The Basics of QI for the Bedside Nurse

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Objectives

• Describe quality improvement theory and concepts
• Differentiate quality improvement, evidence based practice, and research
• Identify and describe commonly used quality improvement tools
• Describe the Microsystem Analysis
• Apply The Model for Improvement (MFI) and Plan, Do Study, Act (PDSA): Interactive Exercise
## Comparison: Quality Improvement, Evidence Based Practice, Research

<table>
<thead>
<tr>
<th>Method</th>
<th>QI (Quality Improvement)</th>
<th>EBP (Evidence Based Practice)</th>
<th>Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample</td>
<td>Unit Level</td>
<td>Patient Population</td>
<td>Representative</td>
</tr>
<tr>
<td>Data Collection</td>
<td>Evaluation</td>
<td>Search &amp; Appraise</td>
<td>Validity</td>
</tr>
<tr>
<td>Results</td>
<td>Improve process</td>
<td>Impact</td>
<td>Add to body of knowledge</td>
</tr>
<tr>
<td>Implications</td>
<td>Process change</td>
<td>Practice change</td>
<td>Understanding change</td>
</tr>
<tr>
<td>Dissemination</td>
<td>Unit/Agency</td>
<td>Practice standards</td>
<td>Scientific community</td>
</tr>
</tbody>
</table>

Adapted from Dimitroff, L.J. Nursing Research Alliance 7th Annual Conference, April 2011, Comparing and Contrasting Nursing Research, Evidence Based Practice, and Quality Improvement: A Differential Diagnosis. Capital District Nursing
Comparing Research and QI Measurement

“Measurement is a critical part of testing and implementing changes; measures tell a team whether the changes they are making actually lead to improvement. Measurement for improvement should not be confused with measurement for research. This difference is outlined in the table below”:

<table>
<thead>
<tr>
<th></th>
<th>Measurement for Research</th>
<th>Measurement for Learning and Process Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose</strong></td>
<td>To discover new knowledge</td>
<td>To bring new knowledge into daily practice</td>
</tr>
<tr>
<td><strong>Tests</strong></td>
<td>One large &quot;blind&quot; test</td>
<td>Many sequential, observable tests</td>
</tr>
<tr>
<td><strong>Biases</strong></td>
<td>Control for as many biases as possible</td>
<td>Stabilize the biases from test to test</td>
</tr>
<tr>
<td><strong>Data</strong></td>
<td>Gather as much data as possible, &quot;just in case&quot;</td>
<td>Gather &quot;just enough&quot; data to learn and complete another cycle</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>Can take long periods of time to obtain results</td>
<td>&quot;Small tests of significant changes&quot; accelerates the rate of improvement</td>
</tr>
</tbody>
</table>
The Science of Improvement

• Knowledge of general truths or the operation of general laws, especially those obtained and tested through the scientific method

• Concerned with how knowledge of specific subject matter is applied in diverse situations
The Science of Improvement

A primary aim of the science of improvement is to increase the chance that a change will actually result in sustained improvement from the viewpoint of those affected by the change.
The Art of Improvement

Improvement requires change

Change implies a newness, a creative aspect
The Science and Art of Improvement

Science:
• The idea is tested first on a small scale
• The change does not require undue restrictions
• Moving improvement from Trial-and-error process to Trial-and-learning process

Art:
• Innovation
• Creativity
• Communication
Improvement

While all improvements require change,

not every change will result in improvement
What is the PDSA Cycle?

“The cycle is a flow diagram for learning, and for improvement of a product or a process”

Deming, 1994
Knowledge to Support the Model

The route to transformation is what Dr. Deming calls “Profound Knowledge” composed of:

• Appreciation for a system
• Knowledge of variation
• Theory of knowledge
• Psychology
The Model for Improvement

What are we trying to accomplish?
How will we know that a change is an improvement?
What changes can we make that will result in an improvement?

Rapid Cycles of Change

Langley, et al., 2009
The Model for Improvement

• What are we trying to accomplish?
  o Specific
  o Measureable
  o Attainable
  o Reasonable
  o Time Limited

• How will we know that a change is an improvement?

