

CHAPTER 4

EVALUATING PERFORMANCE

LEARNING OBJECTIVES

After reading this chapter, you will be able to

- identify common ways of reporting measurement data to facilitate performance assessment,
- apply methods of interpreting healthcare performance measurement data,
- describe the role of performance targets in evaluating performance,
- identify common techniques for establishing performance expectations, and
- explain how comparative performance data are used for assessment purposes.

KEY WORDS

- Appropriate
- Benchmarking
- Bar graphs
- Central tendency

- Common cause variation
- Control chart
- Dashboard
- Data analytics
- Data visualization
- Histograms
- Horizontal axis
- Judgment
- Lower control limit
- Normal distribution
- Pareto charts
- Pareto Principle
- Performance comparison
- Performance gap
- Performance targets
- Performance trends
- Pie charts
- Process variation
- Radar charts
- Scatter diagrams
- Special cause variation
- Standard deviation
- Standards
- Statistical process control (SPC)
- Tampering
- Upper control limit
- Vertical axis

Performance assessment is the evaluation stage of quality management. Measurement data have been gathered and now must be reported and analyzed. If an organization constructs measures carefully, collects accurate data, and reports results in a meaningful way, it produces information useful for decision-making.

Assessment involves judging or evaluating measurement data for the purpose of reaching a conclusion. For instance, when I weigh myself, the scale provides useful measurement data. These data allow me to reach a conclusion: Am I losing, gaining, or maintaining my weight? My weight-loss goals influence my **judgment** of the numbers displayed on the scale. I may be pleased to see I've lost three pounds since last week, but if my goal is to lose five pounds, I'll conclude that I need more exercise. A similar assessment process occurs with healthcare performance measurement data. Measurement results are compared with expectations to judge the quality of patient care and business services.

Judgment

Formation of an opinion after consideration or deliberation.

ASSESSMENT IN QUALITY MANAGEMENT

As shown in exhibit 4.1, the assessment step follows performance measurement. In this step, the organization first judges whether its performance is acceptable. If it is acceptable, the organization continues to measure performance to ensure it does not deteriorate. If its performance is not acceptable, the organization advances to the improvement step.

Second, the organization evaluates measurement results to determine whether processes are performing as expected. Finally, it assesses those results to judge the impact of improvements.

Assessing quality does not rely on data alone. Performance goals, external factors, and other conditions must be considered when evaluating measurement results, all of which are discussed at greater length later in the chapter.

The assessment phase in quality management involves **data analytics**—the examination of raw data by which to draw conclusions about that information. This phase involves three activities:

1. Displaying measurement data
2. Comparing actual performance with expectations
3. Determining whether action is needed

Data analytics

The science of examining raw data with the purpose of drawing conclusions about that information.

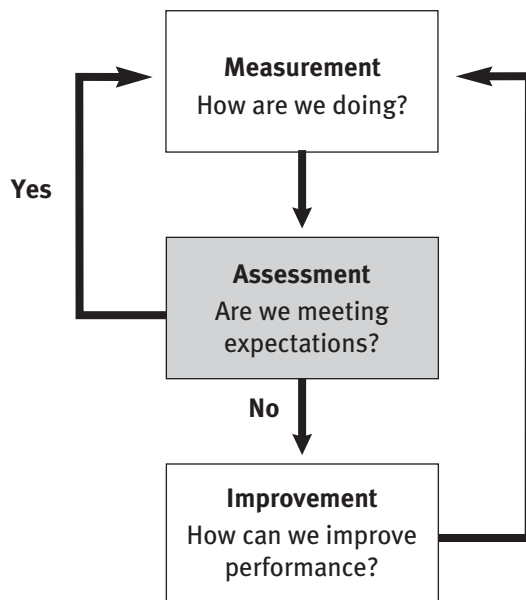


EXHIBIT 4.1

Cycle of Measurement, Assessment, and Improvement

DISPLAY DATA

The first step in analyzing performance data is deciding how the information will be presented or displayed. The data should be reported in a format from which conclusions can be easily drawn. Multiple formats can be used, such as tabulations, graphs, and statistical comparisons. Sometimes, a single data grouping will suffice for analysis purposes. To display data in an understandable format, three factors must be considered:

1. The type of data to be reported
2. The audience
3. The information's intended use

For instance, to understand how well my weight-loss diet is working, knowing the percentage of weight lost or gained at various points in time may be adequate. Alternatively, I may want to keep a daily tally of my weight so I can adjust my eating habits immediately if I am not meeting my goals. Perhaps I want to know the number of hours I exercise each week to better understand the relationship between my fitness habits and weight changes.

More important than the format in which data are displayed, however, is the accuracy and reliability of the information to help the audience answer the following questions:

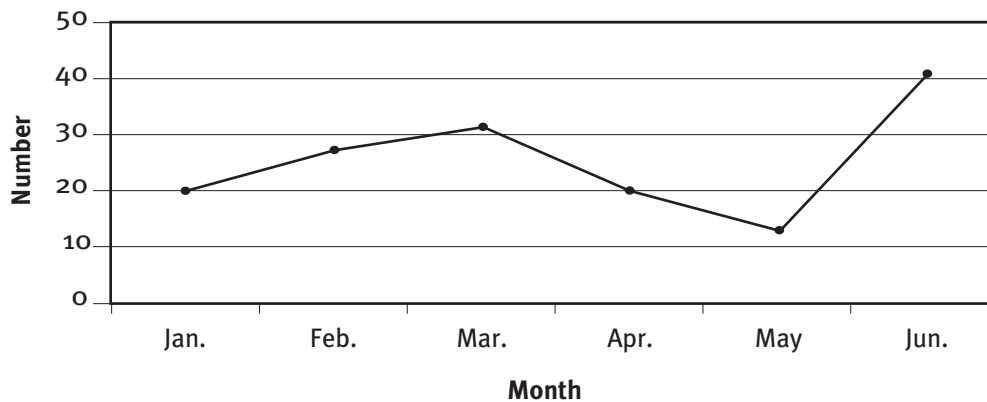
- ◆ What is current performance?
- ◆ Do the data reveal a trend?
- ◆ Should action be taken? What kind of action?

