Workshop: Developing and Implementing a Medical Student Quality Improvement Curriculum

The Workshop Companion Guide

SGIM Annual Meeting
May 7, 2011, Phoenix, AZ
Small Groups Task 1

Brainstorm the spectrum of safety and QI topics you may address in your curriculum (see pages 7-8 of Toolkit for “Suggestions for topics in a student QI curriculum”):
Small Groups Task 2

Select which topic(s) from task 1 that you will teach
Set the goals/objectives for your topic most appropriate for medical students to achieve

What are the ACGME/LCME competencies you will achieve with these goals/objectives? (See page 10 of Toolkit for “ACGME Core Competencies”)

- What teaching formats are best suited? (See pages 11-12 of Toolkit for “Teaching the Core Competencies”)

**ACGME/LCME Core Competencies**
- Medical Knowledge
- Patient Care
- Practice Based Learning and Improvement
- Systems-based Practice/Healthcare Systems
- Interpersonal and Communication Skills
- Professionalism
Small Groups Task 3

Where in the existing curriculum does the new QI curriculum fit best?
- Do you need to create something new?
- Who can/will teach it?
  - Do you need to circle back to your chosen topics based on who can teach the curriculum?
Small Groups Task 4

How will you measure curriculum effectiveness?
-Knowledge, skills, and attitude! *(See pages 5-6 of Toolkit for “Specific Considerations in QI Curriculum Development” especially section VI)*

Figure 1
Levels of Assessment. Adapted from Miller GE³

<table>
<thead>
<tr>
<th>Level</th>
<th>Assessment Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knows</td>
<td>Factual tests: MCQ, essay type, oral...</td>
</tr>
<tr>
<td>Knows how</td>
<td>(Clinical) Context based tests: MCQ, essay type, oral...</td>
</tr>
<tr>
<td>Shows how</td>
<td>Performance assessment in vivo: OSCE, simulated patient based test...</td>
</tr>
<tr>
<td>Does</td>
<td>Performance assessment in vivo: Undercover simulated patient, video, logs...</td>
</tr>
</tbody>
</table>

*(Taken from ACGME Bulletin, May 2008)*
Workshop: Developing and Implementing a Medical Student Quality Improvement Curriculum

EMORY

SGIM Annual Meeting
May 7, 2011
Phoenix, AZ

Facilitators

• Danielle Jones, MD – Workshop Coordinator
• Joyce Doyle, MD
• Nurcan Ilksoy, MD
• Rick Gitomer, MD, MBA

We have no conflicts of interest

but we do have a disclaimer...
Getting to Know You

- Deans?
- Curriculum committee members?
- Clerkship directors?
- Clerkship or residency program coordinators?
- Residency program directors?
- Quality officers?
- Residents?
- Students?

The US health care system reliably delivers evidence-based care to most patients:

A. Strongly disagree
B. Disagree
C. Neither agree nor disagree
D. Agree
E. Strongly agree

Principles of QI are core skills that medical students will use in their future practice of medicine:

A. Strongly disagree
B. Disagree
C. Neither agree nor disagree
D. Agree
E. Strongly agree
The following are necessary for a complete aim statement, EXCEPT:

A. A quantifiable goal
B. A specific deadline
C. Specific accountability
D. A defined population

To determine if your performance improvement test of change has resulted in improvement, an ideal quantity of data collected (such as via chart review) at each data collection interval would be:

A. 5-10 charts
B. A minimum of 50 charts
C. A minimum of 100 charts
D. Enough charts to be able to determine statistical significance

Patient Safety in the US

- 1999 Institute of Medicine Report estimates that as many as 44,000 to 98,000 people die in U.S. hospitals each year as the result of lapses in patient safety
Model for Improvement

- What are we trying to accomplish?
  - AIM STATEMENT
- How will we know that a change is an improvement?
  - MEASURE
- What changes will result in an improvement?
  - PROCESS IMPROVEMENT TOOLS
- Tests of change
  - PLAN, DO, STUDY, ACT

ACGME

- Practice Based Learning and Improvement
  - Residents must be able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence, and improve their patient care practices
  - Quality improvement
  - Evidence-based medicine
  - Life-long learning

AAMC

- Medical schools and teaching hospitals have committed to:
  - Teach quality and patient safety to the next generation of doctors
  - Ensure safer surgery through use of surgical checklists
  - Reduce infections from central lines using proven protocols
  - Reduce hospital readmissions for high-risk patients
  - Research, evaluate, and share new and improved practices
Primary Learning Objectives

• Arm participants with the knowledge, skills, and resources necessary to immediately begin development of an LCME/ACGME competency-based medical student QI curriculum at their home institutions

• Discuss methods for measuring LCME/ACGME competencies via a QI curriculum and how to determine its success

Secondary Learning Objectives

• Explore approaches to enhancing QI knowledge and comfort among faculty who will participate in the curriculum

• Consider specific techniques for teaching a QI curriculum in exciting and interactive ways
Additional Learning Objectives?

