



# Are You Using Data the Right Way?

*How leaders interpret data affects the quality of decision making.*

One of the biggest challenges facing healthcare leaders is the ability to make sound predictions.

Health system leaders want to know: What will our revenue be this quarter? How many nurses should we schedule in the ED next month? How much vaccine should we stock this year? What will our bed occupancy be next week?

To answer these questions with any degree of accuracy, leaders look to data for help. However, in many circumstances, the data they rely upon are inadequate, leading to poor predictions that negatively affect organizational performance.

Take, for example, a dashboard display of hospital-acquired infection rate data over time (see chart below).

Many leaders like to see relevant data for a key measure captured on a

single line. Each measure displayed includes the fiscal-year goal, long-term goal, recent fiscal-year data and the latest quarterly results. These data are intended to provide insight into current performance, desired goals and the magnitude of difference between the two. Many such dashboards then go a step further, easing data interpretation by adding traffic light colors to indicate when a measure is meeting the goal (green), is close to the goal (yellow) or not at all close to the goal (red).

When assessing the data in a dashboard measure display for predictive purposes and to help decide what to do next with the infection reduction initiative (e.g., allocate additional resources, launch further improvement work or monitor and do nothing for now), many leaders conclude the data show progressive improvement, quarter by quarter, with the

organization achieving its fiscal goal during the last quarter.

Leaders present this narrative to their boards, and it's the lead story from the CEO in the staff monthly newsletter.

*Leaders want to easily make data-driven decisions.*

But, will this level of performance continue to be sustained? It's impossible to answer this question using this type of dashboard display. Shewhart statistical process control charts are the better choice.

## Using the Right Tools to Inform Decisions

In 1991, at the start of the quality improvement movement in health-care, the Institute for Healthcare Improvement and its founder, Don Berwick, MD, introduced the field to various improvement methods, including using data for improvement and specific tools like Shewhart charts to display and interpret data over time.

Developed nearly 100 years ago by quality control statistician Walter Shewhart, the chart method is designed to better appreciate the

Dashboard Display							
Measure	Goals		FY17	FY18	FY19		
	FY19	Long-Term			Q1	Q2	Q3
Total infections per 100 patient days	2.00	0.00	3.37	4.33	4.29	2.56	1.95

Source: Common dashboard measure display adapted, Provost LP, Murray S. The Health Care Data Guide: Learning from Data for Improvement. San Francisco: Jossey-Bass; 2011.

behavior of a measure as it unfolds over time. It also aids in differentiating between common cause or random variation and special cause variation, which can be attributed to specific causes. Plotting the data using control charts and applying Shewhart's principles of common cause and special cause variation can result in totally different decisions about what to do next.

Using a Shewhart (process control) chart, let's take another look at the hospital-acquired infection rate data.

The Shewhart chart (see figure on next page) depicts monthly infection rates over time. The center line on the chart reflects the average infection rate, and the upper control limit indicates the upper boundary of common cause variation that is likely to be seen in the data as they unfold over time. In this case there is no lower control limit because the average infection rate is low enough that the limit would fall below zero. Control limits are calculated based on the data and help us visualize the variation that is possible for the measure within the current performance.

Visualizing these data over time in a Shewhart chart tells a different story. Infection rates, which appeared to be decreasing in the tabular dashboard display, now clearly show no change over time; the rates are stable.

Based on what the data are showing in the chart display, rather than monitoring the data for ongoing good performance, the leadership

team should be stepping up actions to reduce infections in their facility. We can make this assessment because the data appear to fall randomly around the center line and none are outside the control limits.

*Shewhart statistical process control chart method is designed to better appreciate the behavior of a measure as it unfolds over time.*

Why does this matter? It matters because a leader of quality needs predictable systems to consistently meet performance goals and deliver reliable care. If important systems measures are not showing predictability and desired performance, then working to stabilize the system to achieve predictability is the best decision a leader can make.

### Exercise Caution With Shewhart Charts

Interpreting a Shewhart chart is not very difficult, though some skill is required. A common pitfall is mistaking common cause variation for special cause variation.