• What changes can we make that will result in an improvement?
The Model for Improvement - PDSA

PDSA

- State objectives of the test
- Make predictions
- Develop a plan to carry out test

Langley et al., 2009
The Model for Improvement - PDSA

PDSA

Rapid Cycles of Change

- Carry out test
- Document problems and unexpected observations
- Begin analysis of the data

Langley et al., 2009
The Model for Improvement - PDSA

PDSA

- Complete the analysis of the data
- Compare data to predictions
- Summarize what was learned

Langley et al., 2009
The Model for Improvement - PDSA

- Adopt the change or
- Abandon the change or
- Run through the cycle again, possibly under different conditions, different materials, different people or different rules

PDSA

Langley et al., 2009
The Model for Improvement - PDSA

What are we trying to accomplish?
How will we know that a change is an improvement?
What changes can we make that will result in an improvement?

- Adopt the change
- Abandon the change
- Run through the cycle again, possibly under different conditions, materials, people or rules

- Complete data analysis
- Compare data to predictions
- Summarize what was learned

- State objectives of the test
- Make predictions
- Develop a plan to carry out test

- Carry out test
- Document problems and unexpected observations
- Begin analysis of the data

Rapid Cycles of Change

Langley et al., 2009
Principles of Improvement

• Know why you need to improve

• Have a way to get feedback to let you know if improvement is occurring

• Develop a change that may result in improvement

• Test a change before any attempts to implement

Langley, et al., 2009
Principles of Improvement

- Customer Driven
- System Optimization and Alignment
- Continual Improvement and Innovation
- Continual Learning
- Management through Knowledge
- Collaboration and Mutual Respect

Massey, et al., 2007
Why is This Important?

Insanity –

Doing the same thing the same way and expecting a different result

Albert Einstein
Quality Improvement Tools & Techniques
Quality Improvement Tool Box

- Data Collection/Check Sheet
- Process Flow Chart
- Run Charts
- Root Cause Analysis/Cause & Effect/Ishikawa/Fishbone Diagram
- Pareto Charts
- Control Charts
- Histograms
- Teams
- Brainstorming
- Microsystem Analysis
- Scatter Diagram
- Affinity Analysis
- System Modeling
- Force Field Analysis
- Failure Mode & Effects Analysis (FMEA)
- Gantt Chart Bar & Pie charts

Lean Tools:
- 5S
- Value Stream Mapping
- Jidoka: (stop the line) - Just in Time
- Poka Yoke: Mistake Proofing
- Heijunka: Smoothing the Process
Why Do We Use QI Tools?

To help us problem solve!

• Effective problem-solving is data driven. Data is impersonal; opinions are not

• To predict conditions, performance, process behavior

• Experience is gained quickest by collecting and analyzing data

• The tools provide common methods of analysis to help problem solving teams operate effectively
Data Collection

**What:** Simple data collection is a process to ensure that the data you collect for performance improvement are useful and reliable, without being unnecessarily costly and time-consuming to obtain.

**Why:** Data is collected to facilitate LEARNING!

IHI, 2016
Data Collection Plan

A data collection plan is useful to bring clarity to the data collection and measurement aspect of the project. The data collection plan should include:

• A specific question - What do you want to know?
• What data can be collected?
• What data analysis tools do you envision using to display the data after we have it? (e.g. run chart, pareto chart, control chart)
• Your data collection approach (qualitative, quantitative) and types of measures (structure, process, outcome)
• Where will you get the data? (e.g. reports, medical records, interviews)
• Who can give you the data?
• How can you collect the data with minimum effort and chance of error?
• What additional information do you need to capture for future analysis?
Making Sense of Data is a Process

Data → Analysis → Interpretation → Prediction

Input → Transformation → Output

(what will happen on application of the recommendations that are drawn from a test or experiment)

Wheeler, 1993; Deming, 1994
Description:

A simple data collection form consisting of multiple categories with definitions. Data are entered on the form with a simple tally mark each time one of the categories occurs.

When to Use:
- When there is a need for data to be observed and collected repeatedly by the same person or at the same location.
- Collecting data on the frequency or patterns of events, problems, defects, defect location, defect causes, etc.
- Collecting data from a process

<table>
<thead>
<tr>
<th>Patient</th>
<th>DOS</th>
<th>HA1C due?</th>
<th>HA1C obtained</th>
<th>Chol due?</th>
<th>Chol obtained?</th>
</tr>
</thead>
<tbody>
<tr>
<td>10563690</td>
<td>12/06/2016</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>
Process Flowchart

Description:

A flowchart is a picture of the separate steps of a process in sequential order.

When to use:
- Developing an understanding of how a process is works.
- Studying a process for improvement.
- Communicating to others how a process is done.
- When there is a need for clear communication between people involved with the same process.
- Documenting a process.
- Planning a project.

