socket Layer
SSN	Social Security Number
SSO	Single Sign-On
STP	Shielded Twisted-Pair
TCP/IP	Transmission Control Protocol / Internet Protocol
TEPR	Toward an Electronic Patient Record Conference
TLS	Transport Layer Security
TOC	Table of Contents
TP	Twisted-Pair
TPS	Transaction Processing System
TSC	HL7 Technical Steering Committee
TTL	Time to Live
UAT	User Acceptance Testing
UDP	User Datagram Protocol
UML	Uniform Modeling Language
UMLS	Unified Medical Language System
URLs	Universal Resources Locators
UPI	Unique Patient Identifier
UPS	Un-interrupted power supply
US	Ultrasound
USB	Universal Serial Bus
US TAG	U.S. Technical Advisory Group
UTP	Unshielded Twisted-Pair
VA	Veterans Administration
VA_NDF-RT	Veterans Administration National Drug File-Reference Terminology
vMR	Virtual Medical Record
VPN	Virtual Private Network
VSS	Volume Shadow Copy Service
VUHID	Voluntary Universal Healthcare Identification System
VUMC	Vanderbilt University Medical Center

W3C	World Wide Web Consortium
WAN	Wide Area Network
WAP	Wireless Access Point
WHO	World Health Organization
WLAN	Wireless Local Area Network
WONCA	World Organization of National Colleges, Academies and Academic Associations of General Practitioners/ Family Physicians. (World Organization of Family Doctors)
WSDL	Web Services Description Language
WWW	World Wide Web
XDR	External Data Representation
XML	Extensible Markup Language



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Appendix 1: Narrative Clinical Workflow Scenarios

Common processes in physician practices include

- Appointment scheduling
- New patient intake
- Existing patient intake
- Exam and Patient Assessment
- Ordering Labs / receiving & communicating results
- Prescriptions
- Referrals out / in
- Diagnostic testing
- Billing

This appendix contains narrative clinical scenarios for several of the clinical processes common to private practices / primary care. These scenarios are used in the lecture examples and learning applications. When used, they should be provided as a hand-out / download for the students.

Scenario: On-line Appointment Scheduling

Patient Paul wakes up at 5:30 am for the third day in a row feeling awful, he has been nauseous and vomiting. He decides that it is time to see his primary care provider, Physician Assistant Pam, at Big City Family Practice. He remembers that they have recently added a patient portal where patients can see their clinical information and also schedule appointments.

Patient Paul grabs his laptop and finds their website. He sees a “for Patients” tab and clicks it. He enters his log-in information. A page comes up and one of the options is “Schedule an appointment”. Patient Paul enters today’s date. Three time slots with PA Pam are available and he chooses the 8:00 am time slot and submits the request. He sees a message on the screen that confirms his appointment has been added to the schedule. He logs off, sets his alarm clock for 7:00 and goes back to sleep.

Scenario: By Phone Appointment Scheduling

Patient Patty wakes up at 5:30 am for the third day in a row feeling awful, she has a roaring headache and a fever. She decides that it is time to see her primary care provider, Doctor Dan at Suburban Family Clinic. She thinks they open at 8:00 am, and sets her alarm clock for 8:00 am and goes back to sleep.

At 8:00, she awakes and finds the office phone number. Receptionist Ronald answers. Patient Patty asks Receptionist Ronald for the soonest appointment with Doctor Dan. Receptionist Ronald states that 9:30 is the earliest. Patient Patty says that 9:30 is fine. Receptionist Ronald adds her to the schedule for 9:30.

Scenario: New Patient Intake and Registration – using paper chart

Patient Peter arrives at the Suburban Family Clinic and is signed in by Receptionist Ronald. Receptionist asks Patient Peter if he has been seen at the clinic before. He says no. Receptionist Ronald asks him for his insurance information and hands him a clip board with three forms on it and asks him to complete them.

When he has completed the forms, Receptionist Ronald locates Patient Peter's record on the clinic's schedule, marks his record as "arrived", and confirms Patient Peter's contact and insurance information. Receptionist Ronald instructs Patient Peter to have a seat in the waiting room. He creates a new patient chart for him and affixes the forms that he completed in the waiting room. Receptionist Ronald finds Nurse Ned and gives him the new chart.

Nurse Ned goes to the waiting room entrance and calls Patient Peter. Nurse Ned escorts Patient Peter to the exam room, interviews him regarding symptoms and/or complaints and records into the Nurses notes form for that visit, and takes and records vital signs in the appropriate section of the form. Nurse Ned then alerts Doctor Dan that the patient is ready to be seen, by placing the chart in the box on the exam room door.

Within a few minutes, Doctor Dan takes the chart from the box on the exam room door and glances through the first page. Doctor Dan then enters the exam room where he examines Patient Peter and records findings in the notes section of the chart. During the exam, Doctor Dan determines if a prescription, procedure, lab work or a referral is required and completes the necessary paperwork if applicable. Doctor Dan provides some additional instructions to Patient Peter and concludes the visit. Finally, Doctor Dan provides the patient chart to the office staff to be re-filed. On the way out, Patient Peter pays his co-pay and concludes the office visit.

Scenario: Existing Patient Intake and Registration – paper chart

Patient Patty arrives at the clinic and is signed in by Receptionist Ronald. Receptionist Ronald locates Patient Patty's record on the clinic's schedule. He notices that she is an existing patient, and marks her record as "arrived", and confirms Patient Patty's contact and insurance information. Receptionist Ronald instructs Patient Patty to have a seat in the waiting room.

