



Topic: Clinical Decision Making  
and Care Process Improvement



## Clinical Workflow Analysis And Process Redesign

Diane Montella, MD  
Office of Informatics and Analytics  
US Department of Veterans Affairs

Click [HERE](#) to download this audio recording in a new window.  
The downloaded file is playable on all devices. Note: Large files may take longer to download.

NEXT >

# Core Competencies Covered

## 1. Fundamentals

- 1.1. Clinical Informatics
  - 1.1.1. The discipline of informatics
  - 1.1.2. Key informatics concepts, models, theories
  - 1.1.3. Clinical informatics literature
  - 1.1.4. International clinical informatics practices
  - 1.1.5. Ethics and professionalism
  - 1.1.6. Legal and regulatory issues
- 1.2. The Health System
  - 1.2.1. Determinants of individual and population health
  - 1.2.2. Primary domains, organizational structures, cultures, and processes
  - 1.2.3. The flow of data, information, and knowledge within the health system
  - 1.2.4. Policy & regulatory framework
  - 1.2.5. Health economics and financing
  - 1.2.6. Forces shaping health care delivery
  - 1.2.7. Institute of Medicine quality components

## 2. Clinical Decision Making and Care Process

### 2.3. Clinical Workflow Analysis, Process Redesign, and Quality Improvement

#### 2.3.1 Methods of Workflow Analysis

#### 2.3.2 Principles of Workflow Re-engineering

- 2.2.4. Implementation of guidelines clinical algorithms
- 2.2.5. Information retrieval analysis
- 2.3. Clinical Workflow Analysis, Process Redesign, and Quality Improvement
- 2.3.1. Methods of workflow analysis
- 2.3.2. Principles of workflow re-engineering
- 2.3.3. Quality improvement principles and practices

## 3. Health Information Systems

- 3.1. Information Technology Systems
  - 3.1.1. Computer Systems
  - 3.1.2. Architecture
  - 3.1.3. Networks
  - 3.1.4. Security
  - 3.1.5. Data
  - 3.1.6. Technical approaches that enable sharing data
- 3.2. Human Factors Engineering
  - 3.2.1. Models, theories, and practices of human-computer (machine) interaction (HCI)
  - 3.2.2. HCI Evaluation, usability testing, study design and methods
  - 3.2.3. Interface design standards and design principles
  - 3.2.4. Usability engineering
- 3.3. Health Information Systems and Applications
  - 3.3.1. Types of functions offered by systems
  - 3.3.2. Types of settings where systems are used
  - 3.3.3. Electronic health/medical records systems as the foundational tool

## 4. Leading and Managing Change

- 4.1. Leadership Models, Processes, and Practices
  - 4.1.1. Dimensions of effective leadership
  - 4.1.2. Governance
  - 4.1.3. Negotiation
  - 4.1.4. Conflict management
  - 4.1.5. Collaboration
  - 4.1.6. Motivation
  - 4.1.7. Decision making
- 4.2. Effective Interdisciplinary Teams
  - 4.2.1. Human resources management
  - 4.2.2. Team productivity and effectiveness
  - 4.2.3. Group management processes
  - 4.2.4. Managing meetings
  - 4.2.5. Managing group deliberations
- 4.3. Effective Communications
  - 4.3.1. Effective presentations to groups
  - 4.3.2. Effective one-on-one communication
  - 4.3.3. Writing effectively for various audiences and goals
  - 4.3.4. Developing effective communications program to

## What Is Workflow?

- Workflow is the sequence of physical and mental tasks performed by various people within and between work environments.
- It can occur at several levels: one person; between/among people; across departments, facilities, and/or organizations.
- It can occur sequentially or simultaneously.

All of the following represent Workflow:

- People flowing through space and time
- Information (for example, stored in paper or electronic format) flowing through space and time
- Objects (for example, medications) flowing through space and time
- People flowing through space and time using Information and Objects

<http://healthit.ahrq.gov/health-it-tools-and-resources/workflow-assessment-health-it-toolkit/workflow>

## Workflow Example: Medication Ordering

The workflow of ordering a medication includes:

- Communication between provider and patient
- Clinical provider's thought process
- The physical action by the provider of writing a paper prescription, and having the patient take the prescription to the pharmacy, or the physical action by the provider of entering an electronic prescription into an electronic health record, and transmitting the order electronically

<http://healthit.ahrq.gov/health-it-tools-and-resources/workflow-assessment-health-it-toolkit/workflow>

## What Is Workflow Analysis?

- Short answer: ... an evaluation or assessment of a workflow process.
- Long answer: ... an evaluation or assessment of the mental and physical steps of a workflow process, including the order of the steps and the steps that comprise interaction among organizations (i.e., departments, facilities) involved.