CASE STUDY

The following case study demonstrates how data presentation influences the interpretation of performance measurement data for assessment purposes.

Continuing the radiology department case study introduced in chapter 3, the department analyzes its performance measurement results, obtained by tracking the number of outpatient X-ray exam reports it communicates to physicians within 48 hours of exam completion, to identify any trends. A line graph (also called a *run chart*) of the number of X-ray reports not communicated to patients' doctors within 48 hours of exam completion is shown in exhibit 4.2.

Although helpful, total numbers provide limited information over time. For example, the manager cannot determine whether a small or large percentage of reports are delayed. A more meaningful approach would be to graph the percentage of delayed reports—the

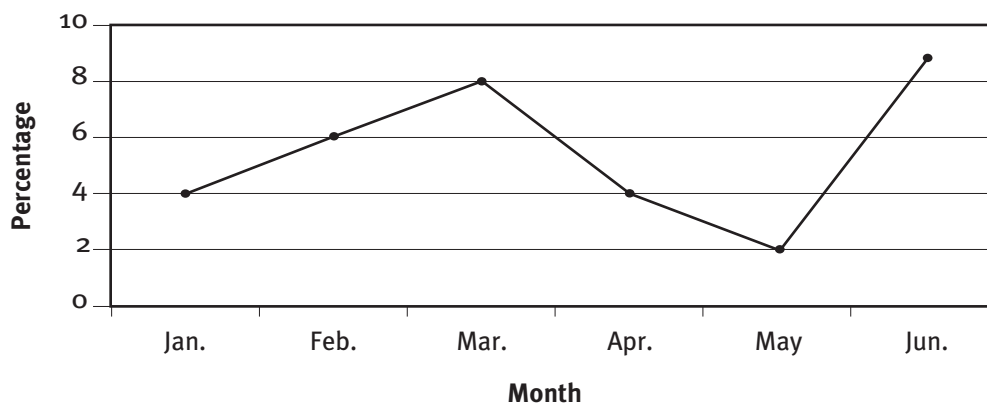
**EXHIBIT 4.2**

Line Graph
Showing Number
of Outpatient
X-ray Reports Not
Communicated to
Doctors Within 48
Hours

number of delayed X-ray reports divided by the total number of X-ray reports—as shown in exhibit 4.3.

If the radiology manager expects all outpatient X-ray reports to be communicated to patients' doctors within 48 hours, he can confirm that the performance expectation of 100 percent has not been met by simply tabulating the number of delayed reports. However, if he has set a target goal—for example, that no more than 5 percent of the reports will be delayed—he can view the data from both measurements when they are presented as a line graph that includes a target line, as shown in exhibit 4.4. With the data displayed in this manner, the radiology manager can compare actual performance each month with the performance expectations.

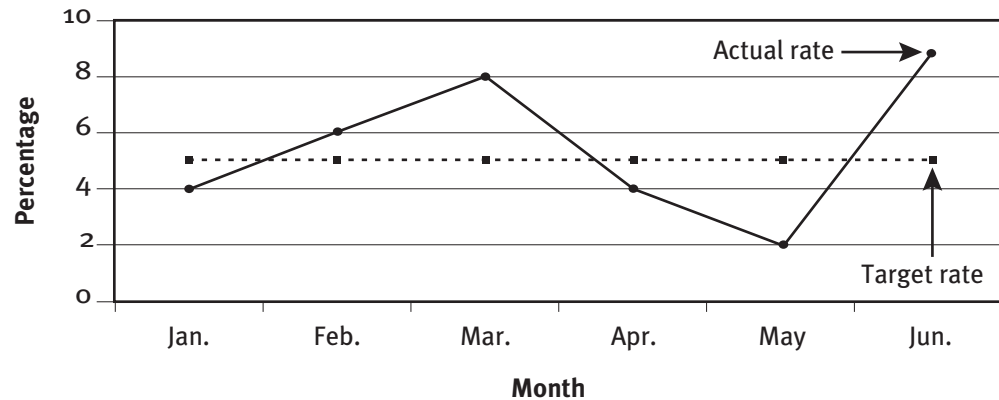
Reporting performance information in the right format is critical to successful quality assessment. In some cases, performance information may be displayed more effectively in a graphic format than in a tabular format. Charts and graphs can be effective media

**EXHIBIT 4.3**

Line Graph
Showing
Percentage of
Outpatient X-ray
Reports Not
Communicated to
Doctors Within 48
Hours

EXHIBIT 4.4

Line Graph
Showing Target
Rate and
Percentage of
X-ray Reports Not
Communicated to
Doctors Within 48
Hours

**Data visualization**

The communication of information clearly and effectively through graphical means.

for conveying information quickly and clearly. With a swift glance, most people can glean meaningful information from pie charts and bar graphs. Graphs create a picture of the results, sometimes referred to as **data visualization**. In the rest of this section, we describe the tabular approach and common graphic display formats used by organizations to report performance data.

SNAPSHOT REPORT FORMATS

Some performance reports provide information collected at a particular point—a snapshot of time. To create reports that represent these snapshots, data are gathered for a certain period and summarized for analysis. Common formats of snapshot reports are tabular reports, pie charts, scatter diagrams, bar graphs, histograms, Pareto charts, and radar charts.

**LEARNING POINT**
Reporting Results

Assessment involves judging or evaluating measurement data for the purpose of reaching a conclusion. The way in which the data are presented influences their interpretation. To display data in an understandable form, three factors must be considered: the type of data to be reported, the audience, and the information's intended use.

Tabular Reports

Tabular reports, sometimes called *data tables*, are used to display numeric data gathered in one snapshot of time. Exhibit 4.5 is a tabular report showing the results of a two-month survey of patient experiences at a behavioral health clinic. A total of 47 patients completed the survey.

When considering the use of tabular reports to display performance or quality data, keep the following in mind:

- ◆ Tabular reports are typically used to present performance information in an easy-to-read format.
- ◆ Audiences may have difficulty comparing findings or identifying associations in tabular reports displaying large amounts of information. For instance, if exhibit 4.5 were to list results from 30 or more survey questions, the relationships among the lower-scoring questions would be difficult to discern. Large amounts of data are usually better displayed in a graphic design, such as the formats discussed next.

