INSTITUTE FOR HEALTHCARE IMPROVEMENT

Helping Leaders Blink Correctly: Part II

Understanding variation in data can help leaders make appropriate decisions.

Editor's Note: Part I of this two-part column can be found in the May/June 2010 issue of Healthcare Executive.

In healthcare we tend to make quick decisions ("blink") by finding patterns in data based on narrow slices of experience ("thin slicing"), a concept Malcolm Gladwell details in his book *Blink: The Power of Thinking Without Thinking* (Little, Brown, 2005). This approach is usually problematic because we see trends where no trends exist, conclude that the data have shifted when in fact they display nothing more than random variation, or spend an inordinate amount of time trying to explain a single high or low data point while ignoring the rest of the data.

While Part I of this article introduced the first two skills healthcare leaders need to make appropriate decisions (understanding the messiness of improving healthcare and determining why they are measuring in the first place), this article will discuss the remaining two skills: understanding and depicting variation and translating data into information.

Understanding and Depicting Variation

Variation exists in all that we do, so why do we react one way when the monthly budget numbers are positive and another way when they are negative, or when patient satisfaction scores increase from one month to the next? The simple explanation is that most healthcare professionals are not given sufficient training in statistical methods to "extract knowledge that may be locked up inside the data," as Don Wheeler illustrates in his book *Understanding Variation: The Key to Managing Chaos* (SPC Press, 1993). They are taught to apply static rather than dynamic statistical approaches to understanding variation.

A static approach to understanding variation is hallmarked by the following activities:

- Presenting data in tabular or aggregated formats and displaying this data in bar or pie charts
- Using measures of central tendency (the mean, median and mode) and measures of dispersion (the range, standard deviation, variance, coefficient of variation, etc.) to summarize the variation in the data
- Comparing two data points to determine if they are statistically different

So, what are the limitations of the static approach to understanding variation? Aggregated data presented in tabular formats or with summary statistics will never allow you to understand the variation in the data or to determine the impact of quality improvement efforts. Aggregated data can only lead to blinking quickly and often leads to a decision based on judgment (see Part I for the distinction between using data for improvement and data for judgment).

To truly understand the variation in your data, a dynamic approach that uses statistical process control methods to analyze variation in data over time is most appropriate. The primary statistical tools for understanding variation in this context are run and control charts. This article will focus only on control charts.