## Workflow Analysis Caveat

- In Workflow Analysis, we want to understand the current actual state of workflow.
- We are not trying to assess the “ideal” workflow, or the workflow that is “supposed to be happening”.

## What Would We Analyze In Our Workflow Example: Medication Ordering

- Communication between provider and patient
  - Identify all types of communication in current use (verbal, written, relayed, telephone, secure messaging, others)
  - Analyze the steps and sequence that occur in each type of communication
- Clinical provider's thought process
  - Identify steps and sequence of steps that the provider goes through
  - Ask provider to share that information with you
- The physical action by the provider of writing a paper prescription, and having the patient take the prescription to the pharmacy, or the physical action by the provider of entering an electronic prescription into an electronic health record, and transmitting the order electronically.
  - Identify steps and sequence of steps to execute these processes, start to finish

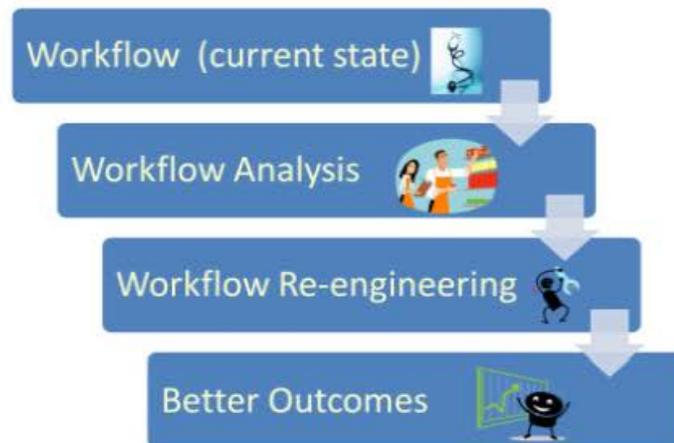
## What Is Workflow Re-Engineering?

Planned and deliberate:

- changes to the mental and physical steps of people who move through a workflow process, and
- changes to the steps in the interaction(s) among organizations (i.e., departments, facilities) involved in a workflow process,

To create workflow that supports improved (good, better, best) outcome of workflow activities (patient care delivery).

Linking the Components for Value:



## Recurring Theme

1. What is Current State?  
Current functioning, plus history that led to it
2. What is Desired Future State?
3. Make a Plan to get from current to future; carry it out
4. Did we get there?  
What are consequences (+ / - ) of being there?

Assess Current

Envision Future

Plan and Act

Evaluate Outcome

Topics:

- **Workflow Analysis & Process Re-Design**
- Effective Healthcare IT Teams
- Project Management
- Strategic Planning
- Change Management

< PREV

NEXT >

## Why Perform Workflow Analysis Specifically In Healthcare Settings?

- Workflow analysis may be used to improve outcome of healthcare processes and products, including the practice of healthcare informatics
- Institute of Medicine landmark reports have called for the use of workflow analysis as part of the effort to improve healthcare quality, efficiency, effectiveness, and safety

## This Is True, And An Understatement

“Health IT systems sometimes do not achieve their full potential due to a lack of integration of the health IT into clinical workflow in a way that supports the workflow among organizations (e.g., between a clinic and community pharmacy), within a clinic, and within a visit.”

Carayon P, Karsh BT, Cartmill R, et al. Incorporating Health IT Into Workflow Redesign: Request for Information Summary Report. AHRQ Publication No. 10-0074-EF. Rockville, MD: Agency for Healthcare Research and Quality. July 2010, p1.

<http://healthit.ahrq.gov/sites/default/files/docs/citation/workflowredesignrfi.pdf>

## Workflow Impact On Health IT And Care Quality

“Evaluations of the impact of health IT on quality and safety show mixed results... The main reasons [sic] seems to be a lack of integration of health IT into clinical workflow in a way that supports the cognitive work of the clinician and the workflows among organizations (e.g., between a clinic and community pharmacy), within a clinic and within a visit.”

Carayon P, Karsh B-T, Cartmill RS, et al. Incorporating Health Information Technology Into Workflow Redesign--Summary Report. AHRQ Publication No. 10-0098-EF. Rockville, MD: Agency for Healthcare Research and Quality. October 2010, p1.