Survey Question	Mean Score N = 47
Overall, how would you evaluate the following:	
1. The quality of the behavioral health services you received	3.5
2. The helpfulness of the staff members	3.0
3. The courtesy shown you by the staff members	3.8
4. The staff's attention to privacy during treatment sessions	4.0
5. The professionalism of the staff members	3.9
6. The extent to which your mental health needs were addressed	3.6
7. The availability of appointments	3.5
8. The effectiveness of the medication and/or treatment you received	3.8
9. The degree to which staff members respected your confidentiality	4.1
10. Opportunities to participate in decisions about your treatment	3.9
<i>Scale: 1 = Poor; 2 = Fair; 3 = Good; 4 = Very Good; 5 = Excellent</i>	

EXHIBIT 4.5

Tabular Report
of Results of
Survey of Patient
Experiences

Pie Charts

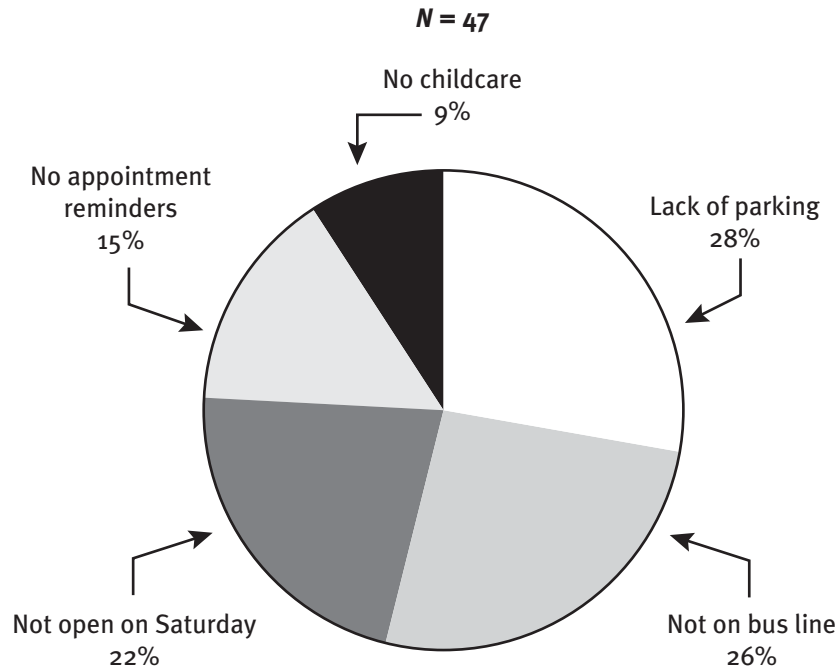
Pie charts portray the contribution of parts to a whole. For example, suppose the behavioral health clinic discussed earlier conducts a follow-up telephone survey to tally patients' most common complaints about the clinic. The results of this onetime survey can be displayed in a pie chart, as shown in exhibit 4.6.

Pie charts

Graphs in which each unit of data is represented as a pie-shaped piece of a circle. (An example of a pie chart is found in exhibit 4.6.)

EXHIBIT 4.6

Pie Chart Showing
Top Five Patient
Complaints and
Percentage of
Patients Citing
Each as Their Top
Complaint



When considering the use of pie charts, keep the following in mind:

- ◆ Pie charts show the data distribution from a snapshot of time.
- ◆ Use pie charts to illustrate the distribution or composition of a single variable. The single variable in exhibit 4.6 is patient complaints.
- ◆ Use pie charts only for variables with mutually exclusive values (i.e., no cases are included in more than one category). In the behavioral health clinic telephone survey, patients could pick only one complaint, which made the categories in exhibit 4.6 mutually exclusive.
- ◆ Avoid using pie charts for variables that have more than five categories.

Scatter diagrams

Graphs used to show how two variables may be related. (Examples of scatter diagrams are found in exhibits 4.7 and 4.8.)

Horizontal axis

The x-axis on a graph.

Vertical axis

The y-axis on a graph.

Scatter Diagrams

Scatter diagrams are tools for analyzing relationships between two variables. One variable is plotted on the **horizontal axis** (x-axis), and the other is plotted on the **vertical axis** (y-axis). The distribution of their intersecting points reveals relationship patterns,

as illustrated in exhibit 4.7. If one variable increases when the other increases, the two variables are positively correlated. If one variable decreases when the other increases, they are negatively correlated. When the points appear to form a line, the variables are strongly correlated. The strength of the correlation is a measure of how likely the two variables are related to each other (Kumar 2017).

Scatter diagrams allow the user to delve beneath the surface into the cause of performance problems. For example, suppose a hospital information technology (IT) department uses computer response time as a measure of performance. The manager notices an increase in response times that has slowly developed and begins to investigate the cause. She looks at several factors and creates scatter diagrams to correlate each factor with computer response times.

The manager creates the scatter diagram shown in exhibit 4.8 to examine the relationship between computer response time (the first variable, plotted on the y -axis) and number of users connected to the computer network (the second variable, plotted on the x -axis) for 24 hours. The diagram reveals that response time increases as the number of users increases, indicating a positive cause-and-effect relationship between the two variables.