Hand Hygiene Flow Process

<table>
<thead>
<tr>
<th>Foam In-Entering Room</th>
<th>Foam In-Exiting Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Walk to door Stop</td>
<td>A</td>
</tr>
<tr>
<td>2 Locate the hand hygiene dispenser</td>
<td>7  Walk to door Stop</td>
</tr>
<tr>
<td>3 Pull hand hygiene foam dispenser</td>
<td>8  Locate the hand hygiene dispenser</td>
</tr>
<tr>
<td>4 Rub hands together covering all hand areas with foam</td>
<td>9  Pull hand hygiene foam dispenser into hand</td>
</tr>
<tr>
<td>5 Enter room</td>
<td>10 Rub hands together covering all hand areas</td>
</tr>
<tr>
<td>6 Complete work</td>
<td>11 Exit room</td>
</tr>
</tbody>
</table>

Phase 1 Current State
Process Flowchart

Micro Level View

IDEAL RECRUITMENT PROCESS FLOW
Run Chart

Description:
A graphical tool to monitor important process variables over time. One of the most important tools for assessing the effectiveness of change.

When to Use:
- Monitoring a continuous variable over time
- Looking for patterns, such as trends, cycles
- When you want a quick preliminary analysis to find obvious problems
- When insufficient points of data have been collected to draw a control chart
Description:
The fishbone diagram identifies many possible causes for an effect or problem. It can be used to structure a brainstorming session. It immediately sorts ideas into useful categories.

The typical categories of the cause and effect diagram includes: Materials, Methods, Equipment, Environment, and People. You can add bones that might fit your situation.

It can be used to structure a brainstorming session.

When to Use:
• When identifying possible causes for a problem.
• Especially when a team’s thinking tends to fall into rut

Non-Compliance Hand Hygiene Root Causes: 5 Whys

Used with permission from Susie Leming-Lee

ASQ, 2016
Description:

A Pareto chart is a bar graph. The lengths of the bars represent frequency and are arranged with longest bars on the left and the shortest to the right. In this way the chart visually depicts which situations are more significant. Often called the 80-20 Rule.

When to Use:

- Analyzing data about the frequency of problems or causes in a process.
- Focusing on the most significant problem or cause; however, there are many problems or causes.
- Analyzing broad causes by looking at their specific components.
- Communicating about your data with others

ASQ, 2016
### Description:

The control chart is a graph used to study how a process changes over time. Data are plotted in time order.

A control chart always has a central line for the average, an upper line for the upper control limit, and a lower line for the lower control limit. These lines are determined from historical data.

By comparing current data to these lines, you can draw conclusions about whether the process variation is consistent (in control) or is unpredictable (out of control, affected by special causes of variation).

**When to Use**

- Controlling ongoing processes by finding and correcting problems as they occur.
- Predicting the expected range of outcomes from a process.
- Determining whether a process is stable (in statistical control).
- Analyzing patterns of process variation from special causes (non-routine events) or common causes (built into the process).

---

**“Voice of the Process”**

**ED Length of Stay**

![Control Chart Diagram](image)

- **Ave Wait All**
- **Average**
- **Upper Control limit**
- **Lower Control Limit**

ASQ, 2016
# QI is a Science: Statistical Approach

## Overall Improvement Strategy

<table>
<thead>
<tr>
<th>Unstable process</th>
<th>Stable process</th>
<th>Stable process</th>
<th>Stable process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special causes present</td>
<td>Common cause variation is high</td>
<td>Common cause variation reduced</td>
<td>Common cause variation low</td>
</tr>
<tr>
<td>Average is too high</td>
<td>Average too high</td>
<td>Average reduced</td>
<td></td>
</tr>
</tbody>
</table>

### Diagram

- **Unstable process**
  - Special causes present
  - Average is too high

- **Stable process**
  - Common cause variation is high
  - Average too high

- **Stable process**
  - Common cause variation reduced
  - Average reduced

- **Stable process**
  - Common cause variation low
  - Average reduced

- **Remove special causes**
- **Process change**
- **Process change**
Control Chart

- Because control limits are calculated based on data from the process, they represent the *voice of the process* (VOP). Typically, they are set at ±3σ. The upper control limit is designated as UCL while the lower control limit is designated as LCL.
  - The difference between the UCL and the LCL constitutes a 6σ spread. This spread is known as the VOP and is a necessary value when determining process capability.

