Measurement for Improvement

Patricia Simino Boyce, PhD, RN
“In God we trust. All others bring data.”

W. E. Deming
Fundamental Questions for Improvement

1. What are we trying to accomplish?
   *Aim Statement*

2. How will we know a change is an improvement?
   *Measures*

3. What changes can we make that will result in improvement?
   *Changes - PDSA*
Relationship of AIM to Measures

• Numerical goals not only clarify the aim, but also help team members begin to think about what changes will most likely impact the project aim
Why Do We Measure?

- To **characterize**
  “How can we characterize the robustness of our system?”
- To **evaluate**
  “How can we demonstrate that we meet our goals?”
- To **predict**
  “How will the process react if we introduce a change?”
- To **improve**
  “What is the gap between current and desired performance?”
Purpose of Using Data & Measuring

The purpose of measuring is to answer critical questions and to guide intelligent action.

Cliff Norman- Associates in Process Improvement
Measurement

- Measurement is critical for testing and implementing changes
- Different from measurement for research
<table>
<thead>
<tr>
<th></th>
<th>Measurement for Research</th>
<th>Measurement for 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 blind 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, just in case</td>
<td>Gather just enough data to learn and complete another cycle</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>Can take a long time</td>
<td>Short duration</td>
</tr>
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</table>
Project-wide Measures

**Outcome Measures:** Voice of the customer or patient. What is the result of the system of care on the patient or community?

**Process Measures:** Voice of the system. Are the parts/steps in the system performing as planned?

**Balancing Measures:** Looking at a system from different directions/dimensions. What happened to the system as we improved the outcome and process measures? (e.g. unanticipated consequences, other factors influencing outcome)
### Sample Set of Measures for Asthma Improvement

<table>
<thead>
<tr>
<th>Aim</th>
<th>Outcome Measures</th>
<th>Process Measures</th>
<th>Balancing Measures</th>
</tr>
</thead>
</table>
| Enhance asthma management to help empower clients to reach their maximum health potential by using The Chronic Care Model as an organizational approach to caring for the population of patients with asthma |  Decreased ER visits  
 Decreased hospitalizations  
 Decreased lost school days  
 Increased symptom-free days |  Use of asthma flow sheet  
 Asthma Action Plan in chart  
 Persistent asthmatics treated with anti-inflammatory meds  
 Patients have an asthma trigger avoidance plan  
 Patients with exposure to smoking referred to cessation program |  Volume of asthma patients  
 Number of acute visits per patient  
 Staff satisfaction results  
 Financial/budget (cost of making changes) |
Some Things to Consider for Data Measurement & Reporting

• Define each measure (operational definitions)
• Decide how the data will be obtained
  - Already being collected (and reported)?
  - Need a collection plan?
  - Use all the data or sample?
• Decide how the data will be summarized
  - Statistic to be used?
  - Frequency?
• Define the target goal for improvement
• Identify any notes or considerations with how to interpret or define the measure
• Determine the plan for review
Well Defined Measures and Data Collection Plan for Asthma

<table>
<thead>
<tr>
<th>Measure</th>
<th>Definition</th>
<th>Data Gathering Plan &amp; Target Goal</th>
<th>Notes/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td># of symptom-free days in previous two weeks</td>
<td>At each patient contact, as the number of days with symptoms in the previous two weeks. Subtract that number from 14 to get the number of symptom free days for the patient in the previous two weeks. (Sum the symptom-free days over all patients. Divide the sum by the number of patients in the data system who report symptom free days)</td>
<td>On the last workday of each month, use the asthma data tracking tool or data system to find the patients who had a severity assessment as last contact. Use the estimate of symptom-free days provided at this contact. <strong>GOAL = &gt;10 Days</strong></td>
<td>Symptoms are those identified on asthma flow sheet. Days are 24-hour periods. A day covers daytime and nighttime.</td>
</tr>
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</table>
Data for Improvement

Using Data to understand progress toward the team’s aim

Using Data to answer the questions posed on in the plan for each PDSA cycle
Measures

How will we know a change is an Improvement?

• Baseline measures
• Trended data over time (performance results)

Look at a family of measures to define the impact of change on a system
Important Considerations for Measuring Improvement

• Focus on trending performance over time
• Balance measurement with improvement (test changes and measure!)
• Turn data into information quickly
• Put it into a form your audience can use
• Communication—share data liberally with everyone—feedback is key to improvement
• Enable improvement at multiple levels
Why are we measuring?

The answer to this question will guide our entire measurement journey.
Measurement Assumptions

- The purpose of measurement is for learning, not judgment.
- All measures have limitations, but the limitations do not negate all value.
- Measures are one voice of the patient and system. Information gained from measurement gives us feedback on how to act within the system.
- Measures tell a story; goals give a reference point.
The “Story”

- Measurement tells the STORY of your improvement actions
- Trended data (3 or more data points) reveal:
  - Variation in the system
  - Impact of your changes
  - If changes are leading to improvement
  - Feedback on system
We have 2 quarterly data points - is this an improvement?
Are we assuming something like this?

Executive Time Series - linear trend

Measurement for Improvement
But it could be like this ...

Executive Time Series - no trend

Something Important

Measurement for Improvement
Improvement in Cycle Time

<table>
<thead>
<tr>
<th>Cycle Time (min.)</th>
<th>Before Change</th>
<th>After change</th>
</tr>
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<tbody>
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<td></td>
<td>70</td>
<td>35</td>
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Run Chart - A Graphical Record of a Measure Plotted Over Time

Cycle Time (min.)

date  Jan  Feb  Mar  Apr  May  Jun  Jul  Aug  Sep  Oct  Nov  Dec

Unit 1

Change Made
Cycle Time
Results for Units 1, 2 and 3
Cycle Time
Results for Units 1, 2 and 3

<table>
<thead>
<tr>
<th>Unit 1</th>
<th>Unit 2</th>
<th>Unit 3</th>
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<tr>
<td><strong>Avg Before Change</strong></td>
<td><strong>Avg After Change</strong></td>
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Family of Measures - Asthma Example

Maintenance
Anti-Inflammatory Meds

Written Action Plan

Symptom
Free Days
Reasons for Plotting Data Over Time

- Summary Statistics hide information (patterns, outliers).
- In improvement efforts, changes are not fixed but are adapted over time.
- The act of measurement itself can move things toward the results you want.
- When annotated with changes and other events, provides evidence of sustained improvement - will guide you as to when you should implement and whether or not you are holding your gains.
- Tells a story that will help with spread.
Annotated Run Chart

- Plot small samples frequently over time

- Observed Data Value
  - (e.g., Infection Rate)

- Time Order (e.g., Month)

- Change 1 tested
- Change 2 tested

- Plot small samples frequently over time
Annotated Run Chart - Symptom Free Days

Annotations
1. Established Registry
2. Test and Medication guidelines
3. SM support and Management Plans
4. Implemented SM support
5. Pollen count high - many fall season triggers
6. Flu/virus season
Visual Display of Data: Annotated Run Chart

- Eliminates ink that does not add information
- Shows the data
- Makes good use of space
- Integrates words with the data
Reporting Progress

- Share the data
- Convert it into usable information
- Create clear, easy to read report designs
- Know your audience
- Provide context for the report
- Determine reporting frequency