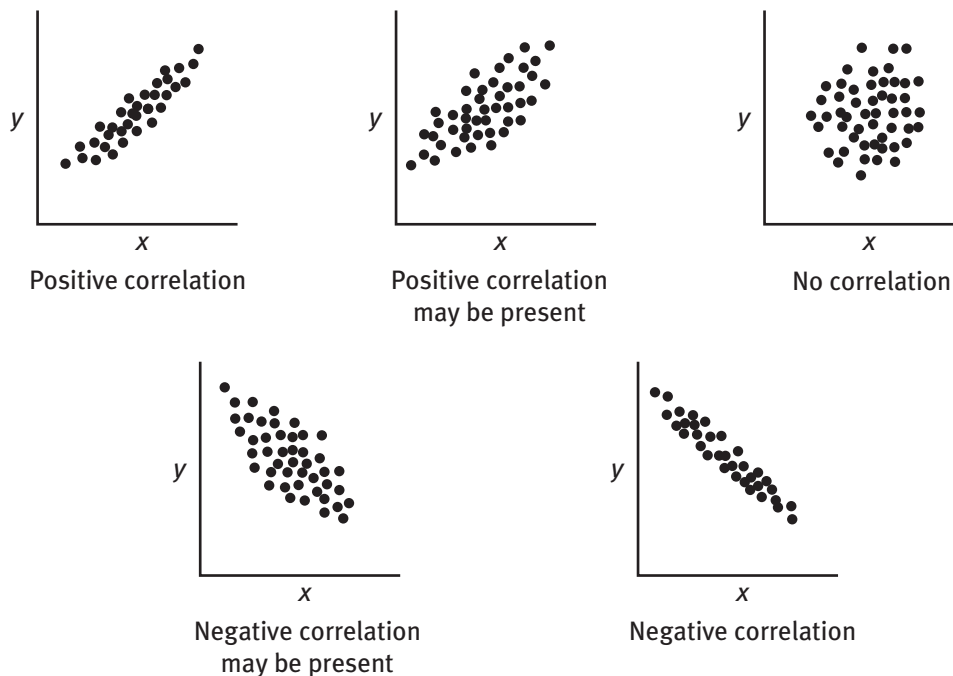
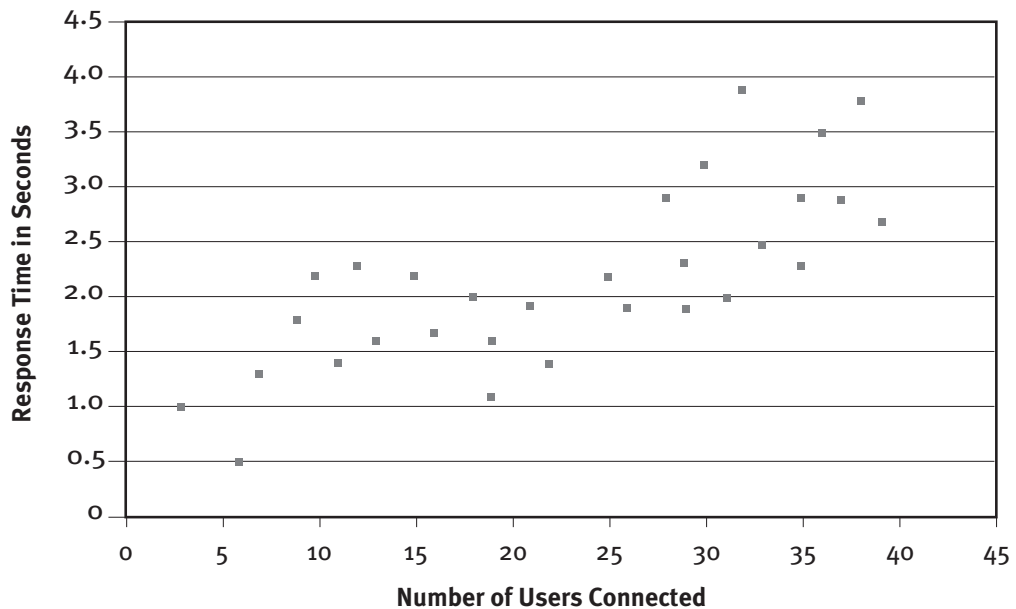


EXHIBIT 4.7
Scatter Diagram
Relationship
Patterns

EXHIBIT 4.8

Scatter Diagram
Showing
Relationship
Between Two
Variables:
Computer
Response Time
and Number of
Users Connected



Scatter diagrams only show relationships; they do not prove that changes in one variable cause changes in the other. Scatter diagrams provide clues that help identify the culprit. The IT department manager will need to investigate further to confirm the relationship suggested by the scatter diagram.

When considering the use of scatter diagrams, keep the following in mind:

- ◆ Scatter diagrams show relationships from a snapshot of time.
- ◆ Use scatter diagrams to examine theories about cause-and-effect relationships. The scatter diagram in exhibit 4.8 helps the IT department manager narrow down what may be causing a performance problem.
- ◆ Scatter diagrams usually show one of five possible correlations between the two variables:
 1. *Strong positive correlation.* The value on the y -axis increases as the value on the x -axis increases.
 2. *Strong negative correlation.* The value on the y -axis decreases as the value on the x -axis increases.

3. *Possible positive correlation.* The value on the y -axis increases slightly as the value on the x -axis increases.
4. *Possible negative correlation.* The value on the y -axis decreases slightly as the value on the x -axis increases.
5. *No correlation.* No connection is evident between the two variables.

Bar Graphs

With **bar graphs**, sometimes called *bar charts*, audiences can easily compare groups of data and quickly assess their implications on performance. One axis of the chart shows the quality attribute being measured, and the other axis represents actual performance results. In Microsoft Excel, vertical bar graphs are called *column graphs* and horizontal bar graphs are called *bar graphs*.

Exhibit 4.9 is a vertical bar graph that shows average computer response times for a six-month period at each of four hospitals in a regional health system. From the graph, the hospital with the lowest average computer response time is easy to identify, and response time performance among the four hospitals is easy to compare.

Exhibit 4.10 is a horizontal bar graph displaying the number of patient falls reported in each of nine hospital units during a three-month period. One advantage of using horizontal bar graphs is that they have more room on the vertical axis to accommodate labels, which is useful when the graph contains many bars or when the label descriptors are long. The bars are arranged according to length so that units reporting the most—and the fewest—incidents are easy to identify.

Bar graphs

Graphs used to show the relative size of different categories of a variable, with each category or value of the variable represented by a bar; also called a *bar chart*. (Examples of bar graphs are found in exhibits 4.9 and 4.10.)