- Remember, ±3σ represents 99.73% of the data. The probability of a point falling outside the limits is only 0.27%. Shewhart felt these limits represented an economical trade-off of the consequences of looking for a special cause that doesn’t exist and not looking for one when it does exist.
  - Users are free to set limits at values other than ±3σ. However, caution is recommended since the out-of-control rules given below no longer apply.
Histogram

Description:

A histogram is the most commonly used graph to show frequency distributions. A frequency distribution shows how often each different value in a set of data occurs.

The histogram looks very much like a bar chart, but there are important differences between them.

When to Use:

- Data are numerical.
- Determining that the output of a process is distributed approximately normally.
- Determining whether a process change has occurred from one-time period to another.
- Determining whether the outputs of two or more processes are different.
Teams

Your Most Important Quality Improvement Tool
The Team is the Engine that Drives Quality Improvement!
What is a Team?

A team is “a group of people working together to achieve a common purpose for which they hold themselves mutually accountable”
Key Elements of a Team

- Members have a shared work product
- Carry out quality improvement activities
- Work across functions or departments to improve complex processes
- Usually consist of five to seven members
- Should represent everyone who works on the process in need of improvement
- Use quality tools to improve processes
- Generate ideas for change!

Scholtes, Joiner, Streibel, 2010
Brainstorming: Tools for Generating Ideas

- Brainstorming Description: “Brainstorming is a method for generating a large number of creative ideas in a short period of time” (ASQ, 2016).

- When to Use:
  - When a broad range of options is desired.
  - When creative, original ideas are desired.
  - When participation of the entire group is desired (McMahon, 2008).
Brainstorming

Tools for Generating Ideas:

• Cause and effect diagram/Ishikawa diagram

• Affinity Grouping: is a brainstorming method in which participants organize their ideas and identify common themes

• Multi-voting: is a structured series of votes by a team, in order to narrow down a broad set of options to a few. Nominal group technique – write ideas in silence, report out with ideas on newsprint
Change Concepts

“While all changes do not lead to improvement, all improvement requires change”

- Eliminate waste - Lean
- Improve work flow
- Optimize inventory
- Change the work environment
- Enhance customer relationship
- Manage time
- Manage variation
- Design systems to avoid mistakes
- Focus on the product or service
- Minimize handoffs
- Move steps closer to the process
- Find and remove bottlenecks
- Change the order of process steps
- Use automation
- Give people access to information
- Implement cross-training
- Reduce wait time
- Standardization
CLINICAL MICROSYSTEMS
Definition of a Microsystem

• “A clinical microsystem is a small group of people who work together on a regular basis to provide care to discrete subpopulations of patients. It has clinical and business aims, linked processes, and a shared information environment, and it produces performance outcomes”.

• They are the place where patients, families, and care teams meet.

• “Microsystems evolve over time and are often embedded in larger organizations. They are complex adaptive systems, and as such they must do the primary work associated with core aims, meet the needs of their members, and maintain themselves over time as clinical units”.

Nelson, Batalden, Godfrey, 2007
History of Microsystems

- W. Edwards Deming, Avedis Donabedian, Parker Palmer, Karl Weick, Donald Schön, and Donald Berwick contributed to the microsystem evolution.

- James Brian Quinn, PhD, pioneered and is known as the “father” of microsystem and macrosystem thinking. Dr. Quinn, has referred to a microsystem as an “intelligent enterprise,” that is to say, an organization that is smart and is able to get smarter.

- The microsystem approach was adapted in late 1980’s early 1990’s to healthcare.

Nelson, Batalden, Godfrey, 2007
Why Do We Study Microsystems?

• You cannot effectively change a system that you do not fully understand

• Avoid unintended consequences

• Engagement of members of the microsystem or environment

• Evaluating your microsystem is the first step to quality improvement
Distinguishing Features of a Microsystem

- **Professional formation locus:** the place where people learn how to become competent health care professionals and develop over time.

- **Living system laboratory:** the place to test changes in care delivery and to observe and understand complexity.

- **Source of workforce motivation or alienation:** the place where pride in work flourishes or flounders.

- **Building block of health care:** the place that joins together with other microsystems to make a continuum of care.

- **Locus of clinical policy in use:** the place where clinical care is actually delivered and thereby the place that reflects the authentic clinical policy.

- **Maker of health care value and safety:** the place where costs are incurred and the sharp end where reliability and safety succeed or fail.

