


The Science of Improvement: Leading Change With Data

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Objectives

- Describe the importance of displaying data over time
- Interpret a run chart to detect non-random patterns in systems or processes
- Using an improvement framework, develop a project plan that drives improvement and communicates value to the leadership team


Anatomy of a Presentation

- The Science of Improvement
 - Research vs. Improvement
 - Model for Improvement
 - Data Over Time
 - Interpreting a Run Chart
- Leading Change With Data
 - Building the System of Improvement
 - Building Improvement Capability

Disclosures

- None

AN IMPROVEMENT ZEALOT'S STORY



THE SCIENCE OF IMPROVEMENT

Research or Improvement?

- Quality improvement projects are typically designed, or intended to:
 - Improve patient care
 - Compare a program/process to an established set of standards such as standard of care, recommended practice guidelines, or other benchmarks
 - Improve the performance of institutional practice or local systems
 - Bring about improvements in health care delivery

Adapted from Boston Medical Center's Quality Improvement (QI)/Quality Assurance (QA) Activities versus Regulated Human Subjects Research checklist. Updated July 21, 2014.

Research or Improvement?

- Human Subjects Research is defined by the United States Secretary of Health and Human Services as a...
 - "systematic investigation, including research development, testing and evaluation designed to develop or contribute to **generalizable knowledge**."

US Department of Health and Human Services. Protection of Human Subjects: 45CFR 46. 2005; <http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.html>. Accessed February 13, 2016.

Using Traditional Statistical Tools for Improvement Work



The Big Differences

Characteristic	Improvement Science	Clinical Research
Intent	Improvement of care system, process (i.e. health care delivery)	New generalizable knowledge
Test observability	Test observable	Test blinded
Bias	Accept consistent bias, obsess about bias	Design to eliminate bias
Sample size	"Just enough" data; small sequential samples	"Just in case" data
Flexibility of hypothesis	Flexible; changes as learning occurs	Fixed
Testing strategy	Sequential tests	One large test
Determining if change is improvement	Run & Shewhart (control) charts	Hypothesis tests (t-tests, chi-square, p-values)

Provost LP, Murray SK. The Health Care Data Guide. First edition:2011;p27.

Improvement Framework

What are we trying to accomplish?


1. Set an aim

How will we know that a change is an improvement?

2. Define metrics

What changes can we make that will result in improvement?

3. Develop a change



4. Test your change

Institute for Healthcare Improvement. The Model for Improvement. <http://www.ihc.org/resources/Pages/HowtoImprove/default.aspx>. Accessed March 26, 2016.