Nurse Ned sees that Patient Patty has arrived and pulls her chart from the filing room. Nurse Ned goes to the waiting room entrance and calls Patient Patty. Nurse Ned escorts Patient Patty to the exam room, interviews her regarding symptoms and/or complaints and records into the Nurses/Progress notes, and takes and records vital signs in progress notes. Nurse Ned then alerts Doctor Dan that the patient is ready to be seen.

Within a few minutes, Doctor Dan takes the chart from the box on the exam room door and glances through the first page. Doctor Dan then enters the exam room where he examines Patient Patty and records findings in the progress notes section of the chart. During the exam, Doctor Dan determines if a prescription, procedure, lab work or a referral is required and completes the necessary paperwork if applicable. Doctor Dan provides some additional instructions to Patient Patty and concludes the visit. Finally, Doctor Dan provides the patient chart to the office staff to be re-filed. On the way out, Patient Patty pays her co-pay and concludes the office visit.

Scenario: Exam and Patient Assessment –using EMR and ePrescribing

Patient Paul has a scheduled appointment with Ms. James, a Physician Assistant at Big City Family Practice, for a sore throat. Medical Assistant Allie escorts Patient Paul to the exam room, weighing him on the scale in the hall on the way. In the exam room, Medical Assistant Allie asks Mr. Smith the reason for his visit while taking his vital signs. Patient Paul states that he has had a sore throat for three days, that it has been getting worse and is really painful to swallow. Medical Assistant Allie documents Patient Paul's chief complaint and vital signs and then confirms Patient Paul's allergies and current medications before leaving the exam room.

Before entering the exam room, PA James looks over Patient Paul's chart on the computer in the hallway. She notices that his chief complaint, sore throat, has triggered a local health alert for strep throat. PA James closes the record on the hall computer, enters the exam room and asks Patient Paul about his sore throat, how long ago it started, and if Patient Paul had run a fever. PA James also asks Patient Paul if he is taking any over the counter medications for his sore throat. Patient Paul states that he has been running a high fever, 101.5 degrees F, and that he is using aspirin for the fever and throat spray and cough drops, and gargles with salt water, and he adds that it has been several years since he has had a sore throat like this. PA James listens to Patient Paul's heart and breathing then she examines his ears, nose, and throat. PA James asks if Patient Paul has had a runny nose, cough or hoarseness? Patient Paul states that he has not.

PA James tells Patient Paul that there are an unusually high number of strep cases in the community over the past month, and that based on the appearance of his throat that he may have strep throat, and that she would like to collect a sample by swabbing his throat with a q-tip and do a rapid strep test. Patient Paul agrees. PA James swabs his throat with a long cotton tipped swab, and does the test.

Five minutes later, PA James returns and tells Patient Paul that the test was positive and that she would like to start him on an antibiotic. Patient Paul readily agrees. PA James pulls his record up on the computer in the exam room, enters the rapid strep result, and asks Patient Paul if his Pharmacy is still the one on 555 Main St. Patient Paul answers affirmatively, and PA James sends the prescription electronically. PA James tells Patient Paul that the prescription will probably be ready on his way home, tells him to get some rest and to call the office if he does not feel better in three to five days or if his pain worsens.

Scenario: Ordering Labs – using an EMR

Mr. Smith arrives at the office of Doctor Jones for a scheduled appointment. He checks in as usual with the receptionist, provides money to cover his co-pay, and within 15 minutes is called back to an exam room. Once in the exam room, Nurse Adams asks his chief complaint, takes his vital signs, and confirms his medications with the medications listed in Mr. Smith's electronic chart. Mr. Smith states that the reason for his visit is that the toe nail of his right big toe has become discolored. He suspects toenail fungus, and has tried several home remedies and over the counter antifungals, but they have not helped. He wants to get rid of his toenail fungus. Nurse Adams asks him to remove his shoe and sock so that Doctor Jones can look at his toe.

Dr. Jones examines the toe and also strongly suspects toenail fungus. He is considering prescribing a new oral antifungal. He explains the available treatment options to Mr. Smith and advantages and disadvantages of each. Mr. Smith indicates interest in the oral antifungal option. Doctor Jones explains to Mr. Smith that some oral antifungals in a small percentage of patients cause liver problems, and that if Mr. Smith wants to try the medication, he needs to draw blood for a panel of liver tests before he starts the medication to make sure that his liver function is normal, and after he has taken the medicine for a while, to make sure that he is tolerating the oral antifungal. Mr. Smith agrees.

Nurse Adams prepares to draw two tubes of blood from Mr. Smith. In the phlebotomy room in the office, Nurse Adams completes a lab sample requisition form, and peels bar coded labels from the form and sticks them on the lab tubes. As each tube is filled, Nurse Adams peels a label from the sample requisition form and sticks the label on the tube. Immediately afterward, the tubes are placed in a centrifuge, and in cold storage. (the lab courier arrives every day at 4:30 and picks up the samples and requisition forms). Nurse Adams returns to the exam room and explains that someone from the office will call Mr. Smith the next day when the lab results are back. Mr. Smith thanks Nurse Adams and the office visit concludes.

Scenario: Receiving and Communicating Lab Results – using a paper chart

Every morning in Doctor Jones' practice, Big City Family Practice, Medical Assistant Grant logs onto their account with the local lab and prints lab result sheets. Basic demographic information (from the sample requisition form) for each patient is included on the lab sheet, along with the provider's name. Mr. Smith's lab results are in those available first thing in the morning. Medical Assistant Grant gives Nurse Adams the printed lab results for Mr. Smith. Nurse Adams glances through the results and sees that all of the tests are within normal clinical limits. Nurse Adams asks Medical Assistant Grant to phone Mr. Smith and let him know that the lab results are normal, and to let him know that the office will phone in a prescription for the oral antifungal to his pharmacy on record, which of course, Medical Assistant Grant will confirm while on the phone with Mr. Smith. Following the request the day before from Dr. Jones, Nurse Adams also asks Medical Assistant Grant to schedule Mr. Smith for a Follow-up appointment and blood draw in two weeks.