Small Groups

Small Groups Task 1

- Brainstorm the spectrum of safety and QI topics you may address in your curriculum
**Small Groups Task 1 - Topics by “Concentrations”**

- Health care issues that impact quality and safety
  - Health care legislation
  - New health care delivery models
- Human factors
  - Limitations of human performance
  - Common sources of error
- Patient safety
  - Culture
  - Disclosure
  - Response to error
    - Support of patients and families
    - Support of clinical team involved in the error
- Process/quality improvement
  - Improvement methodologies
  - Reliability science

---

**Emory M3 Course Example**

- Safety and QI topics addressed:
  - History of the patient safety initiative
  - Introduction to basic QI processes and tools

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**Small Groups Task 2**

- Select which topic(s) you will teach
- Set the goals/objectives for your topic most appropriate for medical students to achieve
- What are the ACGME/LCME competencies you will achieve with these goals/objectives?
  - What teaching formats are best suited?

15 Minutes
Small Groups Task 2

ACGME/LCME Core Competencies
- Medical Knowledge
- Patient Care
- Practice Based Learning and Improvement
- Systems-based Practice/Healthcare Systems
- Interpersonal and Communication Skills
- Professionalism

Small Groups Task 2 – Teaching Formats

- Health care issues that impact quality & safety
  - Interactive didactics
  - Case discussion
- Human Factors
  - Didactic with interactive audience participation (e.g. audience response systems)
- Patient Safety
  - Case discussions
  - Simulation
  - Interactive didactic sessions
- Process/Quality Improvement
  - Team projects
  - Simulation exercises
  - Interactive didactic sessions

Emory M3 Course Example

- Goals/objectives
  - Exposure to QI Challenges in US Healthcare system
  - Exposure to QI principles and tools available for use in QI activities
    - In depth coverage of PDSA/Model for Improvement as a QI tool
    - Practical application of QI principles using PDSA/Model for Improvement
- ACGME/LCME competencies
  - Toolkit
Emory M3 Course Example

• Teaching strategies:
  – Seminar:
    • Interactive, case-based pre-reading
  – Workshop:
    • Case-based, small groups format
  – Self-directed learning:
    • QI project proposal based on outpatient practice

Small Groups Task 3

• Where in the existing curriculum does the new QI curriculum fit best?
  – Do you need to create something new?
  – Who can/will teach it?
    • Do you need to circle back to your chosen topics based on who can teach the curriculum?

10 Minutes

Emory M3 Course Example

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Curriculum</td>
<td>Team Training Elective</td>
<td>Ambulatory Clerkship</td>
<td>Capstone</td>
</tr>
</tbody>
</table>

• Ambulatory Clerkship ideal setting for learning and using PI tools
• Residency QI program directors & facilitators, QI officer, & clerkship director are core faculty
Small Groups Task 4

- How will you measure curriculum effectiveness?
  - Knowledge, skills, and attitude!

![Levels of Assessment](image)

Figure from Change and Improvement in the Learning Environment, ACGME Bulletin, May 2008

Emory M3 Course Example

- We are still working on this!
  - Knowledge and attitudes pre- and post-test
  - Team workshop presentations
  - Individual project proposals
  - Direct student feedback
  - Increase in QI discovery projects or scholarship

The following are necessary for a complete aim statement, EXCEPT:

![Graphs](image)

Principles of quality improvement are core skills that I will use in my future practice of medicine:
Reconvene

“My doctor told me to avoid any unnecessary stress, so I didn’t open his bill.”

The Toolkit

- Our contact information
- General curriculum development information
- QI curriculum information
- QI resources
- ACGME competencies & teaching strategies
- Emory curriculum example
- Glossary of QI terms
- Workshop slides

Workshop: Developing and Implementing a Medical Student Quality Improvement Curriculum

The Toolkit

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The Charge

- Take this information back and start development next week!
- Challenge yourself and your institution to*:
  - Provide effective curricula, role models, and mentors
  - Create an infrastructure that imbeds QI in students’ day-to-day experiences
  - Increase the appeal of QI to students

*Adapted from Envisioning the Future of the Competencies, ACGME Bulletin, September 2008
Feedback

- Did you learn basic info to develop LCME/ACGME competency-based medical student QI curriculum?
- Did you discuss methods for measuring LCME/ACGME competencies via a QI curriculum?
- Did you explore ways to enhance QI knowledge among curriculum faculty?
- Did you consider specific techniques for teaching a QI curriculum?

Thank You!