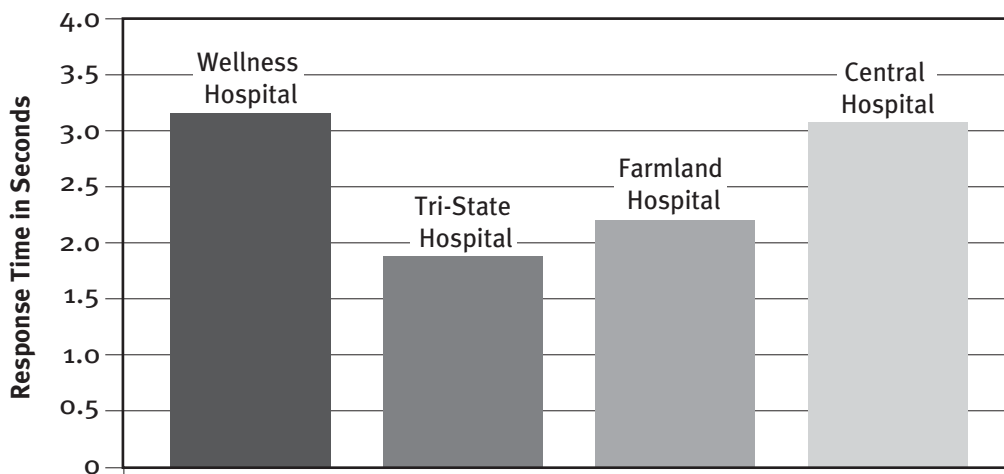
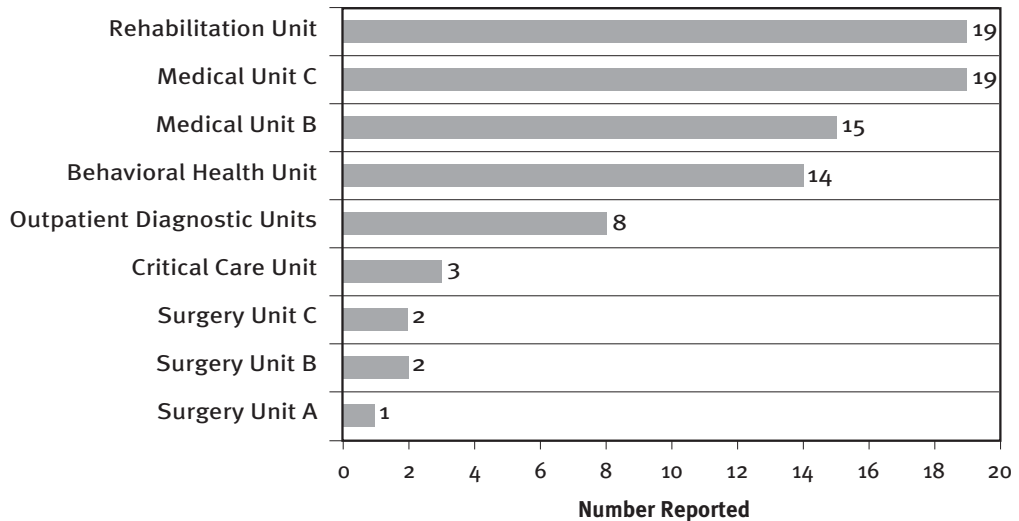


EXHIBIT 4.9

Vertical Bar Graph
Comparing
Computer
Response Times
at Four Hospitals
During One Period

EXHIBIT 4.10

Horizontal Bar
Graph Showing
Number of Patient
Falls in Each
Hospital Unit,
January–March



When considering the use of bar graphs, keep the following in mind:

- ◆ Bar graphs are an excellent way to show performance results from a snapshot of time.
- ◆ The height of the bar represents the frequency of incidences for that category. In exhibit 4.9, the heights of the bars represent the average computer response times at each hospital.
- ◆ The width of the bars within a bar graph is not relevant, but it should be consistent.
- ◆ Horizontal bar charts are often used when the labels along the x -axis are too long to fit under vertical columns or when a large number of bars are displayed.

Histograms

Bar graphs used to show the center, dispersion, and shape of the distribution of a collection of performance data. (An example of a histogram is found in exhibit 4.11.)

Histograms

Histograms, sometimes referred to as *frequency distributions*, are bar charts that show a distribution of values as rankings along the x -axis. Exhibit 4.11 is a histogram illustrating the distribution of patient wait times in a clinic. Wait-time data were gathered for one

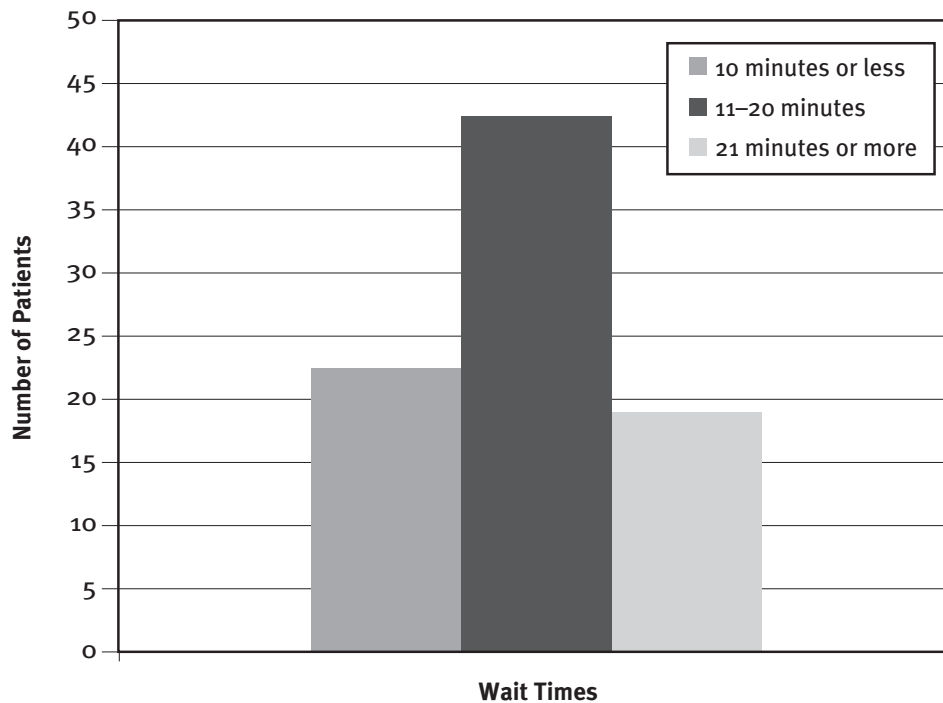


EXHIBIT 4.11
Histogram of
Clinic Wait Times

week, and the data were grouped into three wait-time categories. The number of patients in each category is also shown.