<http://healthit.ahrq.gov/sites/default/files/docs/citation/workflowssummaryreport.pdf>

## The Study Of Work: Historical Perspective

- The study of work in the United States began with **The Scientific Management Movement**. This theory of management **analyzed workflows**. Its main objective was improving economic efficiency, especially labor productivity. It was one of the earliest attempts to apply science to the engineering of processes and to management.
- Skill sets applied to mass production in U.S. manufacturing in the early 1900s are still taught and applied today
- Example: Ford Auto Industry

## The Essence Of Workflow Analysis

- Reduce a complex process into analyzable parts
- Describe complex clinical activity by identifying its component parts in a step-wise fashion.



*Watch as Dr. Montella discusses workflow analysis.*

< PREV

NEXT >

## Workflow Analysis Benefits Healthcare by Improving Understanding of:

- Role of Technology in work
  - potential positive and negative impact of new technologies
  - unintended consequences
- Collaborative work practices
- Temporal dependencies
- Evolution of workers' roles
- Situational risk - patient and worker safety
- Related work processes that should be studied

## Principles Of Workflow Analysis

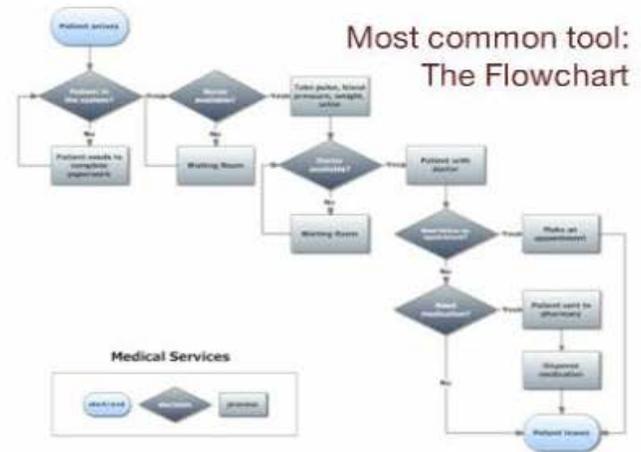
- The goals of the work being studied must be understood
- The purpose and goals of the analysis must be clear
- The analysis of workflow must relate to the work as it is actually performed

## Documenting Workflow: Types Of Flowcharts

- **High-level flowchart:** a diagram that provides a brief overview of a process, only highlighting major events in the process.
- **Detailed flowchart:** a map that marks every step in a process, which includes decision points, waiting periods, and feedback loops.
- **Swimlane flowchart:** a map that displays processes carried out for multiple roles across multiple stages.

Module 5 Appendix: Mapping and Redesigning Workflow. June 2013. Agency for Healthcare Research and Quality, Rockville, MD.

<http://www.ahrq.gov/professionals/prevention-chronic-care/improve/system/pfhandbook/mod5appendix.html>