After calling Mr. Smith, Medical Assistant Grant files the lab results in his chart.

Scenario: Routine Prescription Re-fill – no EMR

Patty, a patient at Suburban Family Clinic, takes Benecar 20mg once a day (QD) for blood pressure control. She has taken this medicine for two years with good results. Patient Patty is a regular patient of Doctor Dan's. Patient Patty does not use the "auto refill" program at her local pharmacy. Today, she noticed that she only has a few pills left and calls Doctor Dan's office, who does not use an EMR and does not use ePrescribing.

Receptionist Ronald answers the phone. Patient Patty explains that she needs another prescription because hers has run out. Receptionist Ronald asks Patient Patty for her pharmacy information, takes a message, and gives it to Nurse Ned who works with Doctor Dan.

Nurse Ned pulls Patient Patty's chart, confirms that she is well controlled on the medication, and has been taking it for two years with good results. Nurse Ned provides the request and a report on his review of the chart to Doctor Dan in the hallway later that morning. Doctor Dan agrees and charts a re-fill.

Nurse Ned provides the chart with the re-fill indicated to Receptionist Ronald, who calls the prescription into the pharmacy.

Scenario: Referral (transfer) out from primary care – using EMR

Patient Smith arrives at Big City Family Practice, a large private practice care facility, with chest pain. Receptionist Randi is the first to see Patient Smith as he approaches the front desk to sign in for his scheduled appointment. Receptionist Randi signs Patient Smith in, and confirms his insurance and contact information on the arrival screen in the practice EMR.

Nurse Nancy sees that Patient Smith has arrived and calls him back to an exam room. In the exam room, Nurse Nancy asks Patient Smith why he came in for a visit today. Patient Smith states that he has been having chest pain on and off for the last two days, and that it is getting worse. Nurse Nancy notices that Patient Smith is sweating, clammy, and looks to be in distress. She takes his vital signs and quickly enters them into the EMR. Nurse Nancy leaves the exam room to alert Doctor David that she suspects that Patient Smith is having a heart attack, an acute condition requiring assessment in an emergency room. She returns very quickly with Doctor David, who retakes Patient Smith's vital signs and starts a 12-lead ECG. After a quick look at the ECG, Doctor David triggers immediate transport to the local hospital and he then administers two aspirin to Patient Smith.

While the ambulance is en-route, Doctor David takes another 12-Lead ECG and continues to monitor Patient Smith. Information collected during the brief office visit is made available for access by the emergency department (ED). This causes an alert to appear on the ED system that a transfer patient is en-route and that data are available for the ED Doctor Ed. ED Doctor Ed receives the alert and previews the data.

When Patient Smith arrives at the local hospital Emergency Department, a room has been assigned and the ED care team is waiting. Immediately, ED Doctor Ed assesses the patient while the care team connects Patient Smith to the ED ECG system and blood is drawn for cardiac lab tests. The 12-lead and cardiac lab tests are ordered using a standard order set in the ED provider order entry system. ECG and laboratory results are populated directly into the patient's electronic medical record. Based on elevated cardiac enzymes and ECG changes, Patient Smith is quickly taken to the cardiac catheterization lab and later admitted to the hospital.

Scenario: Referral (transfer) in to primary care – using EMR

Patient Smith has recently been hospitalized for a heart attack. He was discharged two days ago with new medications and instructions to follow-up with his primary care provider, Doctor David at Big City Family Practice within one week.

Both Big City Family Practice and the local hospital use EMRs, and are interoperable. When Patient Smith was discharged, the local hospital sent information about his hospitalization including diagnosis, procedures, medications and other discharge instructions electronically to Big City Family Practice. The EMR at Big City Family Practice associated the information with Patient Smith and appended the information to his electronic record, where it automatically triggered Big City Family Practice to call Patient Smith and schedule his one week follow-up appointment. The Big City Family Practice EMR also detected that two of the new medications prescribed by the local hospital were in the same classes as two of Smith's old medications. While on the phone with Patient Smith rescheduling, Medical Assistant Andy also confirmed that Patient Peter had discontinued use of the two old medications.

One week after discharge from the local hospital, Patient Smith arrives at Big City Family Practice for his follow-up appointment.

Scenario: Diagnostic testing – using EMR

Patient Pandora was discharged last week from Trinity Tertiary Care after a three day hospitalization for pneumonia. On her discharge, Trinity Tertiary Care sent information about her hospitalization including diagnosis, procedures, x-ray images, medications and other discharge instructions electronically to her medical home, Big City Family Practice. The discharge instructions stated that Patient Pandora should follow-up with her primary care provider in two weeks if she felt better and sooner if her symptoms worsened.

The electronic information about her hospitalization was received by the medical record at Big City Family Practice and integrated in to her electronic record. The morning after her discharge, the EMR at Big City Family Practice alerted Medical Assistant Andy to call and schedule a follow-up appointment.

Feeling somewhat better, two weeks later, Patient Pandora arrives for her follow-up appointment at Big City Family Practice. In the exam room, Nurse Nancy tells her that they would like to do an x-ray to see how the infection in her lungs is clearing. Patient Pandora agrees and follow-up x-rays are done in the office.

Doctor David is alerted when the follow-up x-rays are available in the system and compares them to the x-rays from Patient Pandora's recent hospitalization. From the comparison between the two, and an old image from a similar clear follow-up three years ago, she observes that the infection has not cleared.

