Practice-Based Learning & Improvement Curriculum: The Application of Improvement Knowledge in Clinical Practice
(Session PM07)

Anne Tomolo, MD, MPH
Aleece Caron, PhD
Susan Kirsh, MD
Amy Schechter, MD
Louis Stokes Cleveland DVAMC
Learning Objectives

• Review the goals of the ACGME competency for PBLI
• Learn the principles of CQI
• Learn to apply CQI principles to a clinical project
• Attain strategies for handling challenges encountered in developing residency curriculum
• Explore strategies for successful implementation in clinical practice
• Explore strategies for incorporating faculty development into residency curriculum
Practice-Based Learning & Improvement

• Residents must be able to:
  – Investigate and evaluate their patient care practices
    • Obtain and use information about their own population of patients and the LARGER population from which their patients are drawn
  – Appraise and assimilate scientific evidence
  – Improve their patient care practices
    • Analyze practice experience and perform PBLI activities
    • Use information technology to manage information
Why PBLI?

• It is part of a physician’s **professional** responsibility

• Reviewing your clinical practice patterns is important to **improving your clinical processes**

• Using **CQI tools** will help with understanding variation in practice patterns, which is especially important in clinical administrative positions

• Preparation for **ABIM**
Evolution of Our PBLI Curriculum

- PBLI curriculum must be interactive
- Clinical projects must be relevant to the residents
- Identifying a clinical stakeholder for the project choices is critical to maintaining project integrity
- Team approach to projects
- Faculty & peer presentation of projects
- At least 3 faculty members with multidisciplinary backgrounds is helpful
  - Clinical, systems, & methods expertise
I. **Goal**: For IM Residents to demonstrate proficiency in the development of a CQI project by the end of their ambulatory rotation.

II. **Objectives**:
   a. IM Residents on Ambulatory rotation will attain knowledge in the principles of CQI.
   b. IM Residents on Ambulatory rotation will demonstrate proficiency in CQI through their description and participation in a clinical CQI project that they have developed during the Ambulatory rotation, which is presented to faculty.
   c. IM Residents on Ambulatory rotation will demonstrate proficiency in CQI through the change in their scores on the pre and post-test Quality Improvement Knowledge Assessment Tools (QIKAT)*

Session Overview

Module 1 (3 hrs):
• Assess resident QI baseline knowledge (QIKAT pre-test)
• Residents work in teams of 2-3 and are given a choice of 3 clinical cases (e.g. missed lung mass)
• Introduction to CQI principles
• Application of CQI principles (small group exercises), e.g. aim statement, flowchart, change concepts, Cause-Effect Diagram
Session Overview

Module 2 (3 hrs):
1. Resident teams continue to work on CQI project
2. Introduce CQI tools, including Pareto Chart, Run Chart, and SPC Chart

Module 3 (3 hrs):
1. Team working session on project with faculty available for consultation

Module 4 (3 hrs):
1. Teams present projects at IM M&M conference
2. QIKAT post-test assessment
3. Anonymous curriculum evaluation
Overview of CQI Principles
Improvement vs. research

**Spreading innovation**

**Aim:** better practice

**Methods:**
- tests observable *(helps spread)*
- stable bias
- just enough data
- changing hypotheses --
- sequential tests

**Publishing research**

**Aim:** new knowledge

**Methods:**
- tests blinded
- no bias
- all possible data, just in case
- fixed hypotheses --
- one large test

Plan-Do-Study-Act vs. Plan-Do-Study-Publish
Continuous Quality Improvement: An Overview

- Improvement Knowledge
- QI Process Tools
  - Flowchart
  - Cause Effect Diagram
- QI Tests of Change
  - Statistical Process Control
- Change Concepts
Review the Clinical Case
(5 minutes)
The PDSA Cycle

1. Develop Hypothesis
2. Collect Data
3. Examine Data Against Hypothesis
4. Rethink Hypothesis

Act
Plan
Study
Do

Develop Hypothesis
Collect Data
Examine Data Against Hypothesis
Rethink Hypothesis
Fundamental Improvement Questions

♦ What are we trying to accomplish?
  A clear outcome target is essential to assign resources, garner collaboration, etc.

♦ What changes can we make that will result in improvement?
  A hypothesis generation step ...