Click image to enlarge

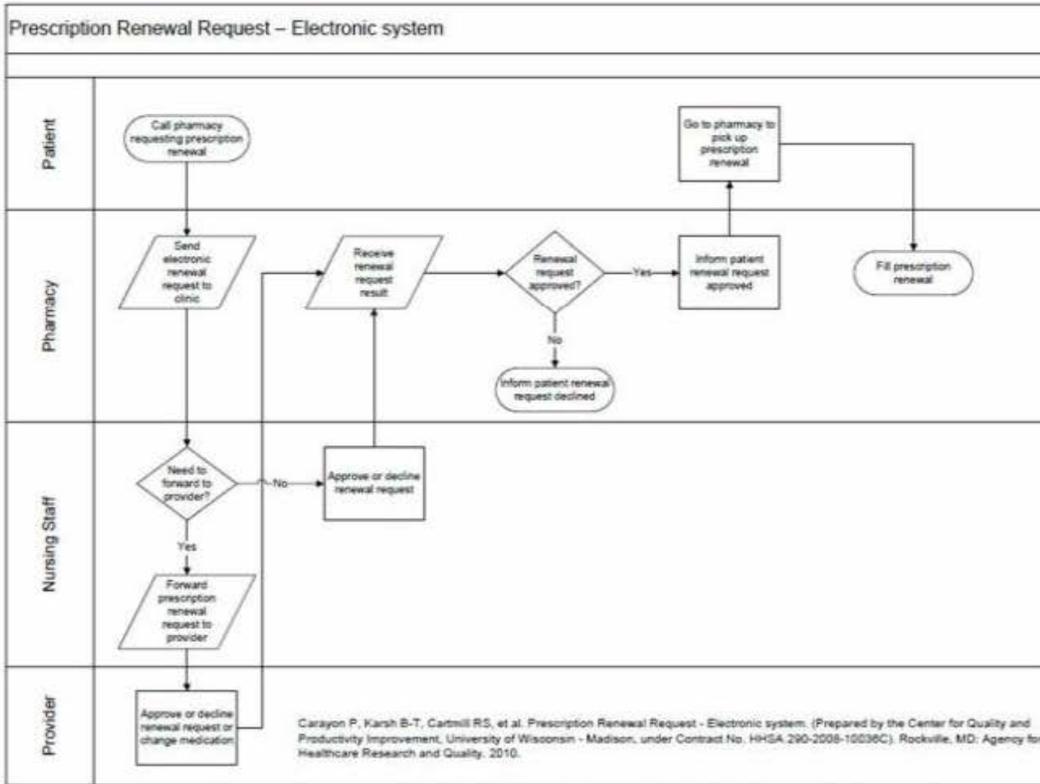
Flowchart Example

< PREV

NEXT >

# Documenting Workflow: Types Of Flowcharts

X Close



< PREV

NEXT >

## Looking at Workflow From Four Perspectives: People, Artifacts, Information, Tasks

Methods of Data Collection - Jordan's Data Collection Categories:

- Person-Oriented Record
- Object-Oriented Record (artifact-oriented)
- Setting Oriented Record (event-oriented)
- Task-Oriented

Jordan's Data Collection Category

- Person-Oriented Record
  - e.g.: understand work of staff person in a specific role
- Object-Oriented Record (artifact-oriented)
  - e.g.: trace path of a medical record document and understand its role in collaboration among staff
- Setting-Oriented Record (aka "event-oriented")
  - e.g.: emergency room or operating room workflow
- Task-Oriented Record
  - e.g.: medication administration procedures

Jordan B. In Shapiro D, Tauber MJ, Traunmüller R, eds. The Design of Computer Supported Cooperative Work and Groupware Systems. Amsterdam: North-Holland;1996: 37-39.

# Design Of A Workflow Analysis Study

Think about the following in designing a workflow analysis study:

- Identify clearly what you are studying: Person/people? Event or Artifact? Setting? Task?
- Identify the question you are trying to answer
- Capture only what you are looking for: Establish boundaries around the subject of study
- Characterize which data you should collect to best answer the study question

Here's a good online resource for workflow analysis study design help and education:

AHRQ Workflow Assessment for Health IT Toolkit



[http://healthit.ahrq.gov/portal/server.pt/community/health\\_it\\_tools\\_and\\_resources/919/workflow\\_assessment\\_for\\_health\\_it\\_toolkit/27865](http://healthit.ahrq.gov/portal/server.pt/community/health_it_tools_and_resources/919/workflow_assessment_for_health_it_toolkit/27865)

## Methods Of Data Collection

- Qualitative
- Quantitative
- Mixed
- Other

## Observational Data - Most Common Type of Data in Workflow Analysis

### Quantitative Observational Data

- Collected via operational systems
- Collected via detached human observer (e.g., counting events)

### Qualitative Observational Data

- Capture details of everyday work practices
- Ethnographic Observation, including participant observation
  - Attends to meaning, goals, context
  - Attends to how people communicate



*Listen as Dr. Montella discusses these approaches to data collection.*

## Additional Approaches To Data Collection



- Interviews
- Focus Groups

## Observational Fieldwork: Practical Considerations

- Know and Follow the Rules of the setting in which you will be working
- Manage Expectations of People you will be studying
- Stay out of the way of people doing their work
- Give out project handouts with helpful information
- Plan ahead for your own supply and equipment needs

## Analysis Of Workflow Data

- Type of analysis should be appropriate to the study question you are trying to answer
- Examples:
  - Studying Questions related to human performance/safety
  - Studying Questions related to efficiency

### Analysis of Workflow Data: Techniques

- Task Category identification
- Examine Themes that emerge from data
- Grounded Theory

## Workflow Analysis: Summary Of Key Activities

- You are Studying Workflow: Understand why the work is being done, and why you are analyzing that work
- You are observing people, artifacts, information, or tasks moving through a system
- Analysis: Count, measure, map, or describe what you have observed and collected
- Display results in a way that addresses the study purpose