Questions?
Workshop: Developing and Implementing a Medical Student Quality Improvement Curriculum

The Toolkit

SGIM Annual Meeting
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*Please direct correspondence to the workshop coordinator
Approach to General Curriculum Development*

First begin to think about the basic steps of curriculum development:

I. Define the problem
II. Perform a needs assessment
III. Set your goals and objectives
IV. Determine educational strategies
V. Implementation
VI. Evaluation and feedback

*Adapted from Curriculum Development for Medical Education: A Six-Step Approach, Edition 2, by David E. Kern (Editor), Patricia A. Thomas (Editor), Mark T. Hughes (Editor).
Specific Considerations in QI Curriculum Development

Using Kern’s steps, hone in on some of the questions necessary to develop a QI curriculum:

I. Define the problem
   A. Need for QI curriculum including ACGME’s markers of success:
      1. Provide effective curricula, role models, and mentors
      2. Create an infrastructure that imbeds QI in students’ day-to-day experiences
      3. Increase the appeal of QI to students

II. Perform a needs assessment
   A. Institution specific
      1. What curriculum already exists?
      2. What can you add to?
      3. What resources does your institution have in existence for QI (healthcare or educational)?

III. Set your goals and objectives
   A. Brainstorm the spectrum of safety and QI topics that you might address in your curriculum*
      1. Consider your resources – you may choose topics based on what resources and/or expertise exist in your institution
   B. Set objectives that medical students should be able to achieve within your chosen focus
   C. Determine LCME competencies related to your objectives

IV. Determine educational strategies
   A. Where in your medical school curriculum will the QI curriculum fit?
   B. What format(s) will your curriculum take (e.g., readings, lectures, workshops, projects)?

V. Implementation
   A. Identify key faculty considering strengths and weaknesses of QI and educational training
   B. Will you further train key faculty?

VI. Evaluation and feedback
   A. How will you measure curriculum effectiveness?
   B. How will you measure LCME competencies?
   C. Will you receive early feedback for improvement from the students?
   D. Consider ACGME’s pyramid (ACGME Bulletin, May 2008):

*See Page 8 for a list of Patient Safety and QI topic areas
ACGME’s Levels of Assessment Pyramid (from *ACGME Bulletin*, May 2008)

**Performance assessment in vivo:**
- Undercover simulated patient, video, logs...

**Performance assessment in vivo:**
- OSCE, simulated patient based test...

**(Clinical) Context based tests:**
- MCQ, essay type, oral...

**Factual tests:**
- MCQ, essay type, oral...
QI Curriculum Development Resources

I. Suggestions for topics in a student QI curriculum
   A. “Case for quality”
      1. Current performance of the US health care system
         a. Cost, quality, & safety
            • IOM Reports
               – To Err is Human – 44,000-98,00 hospital deaths per year due to preventable medical error
               – Crossing the Quality Chasm – Substantive improvement requires system-level changes
            • RAND Study – Patients only receive 55% of evidence-based care that they should receive
      b. Resources
         • The Commonwealth Fund
           (Chart pack is an excellent resource for PowerPoint slides)
         • The Quality of Health Care Delivered to Adults in the United States

   B. Human factors
      1. Understand the limits of human performance
         • Mistake-Proofing the Design of Health Care Processes
           http://www.ahrq.gov/qual/mistakeproof/

   C. Reliability
      1. Design systems to overcome the limits of human performance
         • http://www.ihi.org/IHI/Results/WhitePapers/ImprovingtheReliabilityofHealthCare.htm
      2. High reliability organizations

   D. Understanding variation
      1. Understand the normal variation of processes
         • Wheeler, Donald J., Understanding Variation, The Key to Managing Chaos, SPC Press, Knoxville, TN, 1993
      2. Using data in quality improvement – Run Chart
         • The run chart: a simple analytical tool for learning from variation in healthcare processes, BMJ Qual Saf 2011 20: 46-51
E. History of process improvement & PI methodology overview

1. All methodologies have basis in the Scientific Method
2. Lean
   a. Decoding the DNA of the Toyota Production System
      • http://twi-institute.com/pdfs/article_DecodingToyotaProductionSystem.pdf
   b. Going Lean in Health Care
      • http://www.ihi.org/IHI/Results/WhitePapers/GoingLeaninHealthCare.htm
3. Six Sigma
4. The Model for Improvement
   • http://www.ihi.org/IHI/Programs/AudioAndWebPrograms/OnDemandPresentationMFI.htm?TabId=0

F. In-depth understanding of The Model for Improvement
   • http://www.ihi.org/IHI/Topics/Improvement/ImprovementMethods/HowToImprove/