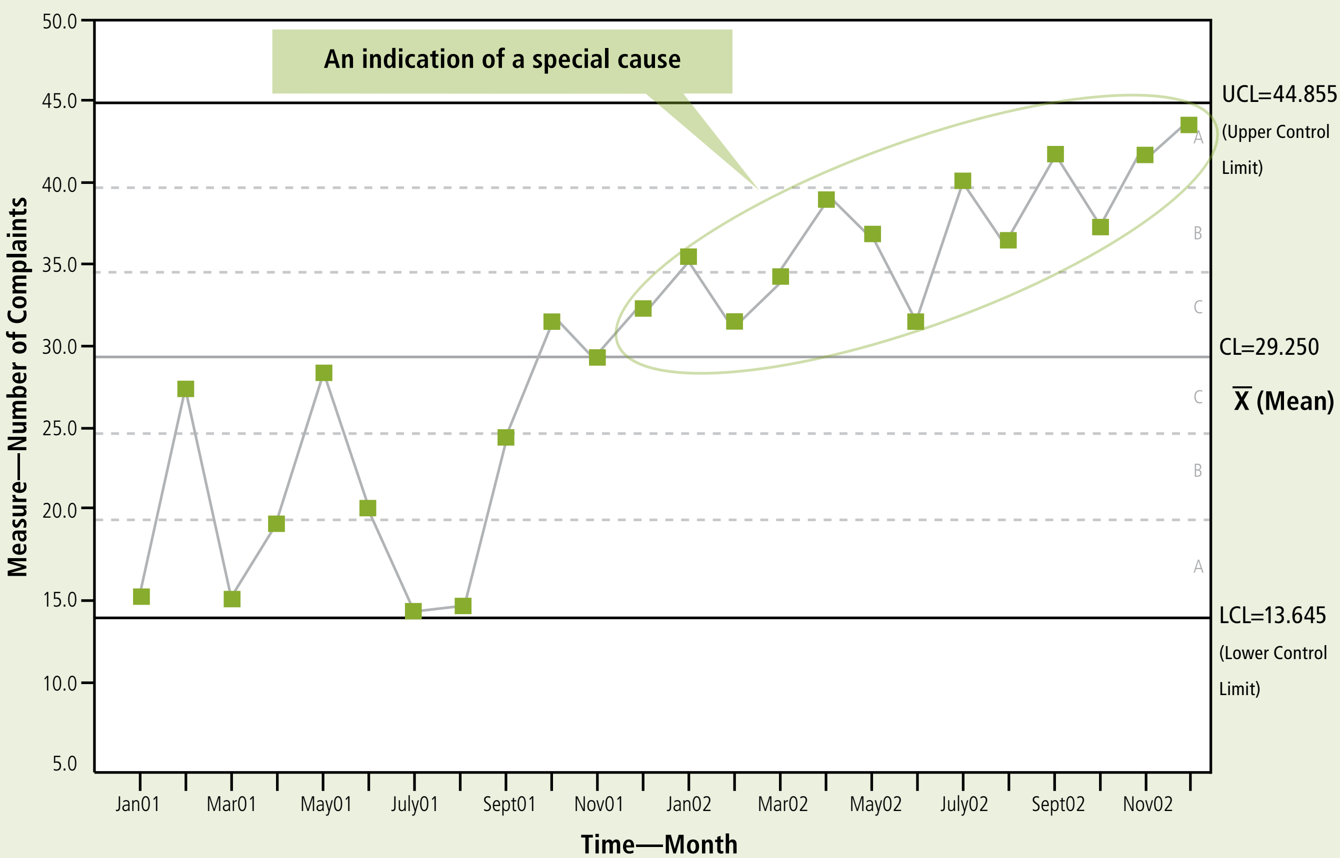
Time is always shown on the horizontal axis of a control chart; the measure of interest is plotted on the vertical axis; and the center line (CL) is the mean of the data points (see chart on page 73). The control chart also has the added advantage of having estimates of the variation in the data. As the sample control chart on page 73 indicates, the variation is captured by the upper and lower control limits (UCL and LCL). Statistical rules are then applied to the data to determine if the variation is common cause (i.e., random) or special cause (i.e., statistically different).

Consider this clinical example that demonstrates the distinction between static and dynamic approaches to understanding variation: monitoring a patient's vital signs in the ICU. Using a static approach, we might obtain the ICU patient's blood pressure at two points in time (at time of admission and at discharge) and then compare the two readings to determine if they are statistically different. Or, we might take several blood pressure readings at various points in time and compute the average over time and the variation between readings. Clinicians would never use a static approach to monitor an ICU patient, however, because it does not provide sufficient understanding of variation. Instead, clinicians rely on telemetry data to understand variation in the patient's key physiological measures (e.g., heartbeat, respiration, blood pressure or oxygen) over time so that appropriate real-time interventions can be made—a dynamic approach.

Translating Data Into Information

All too often we confuse data and information. Data can be used to create information, but data are not information in and of themselves. Charles Austin provides a clear description of the distinction between these two concepts in his book *Information Systems for Hospital Administration* (Health Administration Press, 1983): "Data refers to the raw facts and figures that are collected as part of the normal functioning of the hospital. Information, on the other hand, is defined as data that have been processed and analyzed in a formal, intelligent way so that the results are directly useful to those involved in the operation and management of the hospital."

Elements of a Control Chart



Source: Lloyd, Robert. Quality Health Care *(Jones and Bartlett Publishers Inc., 2004); p. 275.*

Translating data into information occurs only as a result of a deliberate process that involves the following steps, which are also outlined in the chart on this page.

Step 1: Theoretical Concepts. All scientific inquiry begins with theoretical concepts (ideas and hypotheses) and making predictions. The real test of any theory or hypothesis lies with the empirical evidence that can be assembled to test the validity and reliability of the idea.

Step 2: Select and Define Measures. This is a critical step. Define a limited set of measures (usually between five and seven) for each improvement project. Do not blink too quickly in this step by selecting measures that are convenient or that you always have tracked.

Develop a clear operational definition for each measure (e.g., what is a medication error? or when does surgery start?) so that data appropriately represent the concept being measured. There are no universally correct operational definitions, so achieving consensus and consistency is most important.