When considering the use of histograms, keep the following in mind:

- ◆ Histograms show data distribution from a snapshot of time.
- ◆ Use a histogram to display distributions of a variable that can be separated into rankings, such as three-month segments of a year or age ranges.
- ◆ As shown in exhibit 4.11, bars in a histogram should touch one another except when no cases fall into an interval along the x -axis.
- ◆ A histogram shows the **central tendency** and variability of a dataset. It can be used to quickly and easily illustrate the distribution of performance data.

Central tendency

A measure of the middle or expected center value of a dataset. The most common measures of central tendency are the arithmetic mean, the median, and the mode.

Pareto charts

Special types of bar graphs that display the most frequent problem as the first bar, the next most frequent as the next bar, and so on; also called *Pareto diagrams*. (An example of a Pareto chart is found in exhibit 4.12.)

Pareto Principle

Originally, the Pareto Principle referred to the observation that 80 percent of Italy's wealth belonged to only 20 percent of the population. The principle conveys the notion that the majority of results come from a minority of inputs (an 80/20 rule of thumb).

Pareto Charts

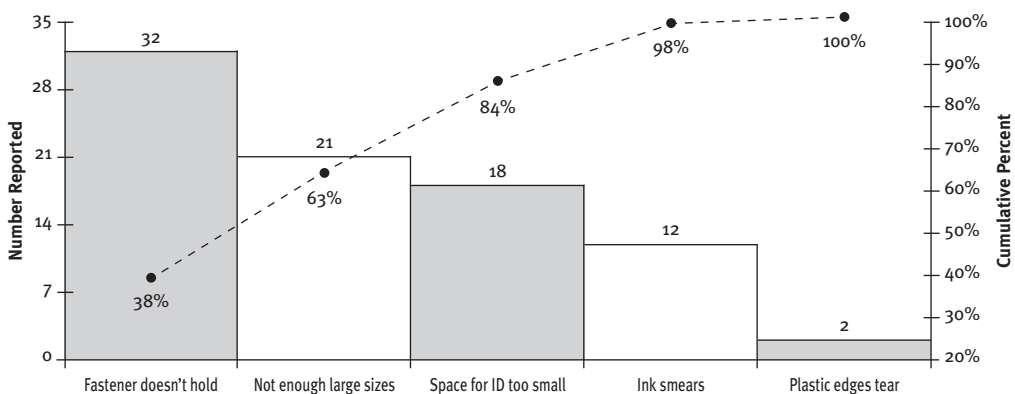
Pareto charts are similar to bar graphs, except that they sort performance data in order of decreasing frequency and include notation of other factors to highlight the **Pareto Principle**. The Pareto Principle, named after the nineteenth-century Italian economist Vilfredo Pareto, states that for many events, 80 percent of the results come from 20 percent of the inputs (Juran 1974). Joseph Juran, an originator of the science of quality, applied the Pareto Principle to quality management. Juran advised management to concentrate improvement efforts on the “vital few” sources of problems and not be distracted by those of lesser importance (Scholtes 1992). Pareto charts, then, are used to identify the 20 percent—the vital few—of the problems affecting 80 percent of performance. Organizations should resolve these problems to have the greatest impact on performance improvement.

To illustrate how a Pareto chart is used for quality assessment purposes, consider the following situation. Community Hospital starts a new practice intended to reduce problems related to patient misidentification. At the time of registration, patients scheduled for outpatient diagnostic tests now are given an identification (ID) wristband on which their name, birth date, and record number are printed. Technicians in outpatient testing areas use the ID band information to positively identify patients before performing a test. Formerly, only patients admitted to the hospital received an ID band.

Shortly after the new process is implemented, staff members in the outpatient registration area begin to complain about it. Some employees say the ink on the bands smears easily. Others say the bands are not well made and do not always fasten securely around the patient's wrist. Rather than react to random complaints, the manager of outpatient registration gathers additional information to thoroughly evaluate the situation. The manager asks employees to report ID band problems each time one occurs. At the end of 30 days, the manager tallies the data and creates a Pareto chart, shown in exhibit 4.12.

EXHIBIT 4.12

Pareto Chart
Showing Patient ID
Band Problems



The manager concludes from these data that three main problems are triggering the complaints: the fasteners do not hold, the space provided for a patient's identifying information is too small, and the unit has too few large-sized bands on hand. A different brand of wristband—one that fastens better and has more space for the patient's identifying information—solves two of the problems. The third problem—insufficient inventory of large bands—would be solved by keeping more large bands in stock to accommodate larger patients. If these problems (20 percent of total problems, or the vital few) are resolved, complaints about ID bands should decrease by more than 80 percent.

When considering the use of Pareto charts, keep the following in mind:

- ◆ Pareto charts show a data distribution from a snapshot of time.
- ◆ Use Pareto charts to separate the few major problems (the vital few) from the many possible problems (the trivial many). Pareto charts encourage the use of data, not perception, to determine which problems are most important.
- ◆ Arrange performance categories or problems according to their frequency (how many), not their classification (what kind). The order should descend from left to right.
- ◆ The right vertical axis can be used to measure the percentage of total occurrences in each category, but in some situations, the main problems may be apparent without adding a cumulative percentage trend line.

Radar Charts

Radar charts are used to plot five to ten performance measures for an interval of time, along with performance expectations. Radar charts are sometimes called *spider charts* because of their shape. Exhibit 4.13 is a radar chart showing patient satisfaction survey results for a healthcare system. The heavy solid line represents the actual results, and the dotted line represents the expected performance or target rates. Printing these lines in different colors also can help the audience discern actual from expected performance.

When considering the use of radar charts, keep the following in mind:

- ◆ Radar charts show data from a snapshot of time.
- ◆ Radar charts show areas of relative strength and weakness and depict overall performance.
- ◆ In a radar chart, a point close to the center on any axis indicates a low value. A point near the edge is a high value. For example, the center point of the chart in exhibit 4.13 is 80 percent, and the edge is 100 percent.