Set an Aim

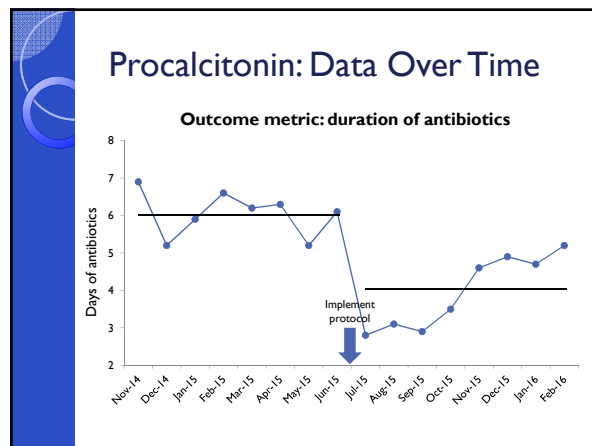
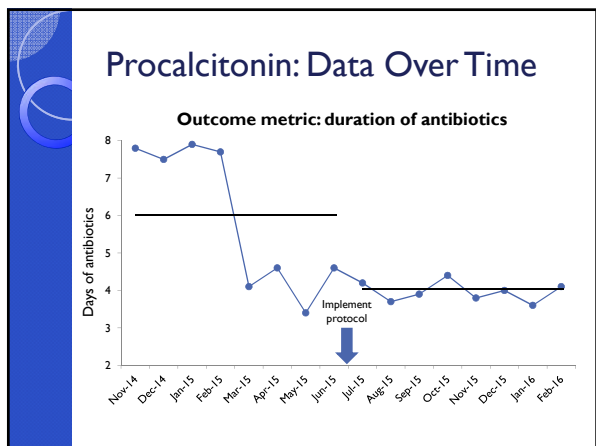
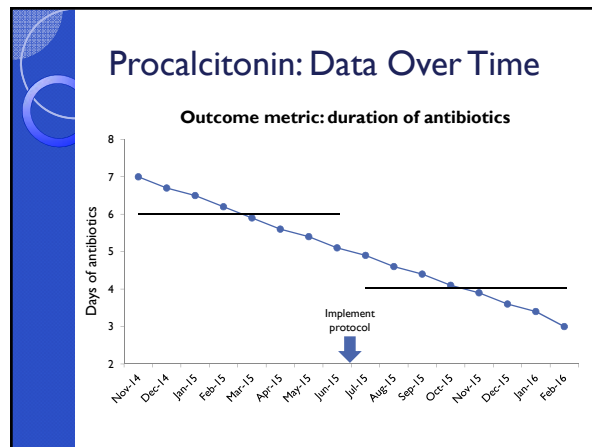
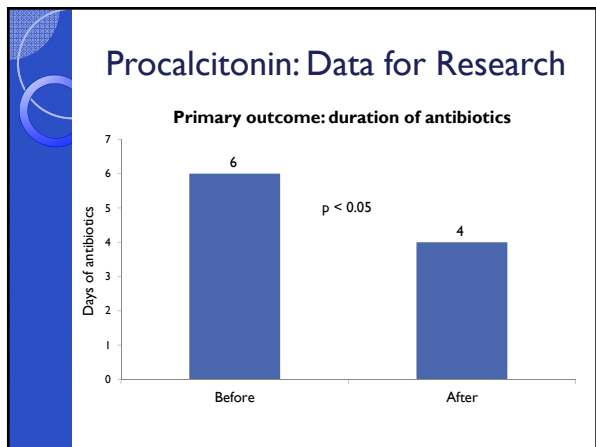
- Specific and time-bound
- Connect to an outcome metric
- Case study
 - Reduce the rate of continuous infusion refill requests from 1.1 to 0.5 per "drip day" by June 30, 2015

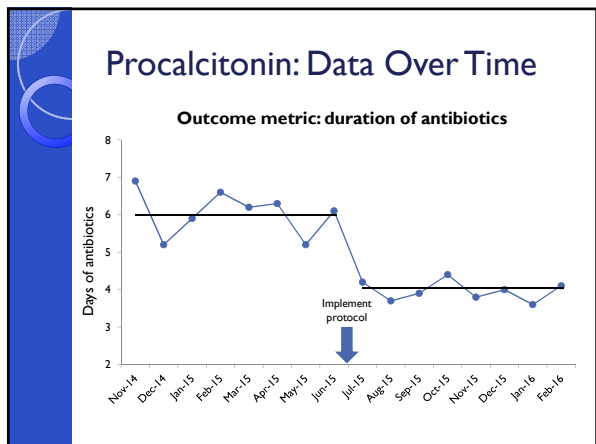
Develop Metrics

- Outcome**
 - Evaluates the "big picture"
 - Connects to aim statement
 - Tracked over the life of the project
- Process**
 - Determines if the change being tested is functioning appropriately
 - Gives voice to the process
- Balancing**
 - Determines if the change being tested has unintended or harmful effects

Develop Metrics: Case Study

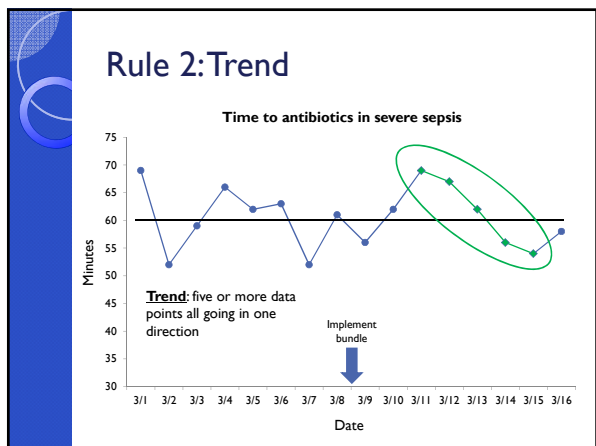
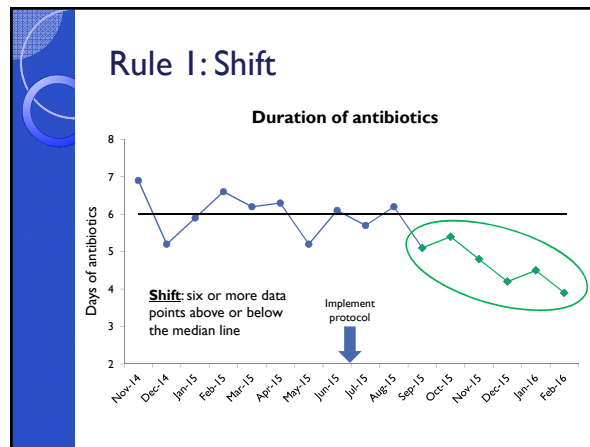
- Outcome**
 - Rate of continuous infusion refill requests
- Process**
 - Percent of reports completed
 - Delay in completing report
- Balancing**
 - Rate of continuous infusion waste



