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.
Component Authors

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Disclaimer

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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

*Indicates this link is no longer functional.


*Indicates this link is no longer functional.

Lecture 1a Charts, Tables and Figures
1.1 Figure: Meaningful Use Criteria. [Public domain] Retrieved from https://www.cms.gov

Lecture 1a Images

Lecture 1b

*Indicates this link is no longer functional.

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
2. Just Enough Structured Analysis (Chapter 1) [Internet]. Available from: http://yourdon.com/strucanalysis/wiki/index.php?title=Chapter_1

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

*Indicates this link is no longer functional.
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=97v5p9Nk2I&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=HEALTHCAREMCql5ylh9VA
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=fJpQlmEVj0U&feature=channel](http://www.youtube.com/watch?v=fJpQlmEVj0U&feature=channel)
Part 2: [http://www.youtube.com/watch?v=Eee8w9VtrmE&feature=channel](http://www.youtube.com/watch?v=Eee8w9VtrmE&feature=channel)
Part 3: [http://www.youtube.com/watch?v=QYXQRA3zggM&feature=channel](http://www.youtube.com/watch?v=QYXQRA3zggM&feature=channel)
Part 4: [http://www.youtube.com/watch?v=-neNYDP1o4&feature=related](http://www.youtube.com/watch?v=-neNYDP1o4&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](http://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](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/](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](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](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/
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
   http://www.merriam-webster.com/dictionary/flowchart

*Indicates this link is no longer functional.

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


Lecture 2a Charts, Tables and Figures
(None in this Unit)

Lecture 2a Images


*Indicates this link is no longer functional.
http://commons.wikimedia.org/wiki/File:LampFlowchart.png


**Lecture 2b**

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.

**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 5: (Right) blueprint, obtained from http://commons.wikimedia.org/wiki/

Unit Required Readings
(None in this Unit)

Unit Suggested Readings
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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Student Application Activities
comp10_unit2_activity.doc
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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*

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/process_mapping_-_an_overview.html
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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Health IT Workforce Curriculum
Fundamentals of Health Workflow
Process Analysis and Redesign
Version 3.0/Spring 2012

This material was developed by Duke University, funded by the Department of Health and Human Services, Office of the National Coordinator for Health Information Technology under Award Number IU24OC000024
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

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

*Indicates this link is no longer functional.
Lecture 3c

Lecture 3c Charts, Tables and Figures

Lecture 3c Images

Lecture 3d

*Indicates this link is no longer functional.
Lecture 3d Charts, Tables and Figures

Lecture 3d Images

Lecture 3e
   Database: A Quarterly Newsletter of SIGBDP, 1(2), 4-10.
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

*Indicates this link is no longer functional.
Lecture 3f

Lecture 3f Charts, Tables and Figures

Lecture 3f Images

Unit Required Readings
( None in this unit)

Unit Suggested Readings

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Student Application Activities
comp10_unit3_activity.doc
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comp10_unit3_self_assess.doc
comp10_unit3_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.

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,
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

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

Lecture 4a Charts, Tables and Figures
(None in this Unit)

*Indicates this link is no longer functional.
Lecture 4a Images


Slide 13: Source: Meredith Nahm, PhD.

Lecture 4b
Acknowledgement: Material used in this lecture comes from the following sources


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


*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

Student Application Activities
comp10_unit4_activity.doc
comp10_unit4_activity_key.doc
comp10_unit4_self_assess.doc
comp10_unit4_self_assess_key.doc

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*


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

Lecture 5a Charts, Tables and Figures
(None in this Unit)

Lecture 5a Images

Lecture 5b
(None in this Unit)

Lecture 5b Charts, Tables and Figures
(None in this Unit)

Lecture 5b Images

Unit Required Readings
(None in this Unit)
Unit Suggested Readings


Student Application Activities

comp10_unit5_activity.doc
comp10_unit5_activity_key.doc
comp10_unit5_self_assess.doc
comp10_unit5_self_assess_key.doc

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

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


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
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
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

Lecture 6a Charts, Tables and Figures
(None in this Unit)

Lecture 6a Images

*Indicates this link is no longer functional.
Lecture 6b

Lecture 6b Charts, Tables and Figures
(No in this Unit)

Lecture 6b Images

Lecture 6c
(No in this Unit)

Lecture 6c Charts, Tables and Figures
(No in this Unit)

Lecture 6c Images
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.
Lecture 6d


*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 ttp://www.cms.gov/ehrincentiveprograms/

Lecture 6e

*Indicates this link is no longer functional.