*Listen as Dr. Montella discusses performing a workflow analysis.*

## Workflow Analysis: Practical Resources

- Workflow Tools Described

<http://healthit.ahrq.gov/health-it-tools-and-resources/workflow-assessment-health-it-toolkit/all-workflow-tools>

- Workflow Tool Examples

<http://healthit.ahrq.gov/health-it-tools-and-resources/workflow-assessment-health-it-toolkit/examples>

- Workflow Published Research

<http://healthit.ahrq.gov/health-it-tools-and-resources/workflow-assessment-health-it-toolkit/research>

## Workflow Re-Engineering, AKA Process Redesign

### Why Workflow Re-engineering?

- The performance of a system is related overwhelmingly to the design of the system, rather than to the intentions of the people who work in the system (Joseph Juran)
- System workflow, including the workflow of healthcare systems, can be “re-engineered” to improve design in order to improve quality and safety
- Where to start: understand the current design of your system (workflow analysis!)



*Listen as Dr. Montella discusses workflow re-engineering.*

## High-Reliability In System Performance

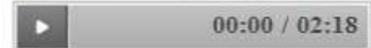
- High Reliability in Healthcare: “each patient receives the best quality care, every single time” (AHRQ)
- High-reliability organizations (“HROs”)
  - Have systems in place that are exceptionally consistent in accomplishing goals and avoiding potentially catastrophic errors
  - Airline industry, nuclear power industry among first to embrace HRO concepts
  - Healthcare organizations have looked to Airline Industry experience as a model for high reliability-functioning

## Why Healthcare Organizations May Not Act Like High Reliability Organizations

- Historically, process improvement methods in health care had been highly dependent on individual vigilance & hard work
- The clinical practice of benchmarking to limited outcomes creates a false sense of system process reliability
- A culture of clinical autonomy has allowed for wide performance variation
- Clinical Processes historically have not been designed to meet defined system reliability goals

Source: IHI.

Resar RK. Making Noncatastrophic Health Care Processes Reliable. Learning to Walk before Running in Creating High-Reliability Organizations. Health Serv Res. 2006 August;41(4 Pt 2): 1677-1689.



*Listen as Dr. Montella discusses why healthcare organizations may not act like high reliability organizations.*

## In Pursuit Of High-Reliability: Workflow Re-Engineering

### Drivers of High-Reliability Activities in Healthcare Systems

- Public awareness of medical errors and quality
- Health information technology (HIT)
  - Allows more precise monitoring of systems of care & system waste
  - However, automating a flawed system decreases efficiency (need to make system reliable before automating it)
- Awareness of Quality Improvement methodologies
  - Continuous Quality Improvement, Total Quality Management, Performance Improvement
  - Six Sigma, Lean, International Organization for Standardization (ISO), Baldrige, VA-TAMMCS, etc.
- Benefits reaped in other industries (airline; nuclear power)

## Methodology For Workflow Re-Engineering: Key Components

33 of 47

Define

Define performance goals

Assess

- Assess where organization needs to be (think regulatory standards), and wants to be (think excellence and customer satisfaction), in terms of performance on well-defined indicators

Prioritize

Choose

Assemble

Map

Revise

Implement

Measure

- Relate goals to overall organizational performance goals



- More than one model exists
- Choice of method will vary by organization
  - Influenced by organizational leadership, culture, experience, financial resources, human resources, etc.
- Generally best for an organization to adopt a single methodology & implement it system-wide

&lt; PREV

NEXT &gt;

## Methodology For Workflow Re-Engineering: Key Components

Define

Assess

Prioritize

Choose

Assemble

Map

Revise

Implement

Measure

Assess / measure current organizational performance using all available reliable data



- More than one model exists
- Choice of method will vary by organization
  - Influenced by organizational leadership, culture, experience, financial resources, human resources, etc.
- Generally best for an organization to adopt a single methodology & implement it system-wide

< PREV

NEXT >

## Methodology For Workflow Re-Engineering: Key Components

Define

Assess

Prioritize

Choose

Assemble

Map

Revise

Implement

Measure

Prioritize Goals (aka aims, objectives) & define timelines

- Goals should be SMART (Specific, Measurable, Attainable, Realistic, and Timebound)



- More than one model exists
- Choice of method will vary by organization
  - Influenced by organizational leadership, culture, experience, financial resources, human resources, etc.
- Generally best for an organization to adopt a single methodology & implement it system-wide

< PREV

NEXT >

## Methodology For Workflow Re-Engineering: Key Components

Define

Assess

Prioritize

Choose

Assemble

Map

Revise

Implement

Measure

Choose a Methodology:

Continuous Quality Improvement

Total Quality Management

Performance Improvement

Six Sigma

Lean

International Organization for  
Standardization (ISO)

Baldrige, etc.