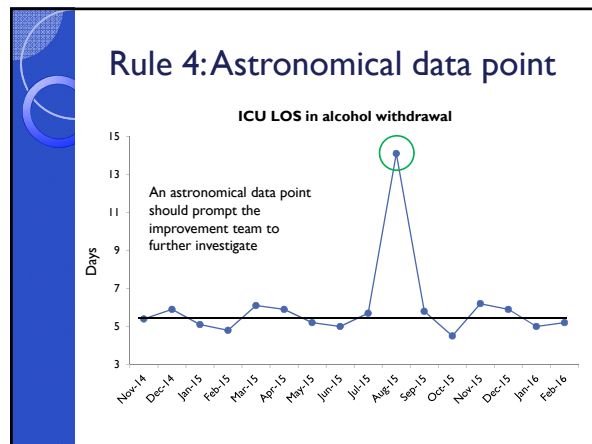
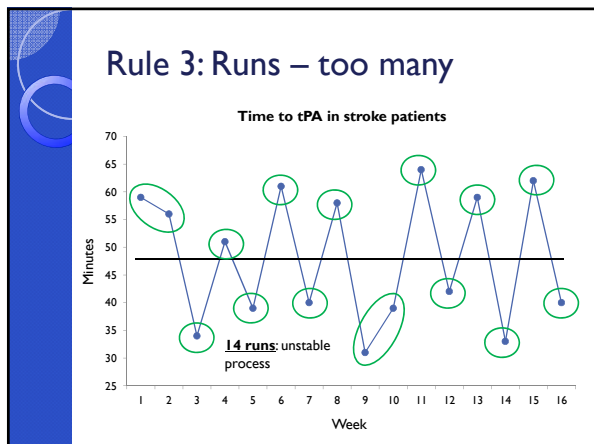


- ### Why Data Over Time?
- Best fits a messy, complex, changing health care environment
 - Makes performance visible
 - Determines if a change led to an improvement
 - Best detects random variation (common cause) and nonrandom variation (special cause)

- ### Special Cause (Nonrandom) Variation
- Significant change in a process (or metric) that is not due to chance ($p < 0.05!$)
 - Three probability-based rules
 - Rule 1: Shift
 - Rule 2: Trend
 - Rule 3: Runs
 - Rule 4: Astronomical data point
- Perla RJ, et al. BMJ Qual Saf 2011;20:46-51.



- ### Rule 3: Runs
- Definition: a series of points in a row on the same side of the median
 - To determine if there are too few or too many runs:
 - Count the number of times the line connecting data points crosses the median line; then add one
 - Refer to a chart to determine the upper and lower limit for number of runs
 - For 16 data points, there should be between 5 and 13 runs
- Perla RJ, et al. BMJ Qual Saf 2011;20:46-51.



- ### The Science of Improvement: Summary
- Use an improvement framework to drive change at your organization
 - When conducting quality improvement, display data over time
 - Use the four rules to learn about you data, detect nonrandom patterns, and improve patient care at your organization

LEADING CHANGE WITH DATA

- ### Essential Role of the Middle Manager
- Promote front line engagement
 - Beyond an “expression of support”
 - Teach, model, and lead
 - Conduit between senior leadership and front line staff
- Pannick S, Sevdalis N, Athanasiou T. BMJ Qual Saf. 2015;Epub ahead of print.