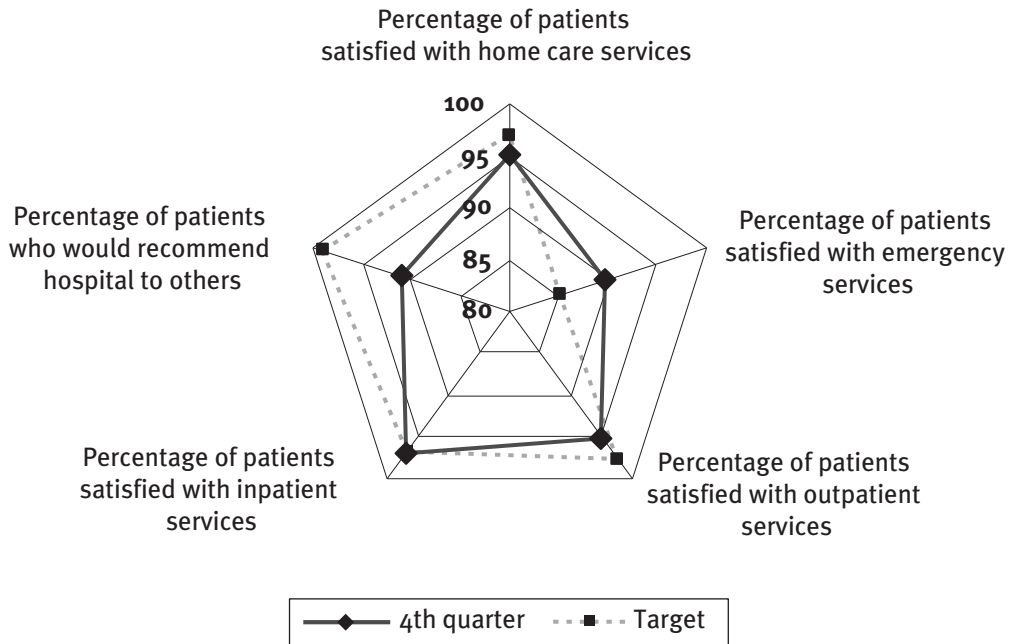
Radar charts

Graphs used to display the differences between actual and expected performance for several measures; also called *spider charts* or *spider diagrams* because of their shape.

- ◆ When interpreting a radar chart, check each axis as well as the overall shape to determine overall performance.

EXHIBIT 4.13

Radar Chart
Showing Patient
Satisfaction Survey
Results



TREND REPORT FORMATS

While a report of performance from an interval of time can be helpful in some situations, decision-making often requires an understanding of performance over time. Quality is a dynamic attribute, so the ability to recognize changes in **performance trends** is important.

The volume of healthcare performance measurement data is rapidly expanding. For this reason, reports must make assessment of results as easy as possible. An audience may have difficulty absorbing information, spotting patterns, identifying aberrations, and uncovering hidden relationships from a large tabular report; graphs are usually a better choice for transforming large quantities of performance data into meaningful information. Both tabular and graph formats of performance trend reports are discussed next.

Tabular Reports

Some of the same report formats used to present snapshots of performance data can also be used to display performance trends; tabular reports are one such format. Exhibit 4.14

Performance trends

Patterns of gradual change in performance; the average or general tendency of performance data to move in a certain direction over time.

Performance Measure	Target	Results			
		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Percentage of patients who report adequate pain control	≥ 90%	94%	85%	90%	92%
Percentage of patients who are admitted to an acute care hospital for at least 24 hours while a home health care patient	≤ 10%	7%	0.3%	5%	12%
Percentage of home health services delivered on the date scheduled	≥ 95%	90%	89%	92%	92%

EXHIBIT 4.14

Tabular Report of Home Health Agency Performance Results for Four Quarters

is an excerpt from a report of system-level measures prepared for the senior leaders of a home health agency. Sometimes referred to as a **dashboard**, this type of report shows a group of performance measures; results for each period; and the performance expectation, or target, for each measure.

Icons or color can be added to the data table to make performance problems more discernible. For example, measurement results not meeting expectations can be printed in red so the audience can easily pinpoint the results of greatest interest.

Dashboard

A set of performance measures displayed in a concise manner that allows for easy interpretation.

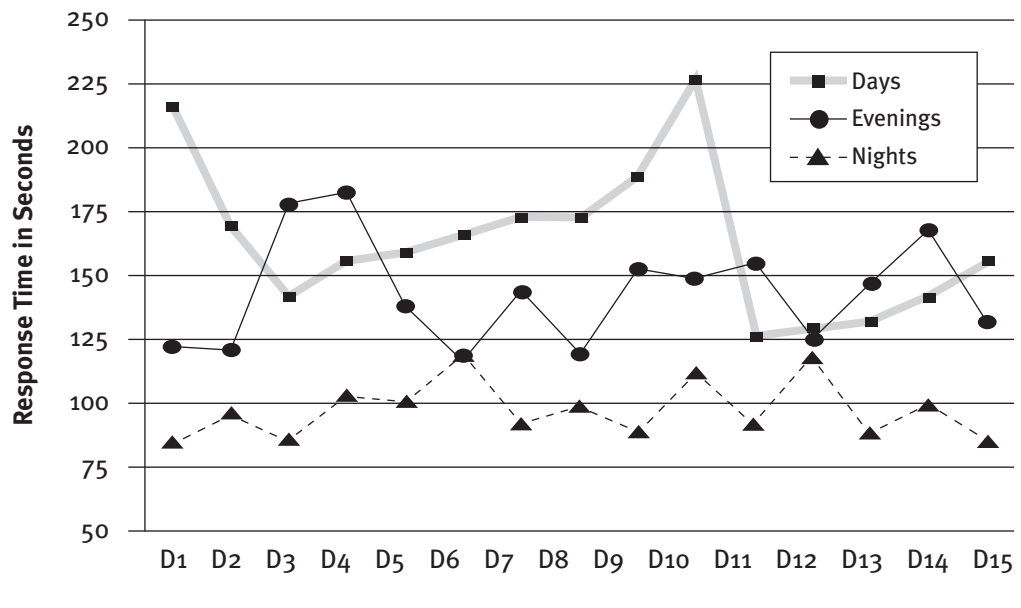
Line Graphs

Line graphs, sometimes called *run charts*, can be used to show changes in a performance measurement over time. The case study near the beginning of this chapter describes the radiology department manager's use of line graphs to measure the number and percentage of outpatient X-ray reports not communicated to patients' doctors within 48 hours of their exams (exhibits 4.2 and 4.3). By adding a line showing the target rate, the radiology manager was able to see how performance over time compared with expectations (see exhibit 4.4).