Doctor David enters the exam room with this information and does a history and physical. Doctor David's findings during the respiratory assessment confirms his suspicion that Patient Pandora has not cleared the infection. After conveying this information to Patient Pandora and a short discussion, Doctor David prescribes a newer antibiotic, and tells Patient Pandora that he would like for her to return in a week and sooner if her symptoms worsen.

Scenario: Billing – using EMR

Patient Pandora has just been seen at Big City Family Practice for a pneumonia follow-up, where she had an office visit and x-rays. The office visit was scheduled through the practice EMR, and the diagnosis, entered by Doctor David following the visit is automatically coded on the record with ICD-10 code set so that Doctor David can see and confirm the code. The x-ray images in the system trigger a diagnostic testing (procedure) code on the record as well.

The codes are available in the system before Patient Pandora leaves the office. Billing Coordinator Cathy reviews the record and submits the claim for reimbursement that day.

Scenario: Initial Meeting with clinic staff

Analyst Amy has just arrived at The Internal Medicine Group (TIMG), a mid-sized practice of ten providers and thirty employees. Practice Manager Mary, the wife of the senior physician greets her and shows her to the conference room where the staff meeting is being held. Analyst Amy came to TIMG that day to initiate process analysis.

Practice Manager Mary started the meeting by introducing Analyst Amy as the person who was there to help her with selecting an EMR for the practice, and that she hoped to have it installed and running in two months. Nurse Nancy folded her arms and whispered, “here we go again” to the person sitting next to her. Doctor Dan, a long time practice member looked angrily at Practice Manager Mary and said, “we should talk about this off –line; this is the first I’ve heard of this”. He was followed by Receptionist Rachel, who said, “Oh gosh, am I going to get laid off? I can’t use a computer.”.

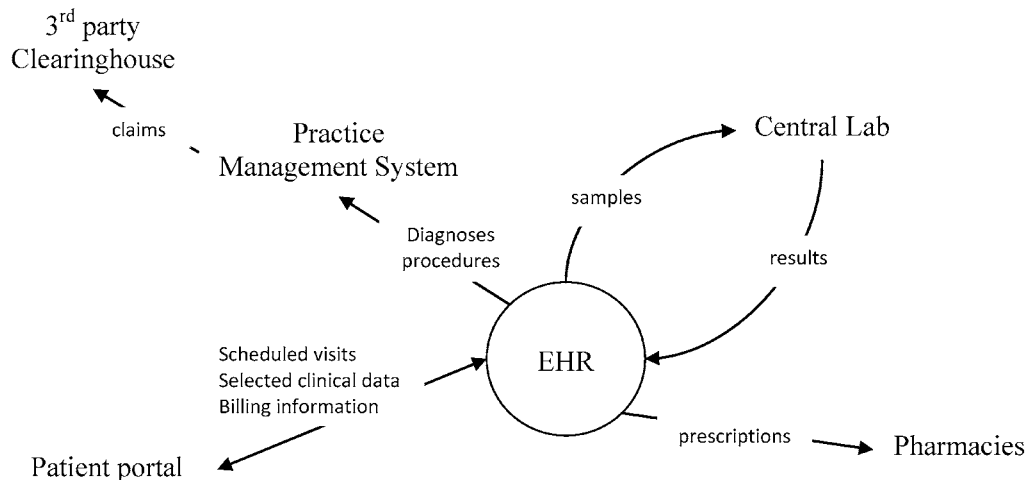
Analyst Amy felt pretty uncomfortable. Practice Manager Mary expected the response she got; many of her meetings with practice providers and staff had similar outcomes.

Scenario: Process Analysis Summary Excerpt

Analyst Amy is reading back through her notes and documents from a Process Analysis that she recently completed for Perfect Private Practice. The following is an excerpt of a process analysis summary. For the process Inventory, Amy has documented the major clinic processes and their variations, including:

- Appointment scheduling (manual but clinic wants to offer self-service web-based scheduling)
- Patient check-in
- Patient visit
- Prescriptions (manual today but clinic wants to move to ePrescribing)
- Assimilating received documentation
- Labs (clinic sends all samples to single commercial central lab)
- Referral-out to specialist
- Disease Management (Hypertension, Diabetes, CHF, and Asthma)
- Billing (practice has an existing PMS)

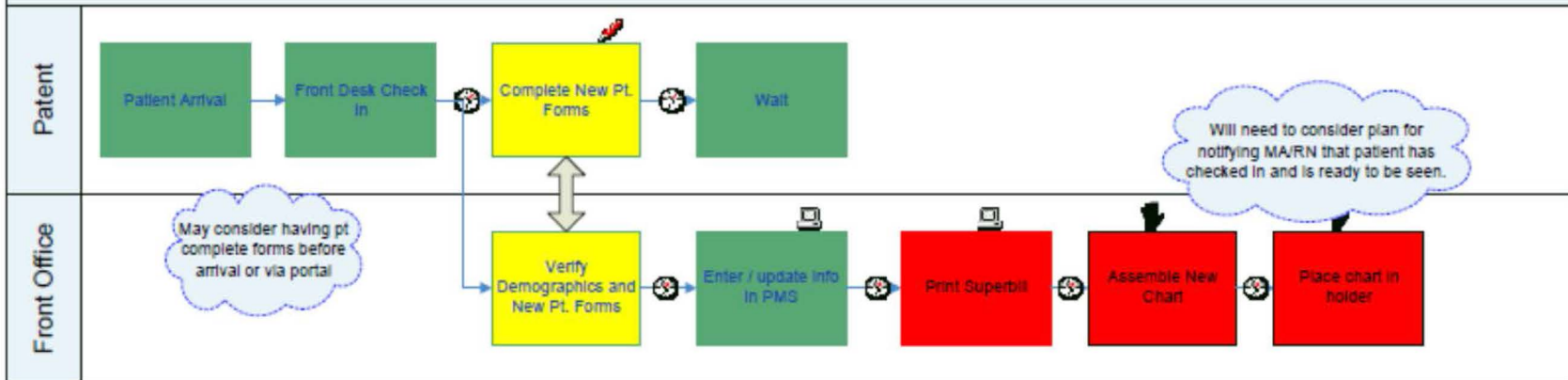
Analyst Amy's context diagram is shown below.



