Residents QI Workshop III: Measurements, Data Sources, and Run Charts

**Measurement** is essential in any improvement work: It tells you if the changes you are testing are leading to improvement. Measurement for improvement is different from measurement for research or measurement for accountability.

Now that you have clearly established your aim,
To: ________________________________________________________________

And considered measures,

Main outcome measure_______________________________________________

Balancing measure(s)_________________________________________________

Other process or outcome measures measure(s)__________________________

Next steps:

What needs to be done?  
Who will do it?  
By when?

What needs to be done?  
Who will do it?  
By when?

What needs to be done?  
Who will do it?  
By when?
3 Types of Measures

• Outcome measures:
  • The measures you are ultimately trying to change (i.e., colon cancer screening completion rate).

• Process measures:
  • The measures of parts or steps of the system that affect the outcome measure.

• Balancing measures:
  • Not always directly related to main goal of a project but may relate to changes that occur as a result of an intervention which may be considered problems.

Displaying data – Run Charts

• Now that you have collected your data – what should you do with them?
• Storing data in a spreadsheet format is helpful during data collection. Please review the information about data protection and PHI.
• Plotting data over time is usually done on a RUN CHART.
  • X axis = time
  • Y axis = a measured variable
• You may consider adding a goal line or other annotations to denote when a PDSA cycle started or ended.
• Plot of measurement over time (or patient encounters, but usually time). One determines the “baseline median” using data prior to implementation of your change idea. Your aim or goal may be visually depicted on this graph as well.

• Generally, we use median values to compare data to look for runs, outliers, variability, trends and shifts. The median represents a true value in the data set (rather than arithmetic mean which may be above or below the median line). If the data is stable or symmetric, mean may also be used but often a moving mean is used to smooth out variability and compare with the mean.

**Example: Run Chart**

![Run Chart Example](image)

**Some general suggestions:**

- There should be at least 25 data points for a chart like this - you may need to collect weekly data or daily data to have meaningful reports.

- Recalculate medians after new processes are implemented and try to collect a comparable number of data points post-intervention.

- Variables data (measures are continuous, like length of stay, time) vs. attributes data (counts or rates derived from a count, discontinuous like number of falls, pressure ulcer number) - this is why median is commonly used.

- Feedback to the organization and stakeholders is important during this process - this may reinforce compliance with your intervention and improve communication about other initiatives which may affect your outcome measure.

- Finally, consider creating run charts for balancing measures if possible to compare favorable results and unintended consequences.

**Run Charts - Pitfalls to Avoid**

There are two ways to misinterpret run charts:
1. To conclude that some trend or cycle exists, when in fact what is being seen is normal process variation
2. Not to recognize a trend or cycle when it does exist.

People are less aware that they are making the first type of error.

**How can you avoid pitfalls?**

Look at a long enough period of time so that a “usual” range of variation is experienced.

Ask:

- Is the recent data within the usual range of variation?

Consider this exercise:

Draw a best-fit trend line from the beginning to the end of the data on the run chart. If the line is approximately horizontal, then the mean of the process can be considered stationary over this time interval. If not, then the process mean is considered nonstationary, or unstable. Drawing this inference requires sufficient data, usually 50 or more observations (i.e., two points are not sufficient).

**Where will you get your data?**

- Chart review
- Epic
- Quality team reports, tracking spreadsheets
- Qlik (more later)
- Billing data
- Insurers
- Other sources?

**How do you know if you are measuring the right outcome?**

Track secular trends and other local / regional or global efforts - track JUP efforts, PFAC, quality team, practice team and individual efforts if possible. *The best way to ensure that you do not miss other change efforts is to advertise what you are doing widely and communicate with key personnel (quality leaders, practice leadership, etc.).* Note the dates when efforts start (and end if possible) and gather a very brief description of the change effort if possible.

To learn more...IHI Open School QI 103: Testing and Measuring Changes with PDSA Cycles