Sometimes called tampering, an example is overreacting to the ups and downs of data month to month and instructing staff to figure out what's going on and fix it. This stance lacks understanding of randomness, common cause variation.

Rather than reacting moment to moment, the better decision is to commission an improvement

initiative to fundamentally improve the overall system to achieve a different level of performance that meets your goal.

A second mistake leaders often make is to assume a system that is displaying special cause variation is stable and predictable when that is not the case. When this occurs, the best decision is to investigate and address the causes of instability so that the system can be returned to a predictable state. (See table on next page.)

Leaders have limited bandwidth and want to maximize their efforts. It's understandable for leaders to want to focus the team's attention on the right problems and want to know how best to act. This critical understanding of variation can help leaders be more confident about knowing when to act to correct and improve the system, increasing the likelihood of monitoring a stable system into the future.

Making the right decision on when and how to act, increases the potential for improvement and reduce cost. Using data wisely helps leaders bring clear meaning to their performance and supports practical choices to improve. ▲



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Figure. U-Chart Shewhart SPC Chart – Infection Rate Per 100 Days

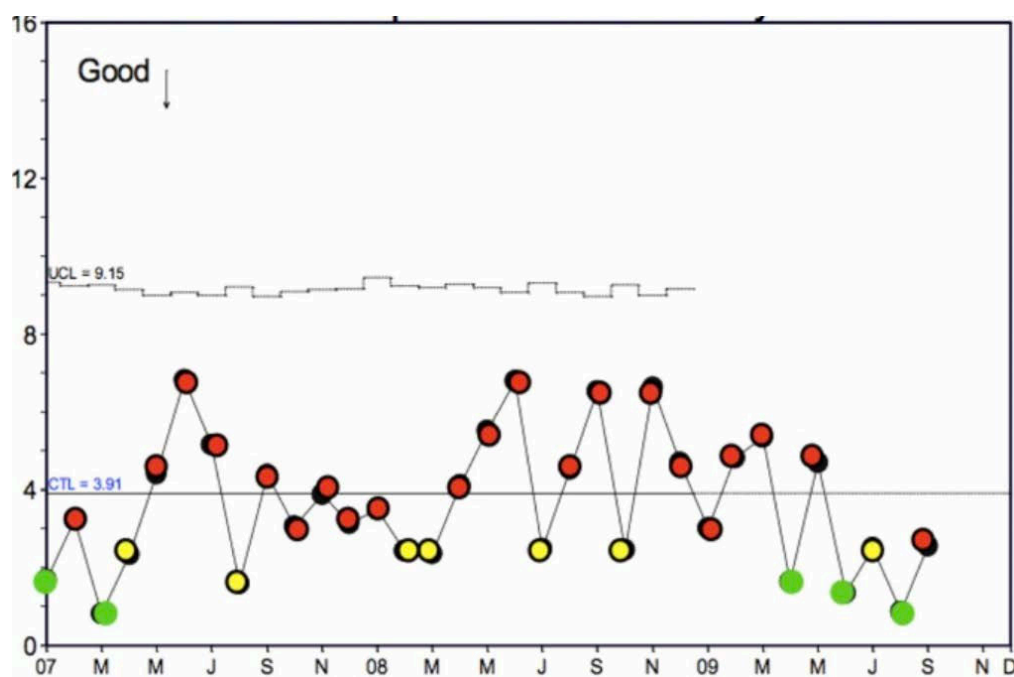


Table.

Actions	Actual Situation of System	
	All Common Causes	Special Causes Occurring
Take action on individual outcome. Treat as <i>special cause variation</i> .	-\$ <b>Mistake 1</b>	+\$ Correct Decision (A)
Treat outcome as part of system work on changing the system. Treat as <i>common cause variation</i> .	+\$ Correct Decisions (B)	-\$ <b>Mistake 2</b>

Source: Provost LP, Murray S. *The Health Care Data Guide: Learning from Data for Improvement*. San Francisco: Jossey-Bass; 2011:118.