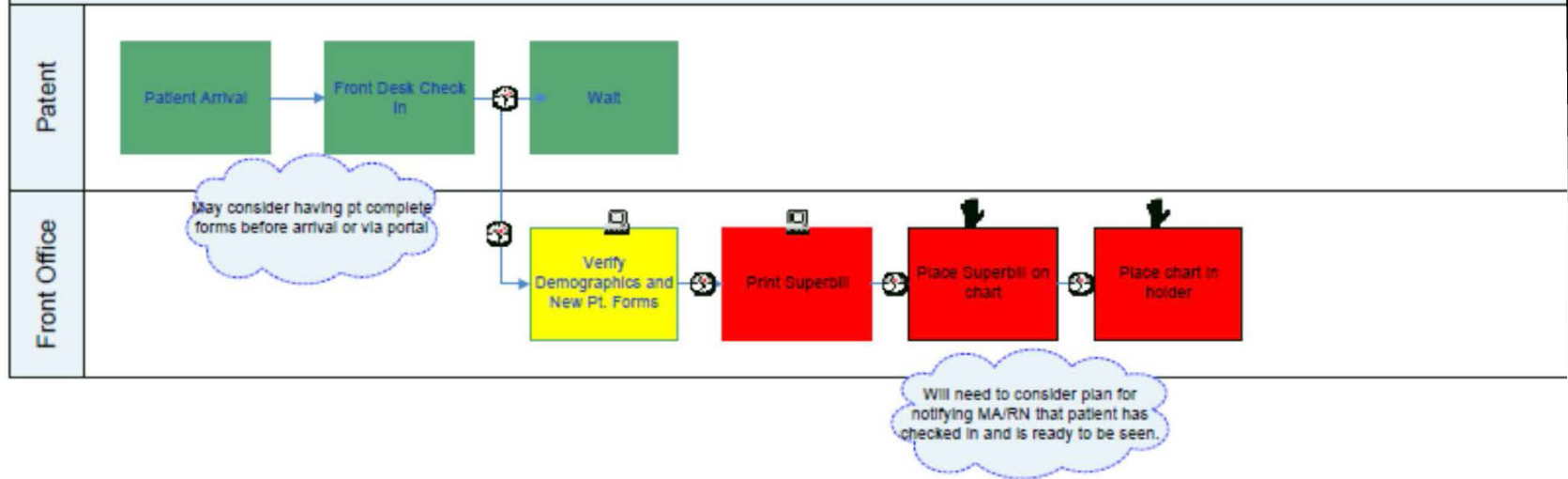
The following pages contain flowcharts for several key processes¹

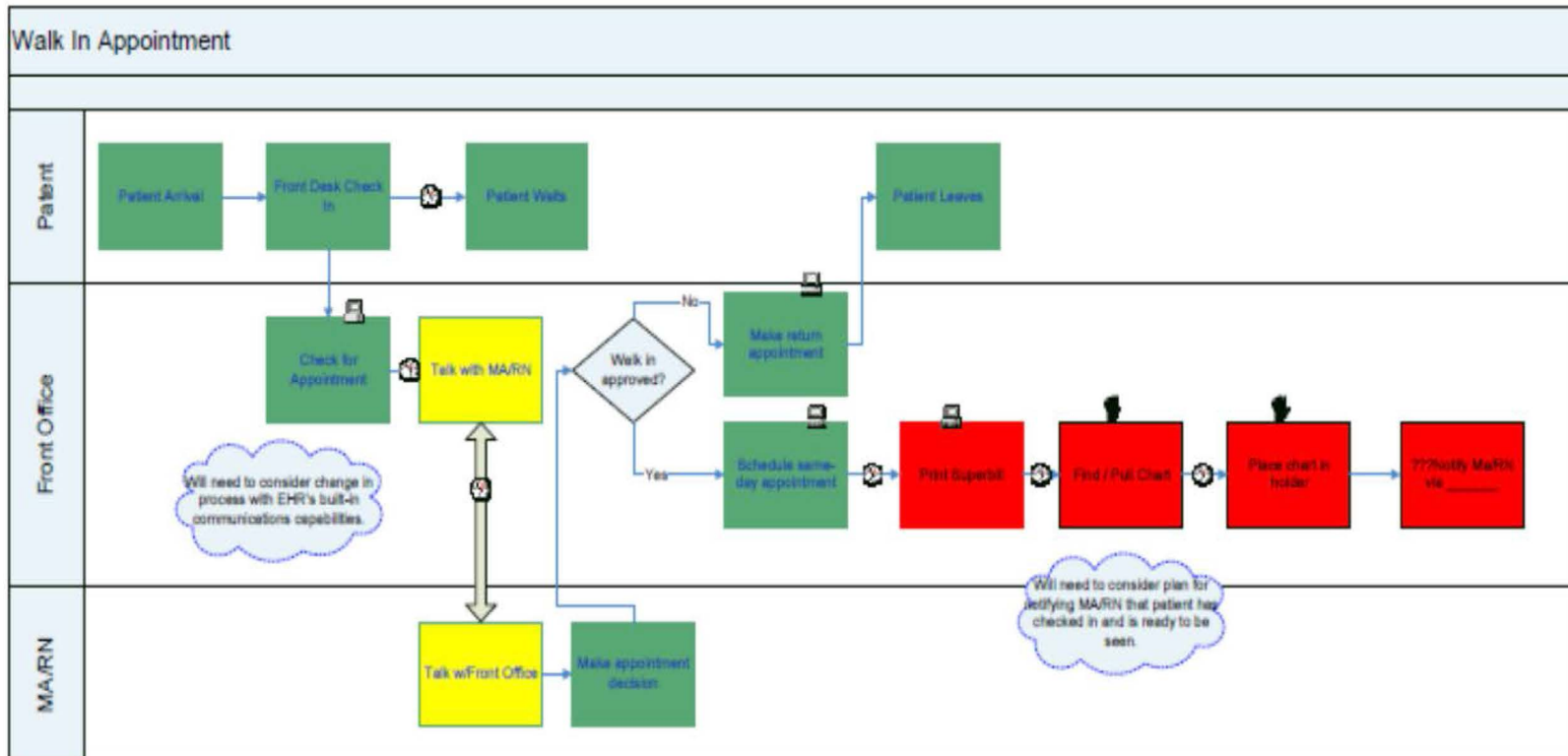
¹ Flowcharts used with permission from eQHealth Solutions (formerly Louisiana Health Care Review) and the Mississippi Regional Extension Center