♦ How will we know that a change is an improvement?
  Without this step, innovation is impossible ... "Truth is found more often from mistakes than from confusion" -- Francis Bacon, 1561-1626

modified from: The Foundation of Improvement by Thomas W. Nolan et. al
The First Step: Flowchart the Process

• A flowchart must include the actual events as they typically occur

• To truly develop a flowchart that is representative you must “walk the line”
  – Talk to the staff involved in the process
  – Talk to staff about the “history” of the process
  – Identify unique contextual issues
Flowchart Example:
An Intern’s Experience Receiving an Admission
Create a Flowchart of the Events in Your Clinical Case (15 minutes)
Cause-Effect Diagram

- Determine area for improvement
- List areas that may cause/impact the improvement
- Method for analyzing process dispersion
- Relates causes and effects

**Advantages:**
- Good brainstorming tool and helps to focus on issues at hand

**Disadvantages:**
- Subject identification of causes and relationships between factors
Patients do not always receive optimal care in the ATR.

Waits and Delays
- Depend upon transport
- Depend upon lab & x-ray response
- Subspecialty clinics overbooked
- Primary care clinic overbooked
- Follow-up unclear & unreliable

Equipment
- No isolation room
- No interrogation room for psych
- Insufficient prosthetic supplies
- Supplies not labeled
- Supplies not stocked
- No central work area

Referrals
- Not always sent for acute care
- Consult not sent
- Indication for referral not clear
- Follow-up not easily arranged
- Records not always sent

ATR Attendings
- Physicians d/c patients
- Not focused on teaching
- No evaluation process
- Process not well outlined
- Objectives unstated

Nursing
- Data entry is burdensome
- Process & policies unclear
- Staff morale is low
- Often work at cross purposes (ie. answer phone, draw labs, call x-ray, transport patients)
- No clear triage guidelines

Residents
- Process of care delivery unclear
- Morale is low
- Goals & Objectives unclear & not well communicated
- No evaluation process
Create a Cause Effect Diagram of the Clinical Problem (15 minutes)
Aim Statement

The Aim:

• Think about your objective
• Define your measure
• BE SPECIFIC
• Set a time limit to meet your objective
Include Numerical Goals

• “Reduce delays” is not as effective as “reduce delays in the surgery process by 50% over the next 6 months”
• Numbers clarify the goal and communicate the expectations
• Numbers help the team to think about measures and initial changes
Sample Clinical Aim Statements:

**Clinical Outcomes**
- Within the next 12 months 80% of our diabetic patients will have documented A1c levels $\leq 8.0\%$.
- Within 12 months we will reduce hospitalizations for our asthmatics to $\leq 1/1,000$ per year for 0-14 year olds, $\leq 2/1,000$ per year for 15-44 year olds, and $\leq 3/1,000$ for 45-64 year olds.

**Patient Satisfaction**
- Within 9 months we will achieve a $> 90\%$ "highly satisfied" rating on routinely monitored satisfaction surveys from our patients regarding access to care, waiting times, service quality, attention to personal needs, and quality of our technical skills.
Create an Aim Statement for your Project
(10 minutes)
Reasons for Pilot Test Challenges

- Change was not well executed
- Support processes inadequate
- Hypothesis/hunch was wrong
  - Change executed, but doesn’t result in local improvement
  - Local improvement, but no impact on the more global outcome measure
- “If you want to learn about a system, try to change it.”
Change Concept:
A general notion or approach to change that has been found to be useful in developing specific ideas for changes that lead to improvement.
Groups of Change Concepts


- Eliminate waste.
- Improve work flow.
- Change the work environment.
- Provider-Patient interface.
- Focus on time.
- Focus on variation.
- Error proofing.
- Focus on service provided.
1. Modify Input

2. Combine Steps

3. Eliminate hand-off failures

4. Eliminate Step

5. Reorder sequence

6. Arrange to change process concept

7. Replace with better value step

8. Based on output, redesign production

9. Based on use of output, redesign

10. Based on need, redesign

CIAG, pp.109,110
TURP: Pre-Change

Patient checks in → TURP → Learn to self-cath → D/C

LOS = 5.0 days
Cost = $20,000
TURP: Change Concept

Patient checks in → TURP → Learn to self-cath → D/C

REORDER SEQUENCE
TURP: Post-Change

- Learn to self-cath
- Patient checks in
- TURP
- D/C

 LOS = 1.2 days
 Cost = $5,000
BREAK TIME
(10 minutes)
Overview of CQI Tools for Measurement
A Model for Improvement

What are we trying to accomplish?