G. Organizational culture
1. Without a safety culture organizations cannot achieve the desired level of quality
2. Emory’s Cultural 5 Competencies
   a. Transparency
   b. Disclosure
   c. Fair & just culture
   d. Patient & family-centered care
      • http://www.ipfcc.org/
   e. Shared decision-making
   f. Cultural competency & diversity

II. Emory QI Team Teaching Resources (please contact us if you are interested in the resources listed below)

A. Powerpoints
   1. Introduction to PI
   2. Human factors
   3. Reliability
   4. Emory University SOM ambulatory M3 workshop companion slides
B. Cases
   1. Case for discussion
   2. Case for simulation exercises
      a. Emory University SOM ambulatory M3 workshop case
ACGME Core Competencies

As they may apply to QI curricula:

I. Practice Based Learning and Improvement
   – Residents must be able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence, and improve their patient care practices
   • Evidence-based medicine
   • Quality improvement
   • Life-long learning

II. Systems-based Practice
   – Residents must demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide optimal health care
   • Health care delivery system
   • Patient safety and advocacy/Systems causes of error

III. Interpersonal and Communication Skills
   – Residents must be able to demonstrate interpersonal and communication skills that result in effective information exchange and teaming with patients, their patients families, and professional associates
   • Communicating with team members
   • Scholarly communication

IV. Professionalism
   – Residents must demonstrate a commitment to carrying out professional responsibilities and an adherence to ethical principles.
   • Treats others in the healthcare environment in a manner that fosters effective patient care

V. Patient care
   – Work with health care professionals, including those from other disciplines, to provide patient-focused care
# Teaching the Core Competencies

<table>
<thead>
<tr>
<th>Content</th>
<th>ACGME Recommended Teaching Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Practice-based learning and improvement</strong>&lt;br&gt;– Quality or Practice Improvement</td>
<td>Lectures/Seminars/Conferences&lt;br&gt;Quality Improvement Project</td>
</tr>
<tr>
<td><strong>Health care system/System-based Practice</strong>&lt;br&gt;– Different types of medical practice and delivery systems&lt;br&gt;– System resources&lt;br&gt;– System issues and the reduction of errors&lt;br&gt;– Conducting a root cause analysis&lt;br&gt;– Patient safety and advocacy</td>
<td>Clinical teaching&lt;br&gt;Patient Safety projects&lt;br&gt;Systems based approach to M&amp;M&lt;br&gt;Lectures/Seminars/Conferences&lt;br&gt;Interdisciplinary Teams&lt;br&gt;Individual or Group Projects&lt;br&gt;Conducting a root cause analysis on near miss or sentinel event</td>
</tr>
<tr>
<td><strong>Interpersonal and Communication Skills</strong>&lt;br&gt;– Communication with colleagues</td>
<td>Standardized communication around handoff&lt;br&gt;Clinical teaching&lt;br&gt;Role modeling&lt;br&gt;Interactive workshops or seminars</td>
</tr>
<tr>
<td><strong>Professionalism</strong>&lt;br&gt;– Professional teamwork with colleagues to achieve excellent patient care</td>
<td>Clinical teaching&lt;br&gt;Continuity clinics&lt;br&gt;Role modeling&lt;br&gt;Bedside rounds</td>
</tr>
<tr>
<td><strong>Patient Care</strong>&lt;br&gt;– Work with health care professionals, including those from other disciplines, to provide patient-focused care</td>
<td>Clinical teaching&lt;br&gt;Continuity clinics&lt;br&gt;Bedside rounds&lt;br&gt;Morning Report presentations&lt;br&gt;Lectures/Seminars/Conferences</td>
</tr>
</tbody>
</table>
Other QI-Specific Suggested Teaching Methods

• Didactics (limited)
• Experiential
  – Audience response systems
  – Case discussions
  – Case simulations
  – Mentored projects
  – Participation on an organizational PI team

Suggested Teaching Methods by Safety and QI Topic “Concentration”

• Health care issues that impact quality & safety
  – Interactive didactics
  – Case discussion
• Human Factors
  – Didactic with interactive audience participation (e.g. audience response systems)
• Patient Safety
  – Case discussions
  – Simulation
  – Interactive didactic sessions
• Process/Quality Improvement
  – Team projects
  – Simulation exercises
  – Interactive didactic sessions
Emory University School of Medicine M3 Curriculum as an Example

I. Define the problem
   A. Need for QI curriculum

II. Perform a needs assessment
   A. Institution specific
      1. What curriculum already exists – 1st year introduction, 2nd year elective
      2. What can you add to? – Build on 1st year introduction to QI and experiences from IM residency program QI curriculum
      3. What resources does your institution have in existence for QI (healthcare or educational)? – Robust QI officers in Emory healthcare system and faculty members involved in QI at residency level