- More than one model exists
- Choice of method will vary by organization
  - Influenced by organizational leadership, culture, experience, financial resources, human resources, etc.
- Generally best for an organization to adopt a single methodology & implement it system-wide

< PREV

NEXT >

## Methodology For Workflow Re-Engineering: Key Components

Define

Assess

Prioritize

Choose

Assemble

Map

Revise

Implement

Measure

Assemble a team to carry out the re-engineering effort

- Document Project Team, Goals, and Responsibilities in a Charter document



- More than one model exists
- Choice of method will vary by organization
  - Influenced by organizational leadership, culture, experience, financial resources, human resources, etc.
- Generally best for an organization to adopt a single methodology & implement it system-wide

< PREV

NEXT >

## Methodology For Workflow Re-Engineering: Key Components

Define

Assess

Prioritize

Choose

Assemble

Map

Revise

Implement

Measure

### Map the Current Process

One approach to creating a map of the current operational process is to use the Workflow Analysis methods described earlier in this presentation.



- More than one model exists
- Choice of method will vary by organization
  - Influenced by organizational leadership, culture, experience, financial resources, human resources, etc.
- Generally best for an organization to adopt a single methodology & implement it system-wide

< PREV

NEXT >

## Methodology For Workflow Re-Engineering: Key Components

Define

Assess

Prioritize

Choose

Assemble

Map

Revise

Implement

Measure

Revise the Map

Re-define the process to match the performance goal



- More than one model exists
- Choice of method will vary by organization
  - Influenced by organizational leadership, culture, experience, financial resources, human resources, etc.
- Generally best for an organization to adopt a single methodology & implement it system-wide

< PREV

NEXT >

## Methodology For Workflow Re-Engineering: Key Components

Define

Assess

Prioritize

Choose

Assemble

Map

Revise

Implement

Measure

Implement the new process

Don't forget to use available resources.



- More than one model exists
- Choice of method will vary by organization
  - Influenced by organizational leadership, culture, experience, financial resources, human resources, etc.
- Generally best for an organization to adopt a single methodology & implement it system-wide

< PREV

NEXT >

## Methodology For Workflow Re-Engineering: Key Components

Define

Assess

Prioritize

Choose

Assemble

Map

Revise

Implement

Measure

### Measure Outcome

- Timeliness
- Reliability
- Efficiency
- Staff satisfaction
- Patient safety measures
- Clinical outcome measures



00:00 / 03:58

- More than one model exists
- Choice of method will vary by organization
  - Influenced by organizational leadership, culture, experience, financial resources, human resources, etc.
- Generally best for an organization to adopt a single methodology & implement it system-wide

< PREV

NEXT >

## Process Re-engineering Use Case: "Re-engineering Discharge Project RED"

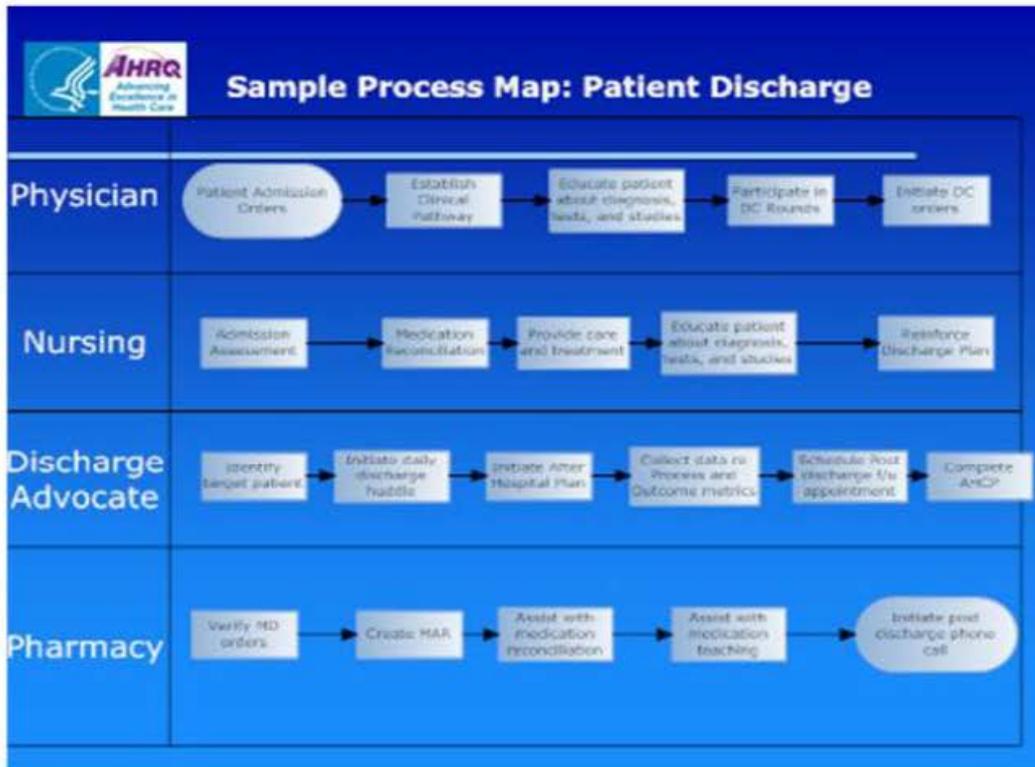
The Project RED (Re-Engineered Discharge) training program is designed to help hospitals re-engineer their discharge process.