How will we know that a change is an improvement?

What change can we make that will result in improvement?

ACT
PLAN
STUDY
DO

Langley et al., The Improvement Guide, 1996
Tips for Measures

• Explicitly state your question/hypothesis
• Seek usefulness, not perfection.
• Don’t wait for the information system.
• Integrate data collection into the current process.
• Data does not have to be inclusive, consider sampling
• Use outcome and process measures.
  – Outcomes ➔ Satisfaction, Quality of Life, Functional Status
  – Process ➔ Efficacy, Waits & Delays, Safety
• Design a form for collecting the data
THE RUN CHART
(An Example: A patient’s glucose level by date)

- Simple data recording form for charting progress over time
- Doesn’t allow for interpretation of cause
An Example of a Run Chart

Urgent Care Census per Month by Hour

Military Time (Hours)

Number of Patients

Sep-04
Oct-04
Nov-04
Dec-04
Jan-05
Feb-05
Focusing on the Problem Area

![Graph showing data points for different days of the week at various times of the day.](image)
Statistical Process Control Chart

• A more advanced run chart that summarizes variation in the dataset

• Control limits set at mean± 2sigma or mean±2(range average/1.13)
  – 2 sigma approximates 2 std. dev.

• Two-types of within process variation
  – Common cause ("random")
  – Special cause
Control Chart for Blood Glucose Levels

- **Upper Control Limit**
- **Lower Control Limit**
- **Mean**
Common Cause (Random) Variation

◆ represents the sum of many small variations, arising from real but small causes that are inherent in—and part of—any real process

◆ because random variation represents the sum of many small causes, it cannot be traced back to a root cause

◆ is a physical attribute of the process
  ➢ different processes have different levels of random variation
  ➢ random variation is a matter of measurement, not goal setting

◆ represents "appropriate" variation

◆ Example: Traffic lights while driving to work

Brent C. James, M.D., M.Stat., Intermountain Health Care, Salt Lake City, Utah, USA
Common Cause (Random) variation

Process Control Chart
(How the process behaves over time)

Brent C. James, M.D., M.Stat., Intermountain Health Care, Salt Lake City, Utah, USA
Special Cause (Assignable) Variation

◆ represents variation arising from a single cause that is not part of the process

◆ therefore can be traced, identified, and eliminated (or implemented)

◆ represents "inappropriate" variation

◆ Example: A traffic accident on the way to work

Brent C. James, M.D., M.Stat., Intermountain Health Care, Salt Lake City, Utah, USA
Special Cause (Assignable) variation

Process Control Chart
(How the process behaves over time)

Brent C. James, M.D., M.Stat., Intermountain Health Care, Salt Lake City, Utah, USA
Managing assignable variation

◆ Find a data point that probably represents assignable variation (usually a statistical outlier)

◆ track it to root causes

◆ eliminate (or implement) the assignable cause

(React to individual fluctuations in the data)

Brent C. James, M.D., M.Stat., Intermountain Health Care, Salt Lake City, Utah, USA
Managing random variation

The level of random variation is a physical attribute of a process. In order to reduce random variation one must find a new process with a new level of random variation -- that is superior to that of the original process.

Usually, the new process is a variant of the old process. Therefore,

- Plan a change (design a new process)
- Do it in a trial (on a small test group)
- Study the results (does the new process have a level of performance and/or random variation that is superior to that displayed by the old process?)
- Act (either implement the tested alternative, modify it and test again, or discard it)

Brent C. James, M.D., M.Stat., Intermountain Health Care, Salt Lake City, Utah, USA
Improvement in Cycle Time

Clinic A

Clinic B

There are lies, damned lies, and statistics.
Improvement in Cycle Time

Clinic A

Clinic B
BREAK TIME
(10 minutes)
Resident Team CQI Project Presentation

at

Morbidity & Mortality Conference

(An Example)
Barriers to Implementing this Curriculum

- Leadership support (e.g. Program Directors, Division Chiefs, Organizational Leaders)
- Faculty Support
- Faculty Skills and Knowledge
- Identifying Clinical Champions
- Faculty Time
- Resident Time
Feedback...