III. Set your goals and objectives
   A. Set objectives that medical students should be able to achieve
      1. Teach basic QI processes and tools
      2. Spark interest in QI
      3. Show that students can apply basic QI concepts to a real clinical setting
      4. Learn how to recruit and work with a multidisciplinary team
      5. Have students spread QI knowledge to community practices
      6. Re-emphasize concepts of the US health care system including issues of poor efficiency and quality of care despite increasing costs
      7. Encourage self-directed and life-long learning
   B. Determine LCME/ACGME competencies related to your objectives
      1. Patient care
         a. Work with health care professionals, including those from other disciplines, to provide patient-focused care
      2. Practice-based learning and improvement
         a. Analyze practice experience and perform practice-based improvement activities using a systematic methodology
         b. Obtain and use information about their own population of patients and the larger population from which their patients are drawn
      3. Communication/interpersonal and communication skills
         a. Shows cultural sensitivity when interacting with patients, families, and co-workers from diverse backgrounds and abilities
         b. Work effectively with others as a member or leader of a health care team or other professional group
      4. Professionalism
         a. Treats others in the healthcare environment in a manner that fosters mutual respect, trust, and effective patient care
      5. Health care systems/systems-based practice
         a. Applies concepts of patient safety, medical error and quality
improvement related to clinical outcomes
b. Demonstrates understanding of health care system issues that result in health care disparities
c. Participates with other health care professionals in transition planning and identification of community resources
d. Understand how their patient care and other professional practices affect other health care professionals, the health care organization, and the larger society and how these elements of the system affect their own practice
e. Advocate for quality patient care and assist patients in dealing with system complexities
f. Know how to partner with health care managers and health care providers to assess, coordinate, and improve health care and know how these activities can affect system performance

6. Research
a. Applies basic principles of the scientific method to research design

IV. Determine educational strategies
   A. Where in your medical school curriculum will the QI curriculum fit? – 3rd year ambulatory clerkship (3 month block, experience in several practices)
   B. What format(s) will your curriculum take (e.g., readings, lectures, workshops, projects)? – Reading, lecture, workshop, self-directed project proposals

V. Implementation
   A. Identify key faculty considering strengths and weaknesses of QI and educational training – Emory Healthcare champions and IM faculty
   B. Will you further train key faculty? - Yes

VI. Evaluation and feedback
   A. How will you measure curriculum effectiveness? – pretest, posttest, direct student feedback, increase in QI scholarship
   B. How will you measure LCME competencies? – demonstration of projects
   C. Will you receive early feedback for improvement from the students? Electronic feedback
A

**Activity** - The task or function that when performed produces a product or service.

**Agency for Healthcare Research and Quality (AHRQ)** - The Nation's lead Federal agency for research on health care quality, costs, outcomes, and patient safety.

**Agile** - An agile organization is one that is nimble and can turn quickly in reaction to market changes. Agility has become a requirement for success in today's rapidly changing, globally competitive landscape.

**Aim Statement** - Improvement requires setting aims. The aim should be time-specific and measurable; it should also define the specific population that will be affected.

**Andon board** - A term for a visual control device that allows anyone to see and manage the real-time status of the value stream.

B

**Balanced flow** - Smoothing the workload throughput and variety such that the total available resources are applied consistently; avoiding overburden or underused resources when performing the activities of a value stream.

**Batch** - A collection of multiple items for processing at some future step.

**Bottleneck** - Any point in the value stream where the capacity to produce work is less than the work needed to be performed.

C

**Capability** - A functional combination of expertise and resources necessary to produce a product or service. Example capabilities are project management, requirements analysis, training, risk management, quality assurance, etc.

**Cause and Effect Diagram** – A tool that is often used in a brainstorming session to identify the barriers to desired outcomes.

**Complex system** - A holistic view that recognizes everything is connected to everything else. For example, business environments are complex systems where you can't just do one thing; every action has multiple planned and unplanned reactions. “Lean” is an approach to improve complex business systems while reducing the risk of unintended consequences.
**Constraint** - Anything that limits the value stream from achieving higher performance; i.e., throughput, cycle time, quality.

**Continuous flow** - The constant flow of work from one activity to the next with no interruptions or downtime. In an ideal continuous flow system, the work time and the cycle time are identical.

**Continuous improvement** - An approach that engages employees in an unrelenting focus on improving the effectiveness and efficiencies of the value streams of an organization.

**Core Measures** – A series of process measures identified by The Joint Commission. They serve as the hospital quality measures used for the “CMS Market Basket Adjustment”. The medical conditions represented by the core measures include acute myocardial infarction, congestive heart failure, pneumonia, surgical care improvement project, and perinatal care. Emory submits data on all, except the perinatal care. Core Measures data are manually abstracted using strict criteria.