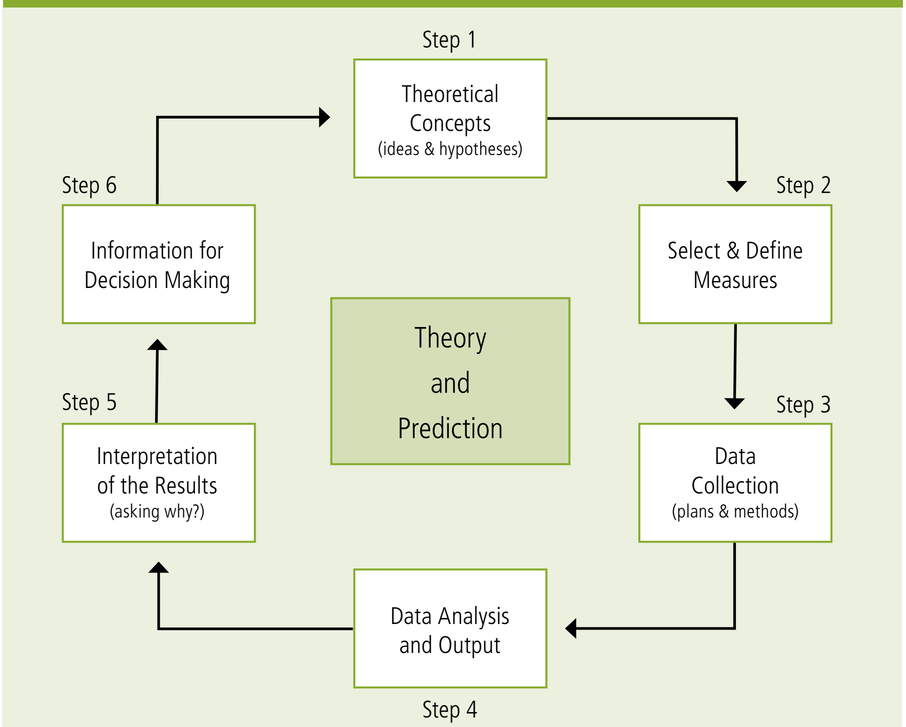
Step 3: Data Collection. This step requires considerable planning and execution. Identifying *what* data will be collected is determined by your defined measures. But you also must consider *how* the data will be collected and *by whom*. Also, determine *where* the data will be stored (e.g., in a database, in the chart or at the nursing station). Issues such as stratification, sampling, the role of pilot tests, the duration and frequency of data collection, respondent and data collector bias, and data collection methods are all critical elements of this step.

Step 4: Data Analysis and Output. Decide who has access to a statistical package to tabulate and analyze data and to produce graphical displays of the data. Also, determine which type of statistical analysis will be conducted. Will you merely calculate the average, minimums and maximums, and standard deviations for the data (static approach), or will you analyze the variation in the data using run or control charts (dynamic approach)? If you are focusing on data for improvement (not judgment or research) then use the dynamic approach.

Step 5: Interpretation of the Results. This is the step when data begins to transform into information and a point at which it is easy to blink too quickly and make a decision based on incomplete information. Interpreting results seeks to answer a very simple question: *why*? This is the point at which the data and the theory should be compared.

Do the analytic results support the proposed theories? Are the data consistent with what we have seen in the past? If not, are the data correct, or is the theory wrong? Do the data reflect common or special causes of variation? This is also the point at which previous research and data play key roles. Are your results consistent with what others have found?

The Process of Turning Data Into Information



Source: Lloyd, Robert. Quality Health Care *(Jones and Bartlett Publishers Inc., 2004); p. 153.*

Step 6: Information for Decision Making. This final step is crucial, and unfortunately many improvement initiatives never reach this step. They often end up with considerable data but no information for decision making.

The key to success in this final step is building a dialogue about the data and what decisions you will make with the results. Questions such as those identified in Step 5 provide the basis for a healthy dialogue designed to build information. The dialogue should center around the data collected, the validity of your theories and concepts, the variation found in your data and the interpretation of what the data mean.

Healthcare leaders and improvement teams alike must have valid information—based on a robust analysis and interpretation of data—on which to base their decisions so they can blink appropriately. These two articles have set the context for how healthcare leaders can make better decisions with the appropriate use of data and information by building skills in four key areas: understanding the messiness of improving healthcare, determining why you are measuring, understanding and depicting variation, and translating data into information. If you are serious about your quality improvement journey, these four blinks will help provide you with key milestones along the way. ▲

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