Explore the Project RED toolkit for a step by step "how to" of preparing for and enacting a workflow re-engineering (process redesign) effort.

Re-Engineered Discharge (RED) Toolkit. March 2013. Agency for Healthcare Research and Quality, Rockville, MD.

<http://www.ahrq.gov/professionals/systems/hospital/red/toolkit/index.html>

# Project RED Example: Process Map



Project RED: Module 1: Preparing to Redesign Your Discharge Program: Project RED (Re-Engineered Discharge) Training Program. August 2011. AHRQ.  
<http://www.ahrq.gov/professionals/systems/hospital/red/module1/slide28.html>



## Once the Process Map is Completed

- Analyze the work flow in the eyes of the patient
- What defects exist? Where are communication breakdowns, failure to hand off information?
- Where do delays occur?
- What are your Project RED gaps?
- Do we have omission , selection, documentation, communication, administration failures?
- What steps in this process would the patient be willing to “pay for”?

Project RED: Module 1: Preparing to Redesign Your Discharge Program: Project RED (Re-Engineered Discharge) Training Program. August 2011. AHRQ  
<http://www.ahrq.gov/professionals/systems/hospital/red/module1/slide29.html>

## Project RED Example: Prep For Re-Design



### Module 1: Summary Expected Outcomes

- Align your strategic priorities
- Develop an infrastructure that will promote communication, understanding of team progress, and documentation of the patient care plan
- Review roles of executive sponsor, project team leader, DA, physician champion and pharmacist in the redesigned discharge process
- Develop a systematic performance improvement process that will facilitate knowledge transfer and sustainable change
- Embed Project RED key principles, including application of the Discharge Care Plan, communication with PCPs and implementing post DC phone calls

Project RED: Module 1: Preparing to Redesign Your Discharge Program: Project RED (Re-Engineered Discharge) Training Program. August 2011. AHRQ.  
<http://www.ahrq.gov/professionals/systems/hospital/red/module1/index.html>

< PREV

NEXT >

## "Culture Of Improvement"

Two important take-aways:

- Workflow Re-engineering can be performed in smaller systems within a larger healthcare organization
- Organization as a whole needs to adopt a "culture of improvement" to have a lasting impact on system performance.



*Listen as Dr. Montella discusses the culture of improvement.*

< PREV

NEXT >

## Recurring Theme

1. What is Current State?  
Current functioning, plus history that led to it
2. What is Desired Future State?
3. Make a Plan to get from current to future; carry it out
4. Did we get there?  
What are consequences (+ / -) of being there?