**Cost of non-quality** - The financial impact due to the production of waste by the organization. Here waste refers to all eight wastes and their financial impact, not just the waste of defects.

**Current state value stream** - A snapshot view of a value stream as it exists at the time of observation.

**Customer** - The internal or external recipient of the product/service produced by an organization's value stream.

**Customer value** - The worth to the customer of the product/service produced by an organization's value stream. Sometimes used interchangeably with stakeholder value.

**Cycle time** - The wall clock time necessary to complete one item of value (i.e. one process step in a value stream map). For example, the cycle time to process one order is the time from when the order is received to the time the order is complete.

**Dartmouth Atlas** – Originally developed by Jack Wennberg at Dartmouth, the Dartmouth Atlas demonstrated that there is unexplained variation in the utilization of healthcare resources. He used MedPar data to show wide geographic variation in the utilization of Medicare resources.

**DMAIC** - The five stages of a cycle of continuous improvement associated with the "six sigma" approach.

- **Define** - Identify the customers, the problem, scope, and goals
- **Measure** - Establish the metrics for analyzing the problem and determining the impact of any proposed changes
- **Analyze** - Review the collected data, establish performance gaps and variation, and identify best practices
- **Improve** - Design and develop a solution, validate and then implement the solution
Control - Establish new standards, update measurement systems, and plan to maintain and improve.

E

Effectiveness - Maximizing the performance of the entire value stream; sometimes at a cost of reduced efficiency of certain individual activities.

Efficiency - Maximizing the performance of a single activity of a value stream.

Eight wastes - The eight forms of non-value added activities

   Overproduction - Producing work prior to its being needed or producing more work than is needed.
   Waiting - Any time period where any resource is not being used.
   Transportation - Moving a resource from one place to another or requiring a lot of motion to perform an activity.
   Overprocessing - Activities that are non-value added; providing higher quality than is necessary.
   Inventory – Excess inventory of supplies, patients, etc.
   Unused Creativity/Talent – Not engaging or developing employees to full potential. Lack of communication.
   Defects - Any error that occurs; repair or rework.
   Motion – Any wasted motion to accomplish a task or lack of standard work.

Error proofing - Building into the process the ability to prevent errors from occurring and/or the ability to immediately recognize errors when they occur.

F

Feedback - The output of an activity that in turn causes a positive or negative reinforcement for other activities.

First in, first out (FIFO) - The order something is taken from a queue or batch. FIFO indicates that the item is removed from the queue in the same order that it entered i.e. the first item in, is the first item removed.

Fishbone Diagram – See Cause & Effect Diagram.

Five M's - Five terms beginning with "M" that are the primary resources of an organization and the drivers of operational performance.

   (Man) Men & Women -The people of the organization.
   Machines - Systems or devices for performing work; including both paper and computerized information systems.
   Materials - Items from which stakeholder value is created; including work-in-process information.
**Methods** - The procedures used to produce stakeholder value.

**Measures** - The performance measures for monitoring and managing.

**Five S** - Five terms beginning with "S" used to create a safe, effective, and easy to use workspace.
- **Sort** - Remove what is not needed and keep what is needed
- **Straighten** - Arrange an appropriate location for all items.
- **Shine** - Clean the work area with emphasis on inspection.
- **Standardize** - Establish a standard process for maintaining a clean uncluttered work area.
- **Sustain** - Maintain the commitment to the five S's.

**Flow** - The movement of assets or resources from one activity to the next in a value stream.

**Future state value stream** - A snapshot view of a value stream as it might appear to an observer at some point in the future.

**G**

**Gemba** - A term for the workspace of an organization. The workspace is an important concept in a lean organization because that is where stakeholder value is created.

**H**

**Hawthorn Effect** - Improved process data that results from staff who know their process performance is being measured and exercise more care in the execution of the process than would normally be done.

[HealthGrades.com](http://HealthGrades.com) — A commercial website that uses hospital billing data submitted to CMS and applies a risk adjustment algorithm to generate comparative ratings for quality.

**Hospital Compare** — [hospitalcompare.hhs.gov](http://hospitalcompare.hhs.gov), a government-sponsored website that displays manually abstracted Core Measures data to the general public.

**Human Factors** - The study of how people use technology. It involves the interaction of human abilities, expectations, and limitations, with work environments and system design.

**I**

**Institute for Healthcare Improvement (IHI)** — An organization based in Boston that is a thought leader in healthcare quality and safety. The IHI was the driving force behind the “100K Lives Campaign”. Don Berwick, the president and CEO, is a very influential leader in healthcare quality and safety.

**Inventory** - Material resources consumed through the production of stakeholder value. In a lean office, information can be considered part of inventory in addition to materials, supplies, etc.
**J**

**Just-in-time** - An activity of a value stream occurring just prior to its being needed, with the assets needed to produce the value of that activity becoming available just prior to the activity being performed.