- **Maker of patient satisfaction:** the place where patients and families interact with staff and experience care as meeting or not meeting their needs.
Clinical Microsystem

Embedded Provider Units in a Health System

Figure 4. Clinical microsystems are embedded in larger systems and are by definition patient-centric.
Clinical Microsystem

The Joint Commission Journal on Quality and Patient Safety

The Physiology of a Clinical Microsystem

- Satisfaction of need, monitoring, assessment of outputs

- Beneficiary knowledge, including knowledge of life while not in direct contact with the health care system

Figure 2. This figure illustrates the dynamics of the caregiving process in frontline clinical microsystems.
Clinical Microsystem Evaluation

Unit of Work = Unit of Analysis = Unit of Change

- **Unit of Work**
  - Inpatient Medical-Surgical Unit or Work Unit

- **Unit of Analysis**
  - The 5 P’s of the Unit

- **Unit of Change**
  - Identify Areas for Change
The 5 P’s

• **Purpose**: What does the microsystem do?

• **Patients**: Who receives care in the microsystem?

• **Personnel**: Who works in the microsystem?

• **Processes**: How care is delivered in the microsystem?

• **Patterns**: What are the Outcomes and Safety of the microsystem?
P 1 = Purpose

• What is the primary goal of your clinical area or ‘microsystem’-the work of the microsystem?

• What is the Mission statement or definition of the area?

• What is the unique contribution/s that the microsystem makes within the overall macrosystem?
P 2 = Patients

- Who is receiving the care in the microsystem?
- What are the characteristics of the patients when they enter your microsystem?
  - Who are they?
  - How old are they?
  - What are the top diagnoses?
  - What is their state of health?
  - How did they enter your microsystem?
  - What are their “health care needs”?
  - Are they satisfied/happy with the care they are receiving?
P 3 = Professionals

- Who are the people who work in the microsystem?
- What is their skill level?
- What do they think about their work?
  - Staff Satisfaction Surveys
- What are the characteristics of their work, what kind of work do they perform?
- How long have they worked in the microsystem?
P 4 = Processes

• What types of processes are occurring in the microsystem? (e.g. diagnosing process, care planning process, admitting process, medication administration process, discharge planning process)
  ◦ Flow diagram of the current processes

• Think of routines or standard operating procedures
P 5 = Patterns

- Patterns measure the performance of the microsystem. Patterns of:
  - Leadership, cultural, traditional workflow

- Patterns gauge the value of care:
  - Are there regular meetings to discuss outcomes of care or care processes on a regular basis?
  - Are there faculty/staff meetings to discuss the successes/struggles of the environment?
  - Who talks to whom?
  - Who never talks to whom?
P 5 = Patterns (continued)

Think of metrics/outcomes:

• What metrics does the macrosystem follow?
• What metrics does the microsystem follow?
Are they aligned with the macrosystems metrics?
• Are the metrics balanced?
  • Functional
  • Satisfaction
  • Cost
  • Clinical Outcomes
• What types of safety mechanisms are in place?
Clinical Value Compass

• The Clinical Value Compass Model can be used to evaluate the effectiveness and efficiency of a quality improvement initiative indicators providing a balanced approach to measurement.

• The Clinical Value Compass is highly suited for the evaluation of clinical setting improvement projects because the models allow for a balanced and meaningful profile of care giving processes and outcomes (Nelson et al.).
Clinical Value Compass
Measurement of Health Outcome

**Functional Health Status**
- General and Disease-specific
- Physical function
- Mental function
- Pain/Symptom Relief
- Quality of life

**Clinical Outcomes**
- Mortality
- Morbidities
- Complications

**Costs**
- Direct Medical
- Indirect Social
- Market Share & Volume

**Satisfaction**
- Patient
- Staff
- Provider
- Access, Retention & Loyalty
Dartmouth Microsystems’ Resources

• Green Books
  • Inpatient
  • Emergency Department
  • Long Term Care
  • Outpatient Primary Care
  • Outpatient Specialty Care
  • NICU Green Book

• Microsystems at a Glance and
• Clinical Microsystem Action Guide Improving Health Care by Improving Your Microsystem can be found at:

  http://clinicalmicrosystem.org/workbooks/
Conclusion

“At the end of the day, the quality, safety, and costs of care are created at the front lines of care - in clinical microsystems, the places where patients, families, and care teams meet”.

Nelson et al., 2008
Conclusion

Tell me and I'll forget; show me and I may remember; involve me and I'll understand. Chinese Proverb
Small Group
Paper Airplane Exercise

• Select Your Team
• Pickup Your Supply Bag: Includes paper airplane exercise instructions
Thank You!
References


References