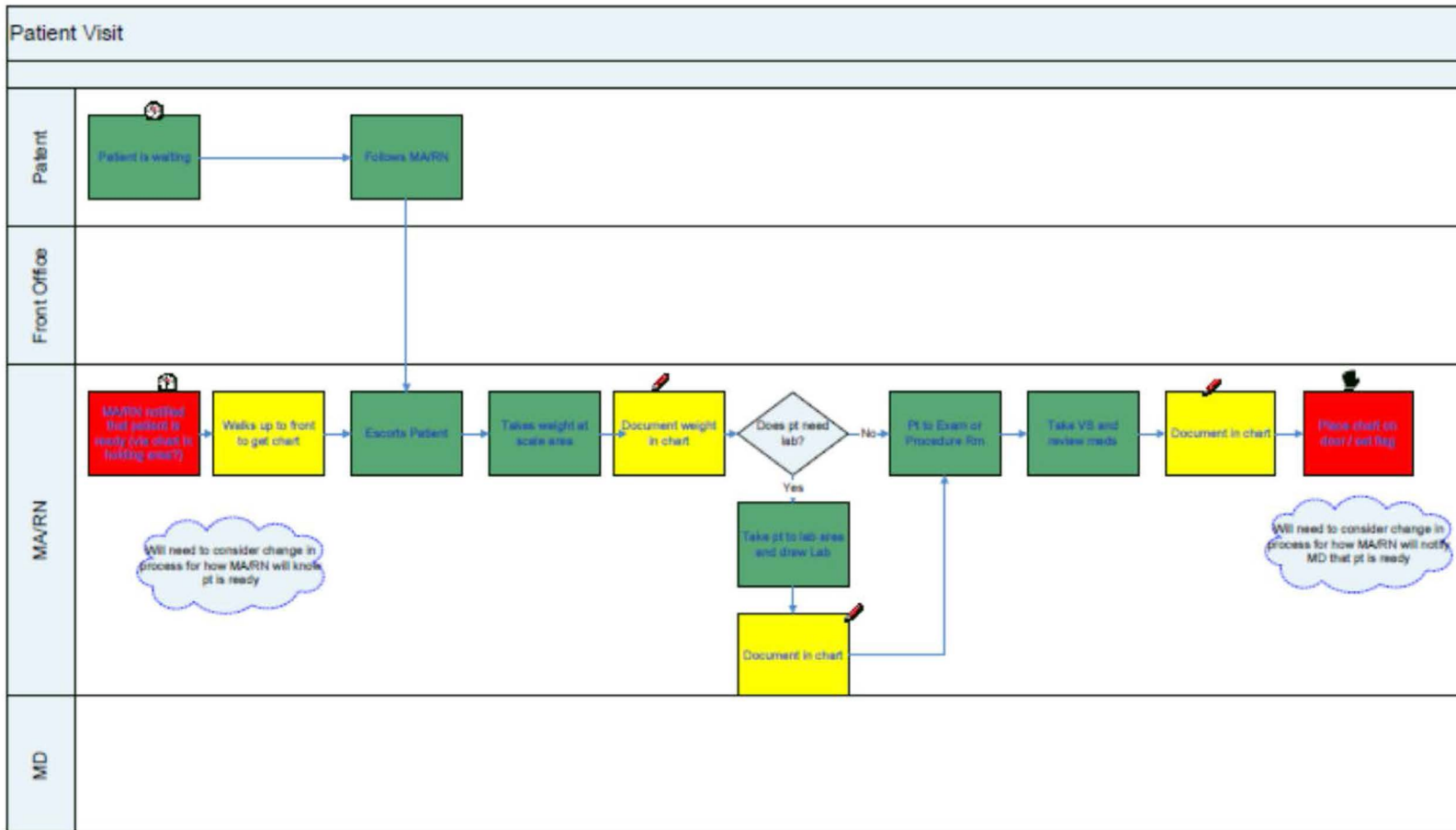
New Patient Check In

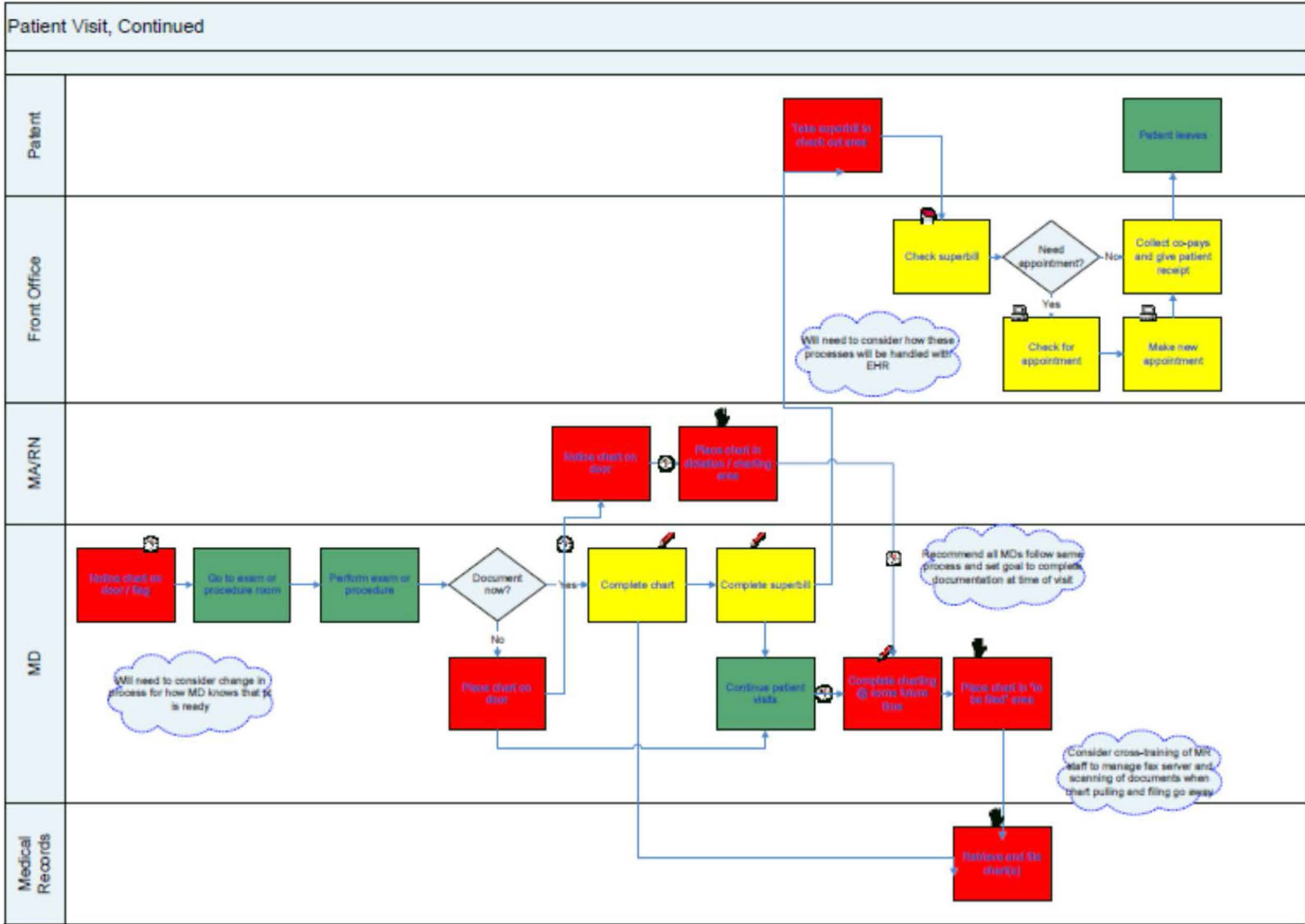