**K**

**Kaizen** - A term for incremental improvement. Kaizen is a people and process-oriented way of thinking as opposed to innovation- and results-oriented thinking.

**Kanban** - The Japanese word for "card", kanban is a term for a visual indicator that it is time to execute an activity in a value stream.

**Kitting** - A term for collecting all of the required resources and information to perform a subsequent activity in the value stream.

**L**

**Last in, first out (LIFO)** - The order something is taken from a queue or batch. LIFO indicates that the item is removed from the queue in the reverse order that it entered i.e. the first item in, is the last item removed.

**Lead time** - The time from when a request is made for a product or service until the product or service is available.

**Lean** - An umbrella term for a powerful combination of techniques to increase business performance. Lean is a term used in the U.S. for what was originally known as the "Toyota Production System". Lean was developed by Toyota to improve the performance of their manufacturing environment. Also referred to as lean production, lean thinking, lean enterprise, etc.

**Lean production** - A manufacturing approach attributed to Taiichi Ohno of Toyota in the early 1950's. It defines work as a series of steps performed by cross-functional teams under distributed control; with the standardization of each of the five M's of operational performance. Lean production concepts are now being used to dramatically increase productivity.

**M**

**Mass production** - A manufacturing approach attributed to Henry Ford in the early 1900s. It defines work as a series of specialized activities under centralized control; with the
standardization of product components. Today, mass production is still the basis of most processes within work environments.

**Measure** – A quantifiable reflection of an Outcome or a Process.

**Mistake proofing** - Designing the value stream so that it is not possible for errors to occur.

**Monument** - A role or tool within the value stream that is very expensive to operation and maintain. As a result the organization feels it must insure the monument is always fed by establishing queues and special handling; adding costs and reducing flexibility.

**Muda** - A term for waste.

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**N**

**Non-value added** - Activities that do not create the appropriate stakeholder value.

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**O**

**Outcome** - The measurable results of work performed by the organization. Outcomes are set in advance of the work performed to help align the organization with a defined strategy. Also known as an Outcome Measure.

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**P**

**Pareto Chart** – A tool that identifies the frequency of results that is often used to identify the 20% of causes for 80% of the outcomes.

**PDCA/PDSA** - The four stages of a cycle of continuous improvement popularized by W. Edward Deming.

- **Plan** - Define the problem, methods to measure it, and obtain management support for future stages
- **Do** - Do the tests and prototypes to understand the problem, establish root causes, and investigate alternatives
- **Check/Study** - Analyze the results of the "do" stage to determine if a solution effectively resolves the problem while breaking nothing else. Adjust accordingly, if applicable.
- **Act** - Fully implement the identified solution

**Performance principles** - A rule or standard used to align day-to-day tactical decision making with organizational strategy and value propositions. Value statements establish worth; a principle is a standard for achieving that worth. If values are the what; principles are the how.

**Poka yoke** - A term that means mistake proofing.
**Policy deployment** - A top down planning process that ties strategic direction to the vital few tactical initiatives for realizing the desired business outcomes. Also known as strategy deployment.

*Policy intervention* - The tendency for an initiative to be delayed, diluted, or defeated by the natural feedback responses of the system to the initiative itself.

**Principle** - A rule or standard; especially of good behavior.

**Productivity** - The amount of stakeholder value produced from a given amount of resources. For example, productivity can be measured as the revenue per employee.

**Process** - Rules for performing activities. Process rules describe when an activity is to be performed, how it is performed, and what resources should be used.

**Process Capability** – the degree to which a process is capable of meeting specifications, often reported as the percentage or proportion of measurements that fall within the desired range.

**Process Measure** – A measure that reflects the performance of a specific step or process. A process measure is often easier to obtain and can be a surrogate for measuring an outcome if there is a tight relationship. See Outcome.

**Pull system** - When the downstream activity pulls work from the activity that occurs prior to it. The opposite of a push system.

**Push system** - When the upstream process pushes work to the activity that follows it. The opposite of a pull system.

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**Q**

**Quality** - The continuous improvement of the effectiveness and efficiency of value added work, while reducing or eliminating waste or non-value added work.

**Queue** - A physical location for storing items as they wait for the next step in a value stream.

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**R**

**Resource** - The assets of the organization including: people, products, tools, and materials.

**Right sizing** - Designing the resources of a value stream such that they are just sufficient to perform the balanced flow of work throughout the value stream.

**Role** - A collection of activities performed by one or more individuals of an organization.

**Roles and flows** - One form of a value stream map that focuses at a particular level on the activities of a value stream.