Lecture 6e Charts, Tables and Figures
(No in this Unit)

Lecture 6e Images

Unit Required Readings
(No in this Unit)
Unit Suggested Readings


Student Application Activities
comp10_unit6_activity.doc
comp10_unit6_activity_key.doc
comp10_unit6_self_assess.doc
comp10_unit6_self_assess_key.doc

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=Ogf2vWCQhHQ

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/
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

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

Student Application Activities
comp10_unit7_activity.doc

*Indicates this link is no longer functional.*
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)
Lecture 8a


Lecture 8a Charts, Tables and Figures

(None in this Unit)

Lecture 8a Images


Lecture 8b


*Indicates this link is no longer functional.

6. Øvretveit, J. Quality and safety in health care, 2002


**Lecture 8b Charts, Tables and Figures**

(None in this Unit)

**Lecture 8b Images**


**Unit Required Readings**

(None in this Unit)

**Unit Suggested Readings**


*Indicates this link is no longer functional.*
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


**Student Application Activities**

comp10_unit8_activity.doc

comp10_unit8_activity_key.doc

comp10_unit8_self_assess.doc

comp10_unit8_self_assess_key.doc

**External Resources**

Institute for Health care Improvement website. Available at http://www.ihi.org/ihi


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/

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

*Indicates this link is no longer functional.


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


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 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.


This material was developed by Duke University, funded by the Department of Health and Human Services, Office of the National Coordinator for Health Information Technology under Award Number IU24OC000024

Unit Required Readings
(None in this Unit)

Unit Suggested Readings

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

*Indicates this link is no longer functional.

Health IT Workforce Curriculum  Fundamentals of Health Workflow
Process Analysis and Redesign
Version 3.0/Spring 2012
This material was developed by Duke University, funded by the Department of Health and Human Services, Office of the National Coordinator for Health Information Technology under Award Number IU24OC000024
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
2. Implementation plan components
3. Communication for implementation
4. Common implementation problems
5. Evaluating the new process

Unit References
(All links accessible as of 1/26/2012)
Lecture 10
(No in this unit)

Lecture 10 Charts, Tables and Figures
(No in this Unit)

Lecture 10 Images
Slide 5: Map Image [Stock photography]. Available from: http://www.istockphotography.com nahm0001*

Unit Required Readings
(No in this Unit)

Unit Suggested Readings

Student Application Activities
comp10_unit10_activity.doc
comp10_unit10_activity_key.doc
comp10_unit10_self_assess.doc
comp10_unit10_self_assess_key.doc

*Indicates this link is no longer functional.
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

Unit References
(All links accessible as of 1/26/2012)
Lecture 11a


Lecture 11a Charts, Tables and Figures


*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 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
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

*Indicates this link is no longer functional.

**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**


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](http://www.youtube.com/watch?v=9Z3o64FAtvA)


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

## Component Acronym Glossary

DCHI Acronym Guide (January 2011)