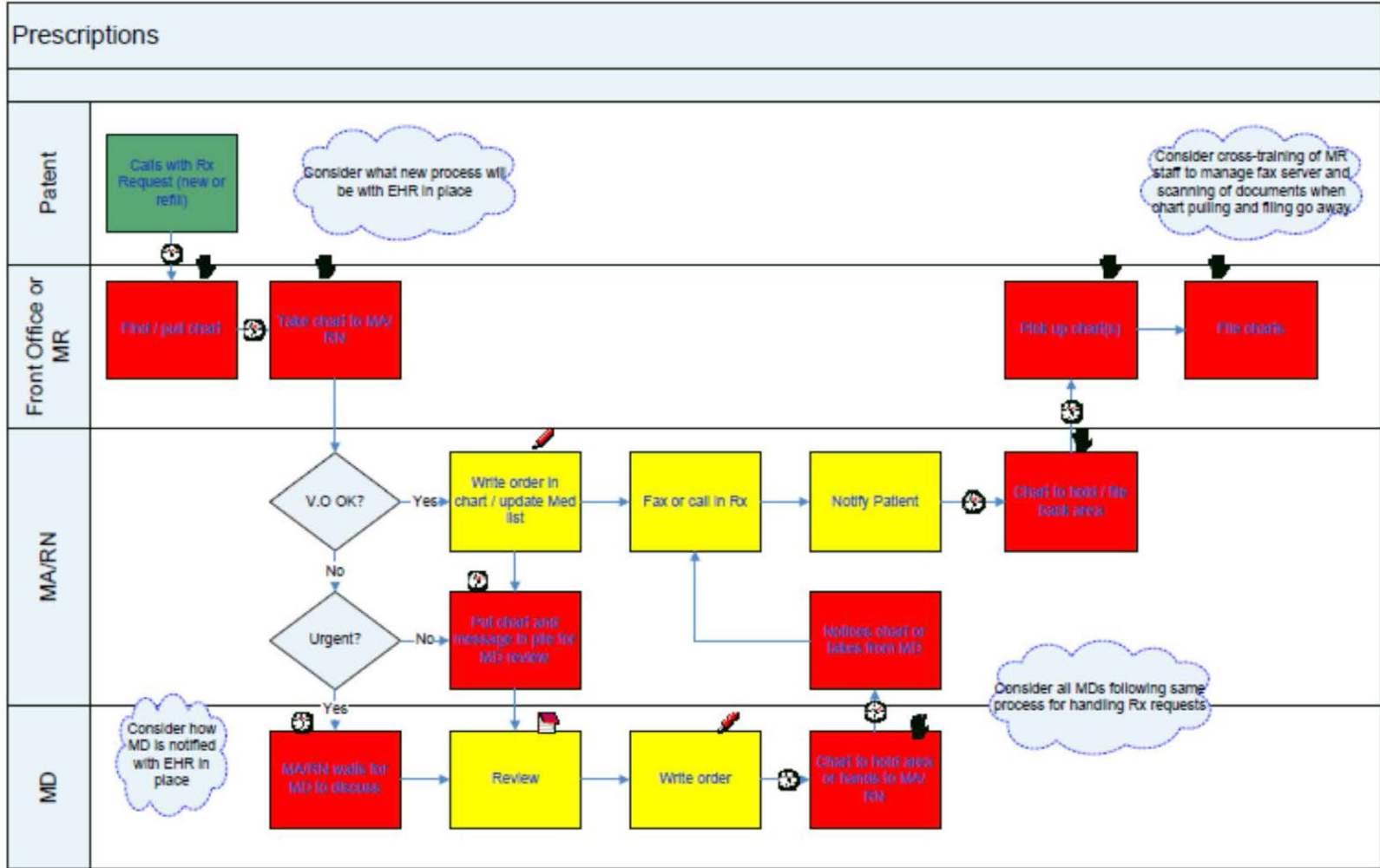
Return Patient Check In