**Run chart** - A method of graphically displaying data over time. When labeled with notations indicating events or changes to the process, this “annotated” run chart serves to effectively communicate the process to an observer.
**S**

**Silo** - A term describing a functional area of an organization, e.g., customer service, that has very little communication or integration with other functional areas. Communication only flows up and down within the organization - forming a silo. In an office environment having a "silo view" is the opposite of having a "system-wide view."

**Six sigma** - A statistical approach for reducing variability of a value stream.

**Specification** – An explicit statement of the acceptable range for a measurable performance or outcome parameter.

**State** - A snapshot view that provides an observer the picture of the situation.

**Stakeholder** - Any party that has an interest in the product/service produced by an organization's value stream.

**Stakeholder value** - The worth of the stakeholder's interest in the product/service produced by an organization's value stream. Sometimes used interchangeably with customer value.

**SPC (statistical process control) chart** - A graphical display of data that includes statistical parameters such as the mean and control limits. This chart describes process behavior, allowing one to determine whether data points are within the range of common cause variation or are likely the result of special cause variation (i.e., true change).

**Stop-the-line** - An approach to managing a value stream that allows anyone to halt work, while defects are occurring, so they are not propagated through the system.

**Strategy deployment** - A top down planning process that ties strategic direction to the vital few tactical initiatives for realizing the desired business outcomes. Also known as policy deployment.

**Supermarket** - A collection of queues where the minimum and maximum amount of inventory that can be stored in each queue is regulated. Supermarkets form the boundaries between push and pull systems of a value stream.

**System-wide view** - Evaluating the performance of the organization by considering the complex interactions between all of the activities that produce value added work – not just those of a single functional department or product line.

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**T**

**Takt time** - A term for the beat or rhythm of the activities that makes up a value stream. For example suppose the takt time of a value stream is set at 30 minutes. This means that the activities are designed and resourced so that every step in the value stream is completed every 30 minutes. When every step of the value stream executes to the same beat or tact time, the output of each upstream step is finished at the same time each downstream step becomes ready for its input. This helps continuous flow; reducing wait time between value stream steps by synchronizing their start and stop times.
**Test of Change** – Testing a change in the real work setting — by planning it, trying it, observing the results, and acting on what is learned. This is the scientific method used for action-oriented learning. See PDCA (PDSA).

**Theory of constraints** - Streamlines operations by focusing on end-to-end throughput, not individual efficiency. Seeks to identify bottlenecks and provide alternatives for their elimination.

**Throughput** - The velocity of work performed by a value stream. Throughput counts the units of stakeholder value produced in a given time.

**Touch time** – The actual time spent accomplishing a single task; oftentimes assumed to be the value-added time of a process step.

**Toyota Production System (TPS)** - The various techniques developed by Taiichi Ohno of Toyota to increase manufacturing performance. Outside of Toyota these techniques are better known as “lean”- such as lean production or lean office.

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**V**

**Value** - Something of worth in usefulness or importance to the possessor.

**Value added** - The activities that transform the resources of an organization into a product or service someone is willing to pay for.

**Value equation** - Received Value = Created Value – Created Waste. Where Received Value is what the stakeholder is willing to pay for, Created Value is the value produced by the organization, and Created Waste is the non-value produced by the organization a stakeholder is not willing to pay for. Each variable of the value equation is calculated at the price or the fully burdened cost plus profit margin.

**Value matrix** - A matrix that is defined for each organization by the multiple domains of stakeholder value creation. Every organization has a value matrix consisting of at least two or more of the following domains: 1) customer, 2) employee, 3) region, 4) product/service, and 5) process.

**Value priorities** - The relative ranking of the stakeholder values generated by a single value stream.

**Value statement** - Establishes the way or direction that stakeholder worth or usefulness is created by an organization. Value statements say what the organization is committed to do. In contrast, principle statements say how the organization is going to do it.

**Value stream** - A holistic collection of value added and non-value added activities that chain together to create a product or service.

**Value stream map** - The visual documentation of the activities creating stakeholder value and how information and resources flow between them.

**Visual controls** - The methods to see and manage the real-time flow of work through a value stream.
Wall clock time - The total elapsed time from the starting point to the ending point of an event.

Waste - Anything that does not directly add to or support the creation of stakeholder value.

Work-in-process (WIP) - Inventory that is being worked on within a value stream. For example, batches of sales orders that are waiting in a queue for further processing are work-in-process.

Work - The execution of activities that consume resources and produce new a product or service.

Workspace - The area where stakeholder value is created. This is an important concept in lean office because the design and state of the workspace has a direct impact on the efficiency and effectiveness of a value stream.

Work time - The wall clock time that is spent performing direct value added activities within a value stream. For example, the work time on an order may only be a half hour; although the total time from order start to completion might be 8 hours (its cycle time).