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Name</th>
</tr>
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<tbody>
<tr>
<td>AAFP</td>
<td>American Academy of Family Physicians</td>
</tr>
<tr>
<td>ABIM</td>
<td>American Board of Internal Medicine</td>
</tr>
<tr>
<td>ACK</td>
<td>Acknowledgment (Data networks)</td>
</tr>
<tr>
<td>ACLs</td>
<td>Access Control Lists</td>
</tr>
<tr>
<td>ACM</td>
<td>Association for Computing Machinery</td>
</tr>
<tr>
<td>ACMI</td>
<td>American College of Medical Informatics</td>
</tr>
<tr>
<td>ACR</td>
<td>American College of Radiology</td>
</tr>
<tr>
<td>ADaM</td>
<td>Analysis Data Model (ADaM)</td>
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<td>ADA</td>
<td>American Dental Association</td>
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<tr>
<td>ADEs</td>
<td>Adverse Drug Events</td>
</tr>
<tr>
<td>ADR</td>
<td>Adverse Drug Reaction</td>
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<td>ADT</td>
<td>Admissions, Discharge, Transfer</td>
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<td>AHIC</td>
<td>American Health Information Community</td>
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<td>AHIMA</td>
<td>American Health Information Management Association</td>
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<td>AHIP</td>
<td>America’s Health Insurance Plans</td>
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<td>AHRQ</td>
<td>Agency for Healthcare Research and Quality</td>
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<td>AM</td>
<td>Amplitude Modulation</td>
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<td>AMA</td>
<td>American Medical Association</td>
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<td>AMIA</td>
<td>American Medical Informatics Association</td>
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<td>ANSI</td>
<td>American National Standards Institute</td>
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<td>API</td>
<td>Application Programming Interfaces</td>
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<td>ARRA</td>
<td>American Recovery and Reinvestment Act</td>
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<tr>
<td>ASC X12</td>
<td>Accredited Standards Committee</td>
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<td>ASTM</td>
<td>American Society for Testing And Materials</td>
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<td>ASQ</td>
<td>American Society for Quality</td>
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<tr>
<td>ATA</td>
<td>American Telemedicine Association</td>
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<td>ATCB</td>
<td>Authorized Testing and Certification Bodies</td>
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<td>ATM</td>
<td>Asynchronous Transfer Mode</td>
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<td>Acronym</td>
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<tr>
<td>AUP</td>
<td>Acceptable Use Policy</td>
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<td>BCMA</td>
<td>Bar Code Medication Administration</td>
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<td>BCP</td>
<td>Business Continuity Planning</td>
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<td>BIS</td>
<td>Bispectral Index</td>
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<td>BMI</td>
<td>Body Mass Index</td>
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<tr>
<td>bps</td>
<td>Bits Per Second</td>
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<tr>
<td>BRIDG</td>
<td>Biomedical Research Integrated Domain Group</td>
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<tr>
<td>BSA</td>
<td>Body Surface Area</td>
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<td>BSLM</td>
<td>Bioinformatic Sequence Markup Language</td>
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<td>CA</td>
<td>Certificate Authority</td>
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<td>CaDSR</td>
<td>Cancer Data Standard Repository</td>
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<td>CAP</td>
<td>College of American Pathologists</td>
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<tr>
<td>CBA</td>
<td>Cabarrus Health Alliance</td>
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<tr>
<td>CCD</td>
<td>Continuity of Care Document</td>
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<tr>
<td>CCHIT</td>
<td>Certification Commission for Healthcare Information Technology</td>
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<td>CCOW</td>
<td>Clinical Context Object Workgroup (HL7)</td>
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<td>CCR</td>
<td>Continuity of Care Record</td>
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<tr>
<td>CDA</td>
<td>Clinical Document Architecture</td>
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<td>CDASH</td>
<td>Clinical Data Acquisition Standards Harmonization</td>
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<td>CDC</td>
<td>Centers for Disease Control and Prevention</td>
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<td>Common Data Elements</td>
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<td>CDISC</td>
<td>Clinical Data Interchange Standards Consortium</td>
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<td>CDM</td>
<td>Chronic Disease Management</td>
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<td>CDS</td>
<td>Clinical Decision Support</td>
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<td>CDSR</td>
<td>Cochrane Database of Systematic Reviews</td>
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<tr>
<td>CDSS</td>
<td>Clinical Decision Support System</td>
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<td>CEN</td>
<td>European Committee for Standardization</td>
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<td>CG</td>
<td>Clinical Genomics</td>
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<td>CHF</td>
<td>Congestive Heart Failure</td>
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<td>CHI</td>
<td>Consumer Health Informatics</td>
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<tr>
<td>CICA</td>
<td>Context Inspired Component Architecture</td>
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</table>
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
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tr>
<td>DSL</td>
<td>Digital Subscriber Line</td>
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<td>DSS</td>
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<td>Draft Standard for Trial Use</td>
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<td>DTD</td>
<td>Document Type Definition</td>
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<td>DURSA</td>
<td>Data Use and Reciprocal Support Agreement</td>
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<td>Electronic Data Interchange</td>
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<td>Electroencephalogram</td>
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<td>Enterprise Master Patient Index</td>
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<td>Enterprise Vocabulary Service</td>
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<td>FACIA</td>
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<td>Food and Drug Administration</td>
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<td>FDDI</td>
<td>Fiber Data Distributed Interface</td>
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<td>FERPA</td>
<td>Family Educational Rights and Privacy Act</td>
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<td>Acronym</td>
<td>Definition</td>
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<tr>
<td>FM</td>
<td>Frequency Modulation</td>
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<tr>
<td>FMEA</td>
<td>Failure Mode and Effects Analysis</td>
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<td>File Transfer Protocol</td>
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<td>FQHC</td>
<td>Federally Qualified Health Center</td>
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<td>an object-oriented expression language for clinical decision support</td>
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<td>GIN</td>
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<td>GLIF</td>
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<td>ICPC</td>