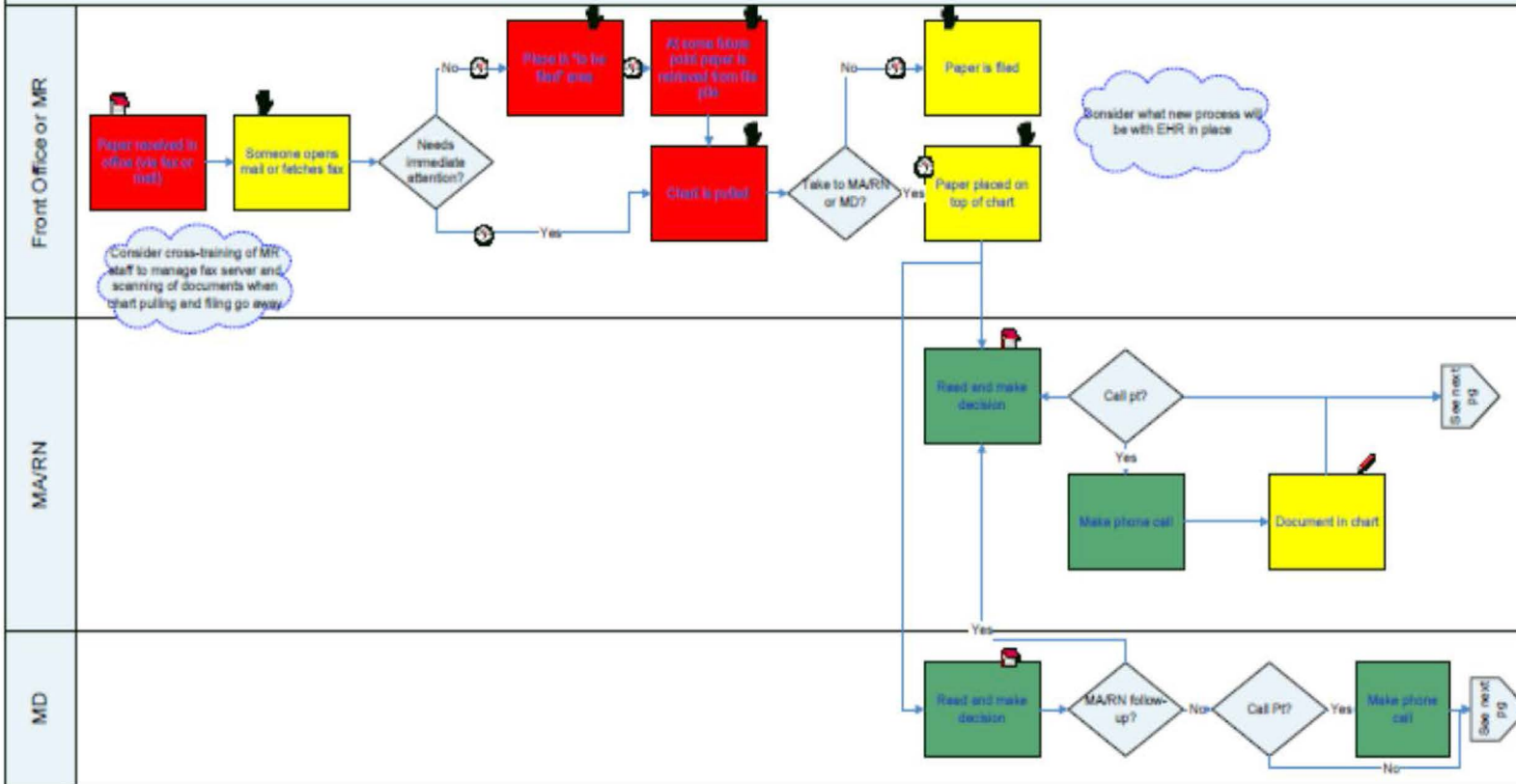








Outside Documentation Handling



Outside Documentation, Continued