- ### Building the System of Improvement
1. Establishing constancy of purpose
 2. Understanding the organization as a system
 3. Designing and managing a system for gathering information for improvement
 4. Conducting planning for improvement and integrating it with business planning
 5. Managing and learning from a portfolio of improvement initiatives
- Langley GL, et al. The Improvement Guide: 2nd Edition; 2009:312.

Establishing Constancy of Purpose

- **BMC:** We will provide consistently excellent and accessible health services to all in need of care regardless of status or ability to pay – exceptional care, without exception.
- **Pharmacy:** We will provide high value, comprehensive pharmacy services to our patients and the health care team across the continuum of care through the use of integrated technology, innovative clinical initiatives, and our exceptional workforce.

Establishing Constancy of Purpose

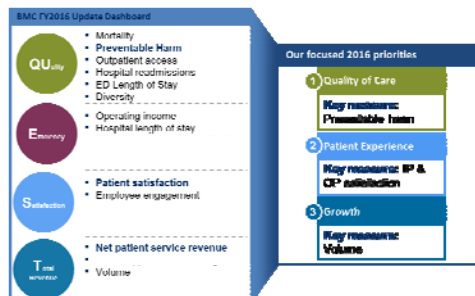
- **MUST** be able to clearly communicate the organization's and department's goals to the front line staff



Understanding the Organization as a System

- Connect front line work to organizational priorities
- Balance between top down and bottom up

Understanding the Organization as a System



BMC FY2016 Update Dashboard

- Quality**
 - Mortality
 - Preventable Harm
 - Outpatient access
 - Hospital readmissions
 - ED Length of Stay
 - Diversity
- Efficiency**
 - Operating income
 - Hospital length of stay
- Satisfaction**
 - Patient satisfaction
 - Employee engagement
- Total Revenue**
 - Net patient service revenue
 - Volume

Our focused 2016 priorities

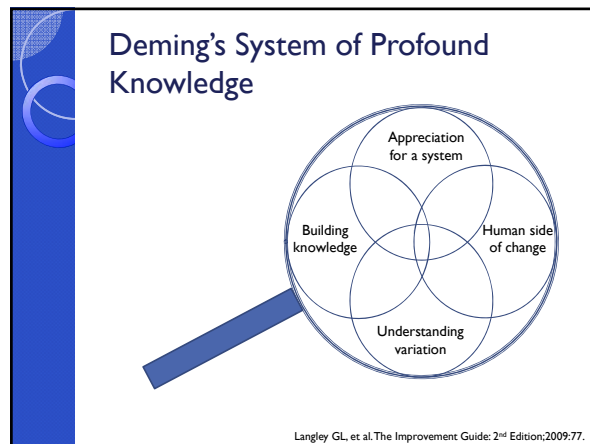
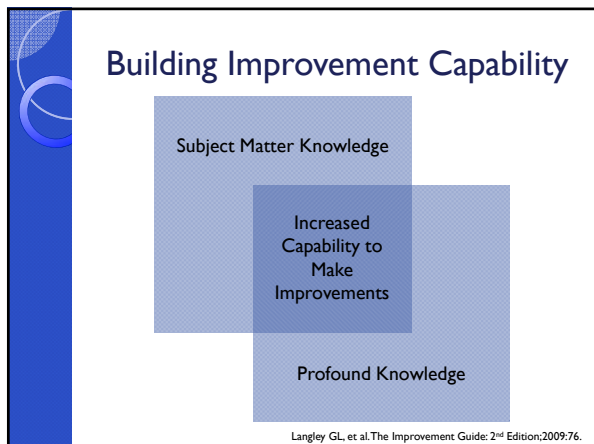
1. Quality of Care
Key measure: Preventable Harm
2. Patient Experience
Key measure: EP & CP satisfaction
3. Growth
Key measure: Volume

Understanding the Organization as a System



Building Improvement Capability





- ## Building Improvement Capability: BMC's Experience
- It's really hard!
 - It takes time and patience
 - It requires organizational and departmental leadership support
 - It doesn't *really* end!

- ## Call to Action: Ten Reasons to Step Up Your Improvement Game
10. Improvement is what we do best
 9. Differentiate ourselves
 8. Drive the agenda
 7. Connect our work to the organization
 6. Fits our attention span and business cycle
 5. Critical need for publications
 4. Can't improve if we don't measure
 3. It's a lot of fun
 2. Future of health care
 1. It's right for the patient

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