Assess Current

Envision Future

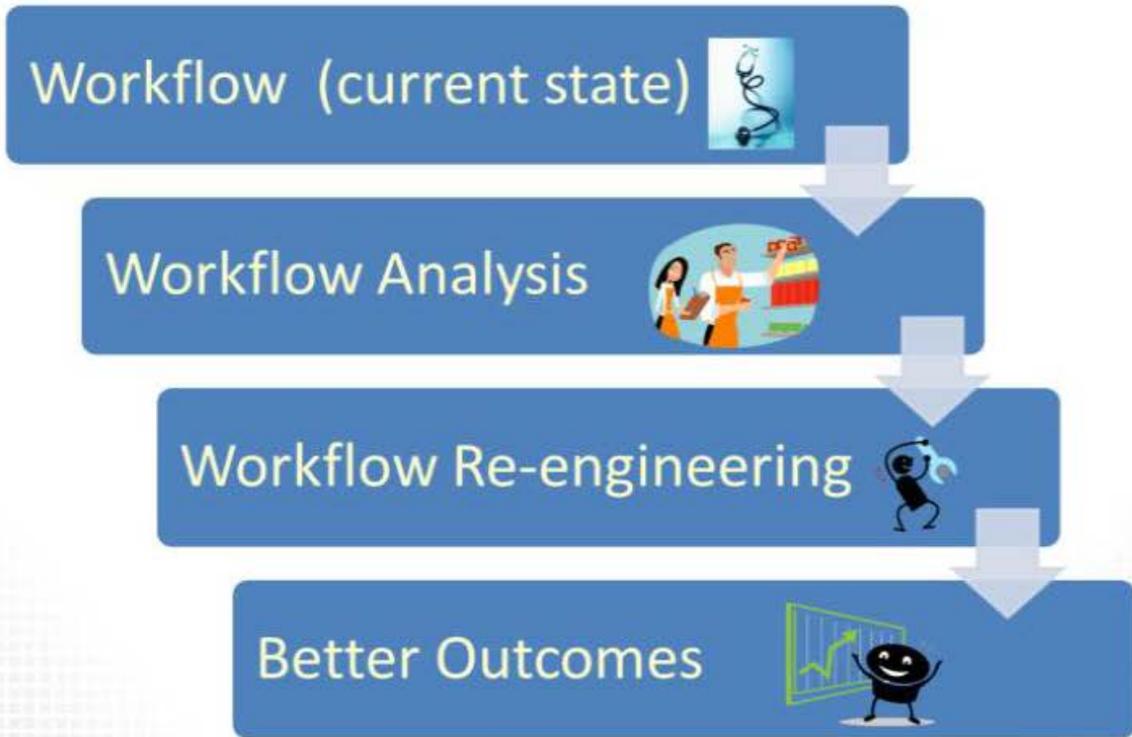
Plan and Act

Evaluate Outcome

### Topics:

- Strategic Planning
- **Workflow Analysis & Process Re-Design**
- Change Management
- Project Management
- Effective Healthcare IT Teams

# Summary



## Additional Suggested Readings

- AHRQ Workflow Analysis Toolkit:  
[http://www.healthit.ahrq.gov/portal/server.pt/community/health\\_it\\_tools\\_and\\_resources/919/workflow\\_assessment\\_for\\_health\\_it\\_toolkit/27865](http://www.healthit.ahrq.gov/portal/server.pt/community/health_it_tools_and_resources/919/workflow_assessment_for_health_it_toolkit/27865)
- Carayon P, Karsh B-T, Cartmill RS, et al. Incorporating Health Information Technology Into Workflow Redesign--Summary Report. (Prepared by the Center for Quality and Productivity Improvement, University of Wisconsin-Madison, under Contract No. HHSA 290-2008-10036C). AHRQ Publication No. 10-0098-EF. Rockville, MD: Agency for Healthcare Research and Quality. October 2010. Accessed 11 April 2014( Available online  
<http://healthit.ahrq.gov/sites/default/files/docs/citation/workflowsummaryreport.pdf>
- Jordan B. Notes On Methods for the Study of Work Practices. 2007. Available online:  
<http://www.lifescapes.org/Papers/Methods%20for%20the%20Study%20of%20Workpractices%202007.htm>
- Hines S, Luna, K, Lofthus J, et al. Becoming a High Reliability Organization: Operational Advice for Hospital Leaders. (Prepared by the Lewin Group under Contract No. 290-04-0011.) AHRQ Publication No. 08-0022. Rockville, MD: Agency for Healthcare Research and Quality. April 2008. Available online  
<http://www.ahrq.gov/professionals/quality-patient-safety/quality-resources/tools/hroadvice/hroadvice.pdf> (accessed 19 April 2014).
- Project RED: Module 1: Preparing to Redesign Your Discharge Program: Project RED (Re-Engineered Discharge) Training Program. August 2011. Agency for Healthcare Research and Quality, Rockville, MD. <http://www.ahrq.gov/professionals/systems/hospital/red/module1/index.html>