<td>International Classification of Primary Care</td>
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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 Medicomp 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
<table>
<thead>
<tr>
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<td>Modifiable Off-the-Shelf</td>
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<td>MPI</td>
<td>Master Patient Index</td>
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<td>MSH</td>
<td>Message Header Segment</td>
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<tr>
<td>MU</td>
<td>Meaningful Use</td>
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<td>NAHIT</td>
<td>National Alliance for Health Information Technology</td>
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<td>NCPDP</td>
<td>National Council for Prescription Drug Programs</td>
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<td>National Cancer Institute</td>
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<td>NCI-CBIIT</td>
<td>National Committee on Vital Health Statistics</td>
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<td>NCVHS</td>
<td>National Cancer Institute Center for Bioinformatics and Information Technology</td>
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<td>National Drug File</td>
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<td>NDF-RT</td>
<td>National Drug File-Reference Terminology</td>
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<td>National Electrical Manufacturers Association</td>
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<td>National Electronic Disease Surveillance System</td>
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<td>NETSS</td>
<td>National Electronic Telecommunications System for Surveillance</td>
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<td>NetBUI</td>
<td>NetBios Extended User Interface</td>
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<td>National Health Information Management Group</td>
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<td>NPI</td>
<td>National Provider Identifier</td>
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<td>NRZ</td>
<td>Non Return to Zero</td>
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<td>NTFS</td>
<td>New Technology File System</td>
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<td>National Quality Forum</td>
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<td>OASIS</td>
<td>Organization for the Advancement of Structured Information Standards</td>
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<td>Office of Care Coordination</td>
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<td>OCL</td>
<td>Object Constraint Language</td>
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<td>Office of Civil Rights</td>
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<td>ODM</td>
<td>Operational Data Model or Optical Character Recognition</td>
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<td>OID</td>
<td>Object Identifier</td>
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<td>OLAP</td>
<td>Online Analytical Processing</td>
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<td>OMG</td>
<td>Object Management Group</td>
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<td>Office of the National Coordinator for Health Information Technology</td>
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<td>ONC-ATCB</td>
<td>Office of the National Coordinator Authorized Testing and Certification Body</td>
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<td>OOD</td>
<td>Operating Room</td>
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<tr>
<td>OR</td>
<td>Object Oriented Design</td>
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<tr>
<td>OS</td>
<td>Operating System</td>
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<tr>
<td>OSI</td>
<td>Open Systems Interconnection</td>
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<td>OTP</td>
<td>One-Time Passwords</td>
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<td>OUI</td>
<td>Organizational Unique Identifier</td>
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<td>OWL</td>
<td>Web Ontology Language</td>
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<td>PACS</td>
<td>Picture Archiving and Communication Systems</td>
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<td>Pharmacy Benefit Managers</td>
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<tr>
<td>PCI</td>
<td>Peripheral Component Interconnect</td>
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<td>Primary Care Trust</td>
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<td>PDAs</td>
<td>Portable Digital Assistants or Personal Digital Assistants</td>
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<tr>
<td>PDCA</td>
<td>Plan–Do–Check–Act</td>
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<td>PDSA</td>
<td>Plan-Do-Study-Act</td>
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<td>PDU</td>
<td>Protocol Data Units</td>
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<td>PHDSC</td>
<td>Public Health Data Standards Consortium</td>
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<td>Definition</td>
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<td>RA</td>
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<td>R-ADT</td>
<td>Reservation/Registration-Admission, Discharge, Transfer</td>
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<td>RAID</td>
<td>Redundant Array of Independent Disks</td>
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<td>RAM</td>
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<td>Role Based Access Control</td>
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<td>RF</td>
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<td>Service Set Identifier</td>
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<td>TP</td>
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<td>Transaction Processing System</td>
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<td>TTL</td>
<td>Time to Live</td>
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<td>Unique Patient Identifier</td>
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<td>Un-interrupted power supply</td>
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<td>Ultrasound</td>
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<td>Universal Serial Bus</td>
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<td>Virtual Medical Record</td>
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<td>Virtual Private Network</td>
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<td>W3C</td>
<td>World Wide Web Consortium</td>
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<td>Wide Area Network</td>
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<td>World Health Organization</td>
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<td>WONCA</td>
<td>World Organization of National Colleges, Academies and Academic Associations of General Practitioners/Family Physicians. (World Organization of Family Doctors)</td>
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<td>Web Services Description Language</td>
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<td>World Wide Web</td>
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<td>XDR</td>
<td>External Data Representation</td>
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<td>XML</td>
<td>Extensible Markup Language</td>
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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 Pandra 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 Pandra 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 into 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 Pandra 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 Pandra 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 Pandra’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 confirm his suspicion that Patient Pandra has not cleared the infection. After conveying this information to Patient Pandra and a short discussion, Doctor David prescribes a newer antibiotic, and tells Patient Pandra that he would like for her to return in a week and sooner if her symptoms worsen.
Scenario: Billing – using EMR
Patient Pandra 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 Pandra 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 processes.

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

- Patient Arrival
- Front Desk Check In
- Wait

Front Office

- May consider having pt complete forms before arrival or via portal
- Verify Demographics and New Pt. Forms
- Print Superbill
- Place Superbill on chart
- Place chart in folder

Will need to consider plan for notifying MA/RN that patient has checked in and is ready to be seen.
Walk In Appointment

Patient Arrival → Front Desk Check In → Patient Walls → Patient Leaves

Front Office

Check for Appointment → Talk with MA/RN

Walk in approved? → Yes

Schedule same-day appointment → Print Superbill, Print Info Chart, Place chart in folder

No

Make return appointment → Talk with MA/RN → Make appointment decision

Will need to consider change in process with EMR's built-in communications capabilities.

MA/RN

Talk with Front Office → Make appointment decision

Will need to consider plan to notify MA/RN that patient has checked in and is ready to be seen.
Outside Documentation, Continued

Review chart & message \rightarrow Call patient \rightarrow Make appointment or whatever is needed \rightarrow Close chart in file \rightarrow File out

Front Office or MR

Need Front Office to call pt? Yes

Document in chart \rightarrow Place chart in file

MA/RN

No

Consider cross-training staff to manage fax and scanning of document chart pulling and filing

Outside Documentation, Continued

Document in chart \rightarrow Place chart in file

MD