One line graph can be used to report several performance measurement results. Exhibit 4.15 is a line graph showing the response rate (in seconds) to patient call lights by a hospital's nurses for 15 consecutive days. To display data effectively, line graphs should include no more than four measures. If the lines intersect, even four measures may be too many. If you are required to report many measures, consider spreading the data over more than one graph. To clarify the values along the graph lines, you might include data point markers (dots or symbols at each data point on the line). If the report identifies general

EXHIBIT 4.15

Line Graph
Showing How
Quickly Hospital
Nurses on Each
Shift Responded to
Patient Call Lights
on 15 Consecutive
Days



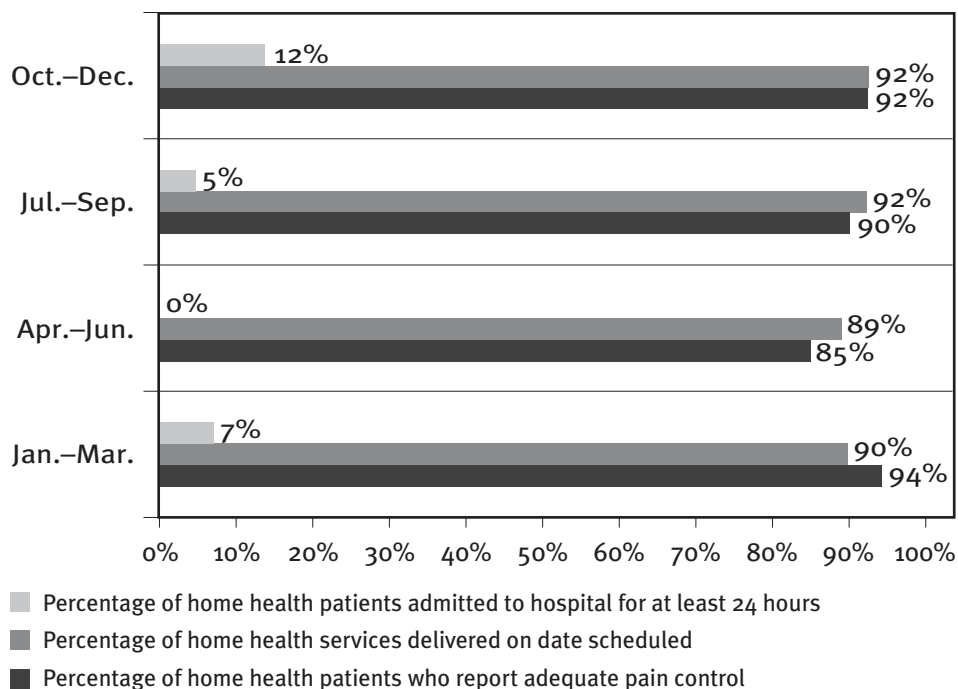
performance trends, data point markers may not be necessary. If you wish to convey exact numeric results, numbers can be added to the trend line at each data point.

Bar Graphs

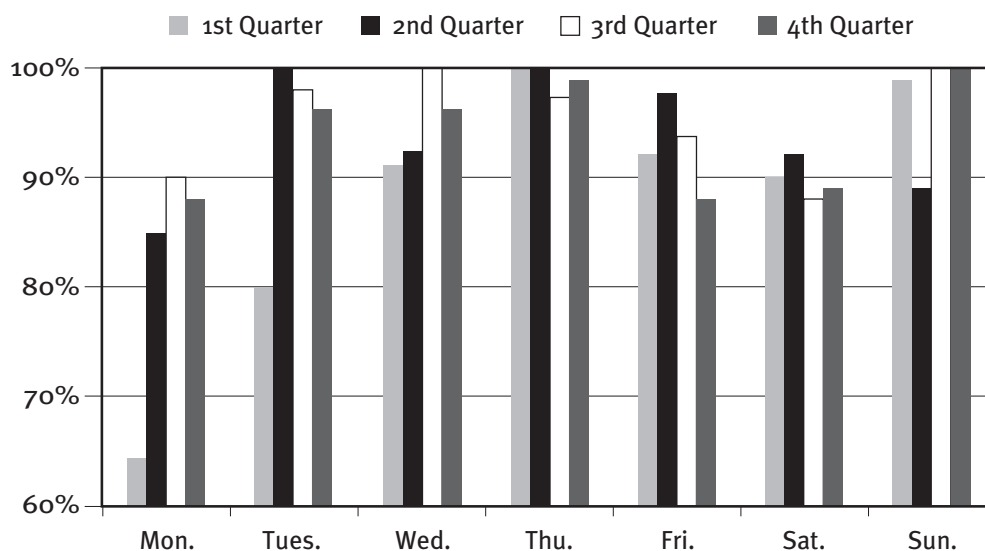
Bar graphs can be used to report a snapshot of performance and also display performance data for different periods. The same three home health agency measures shown in exhibit 4.14 are reported in a horizontal bar graph in exhibit 4.16. This chart is called a *clustered bar graph* because it shows the relationship among three clusters of variables (the measurement results) for each of the four periods.

For analysis purposes, performance measurement results can be broken down into meaningful categories. For instance, on-time delivery of home health services could be reported by day of the week and the results compared from one quarter to the next. Exhibit 4.17 is a vertical bar graph showing the percentage of home health services delivered when scheduled, reported by day the service is to be provided. When the results are reported by day of the week, the home health director can see clearly where to focus improvement efforts.

Line graphs and bar graphs are the two most common ways to display performance data over time. For more than four periods, line graphs are usually the better choice. If the audience wants to see general performance trends, it may work well to use both bars and

**EXHIBIT 4.16**

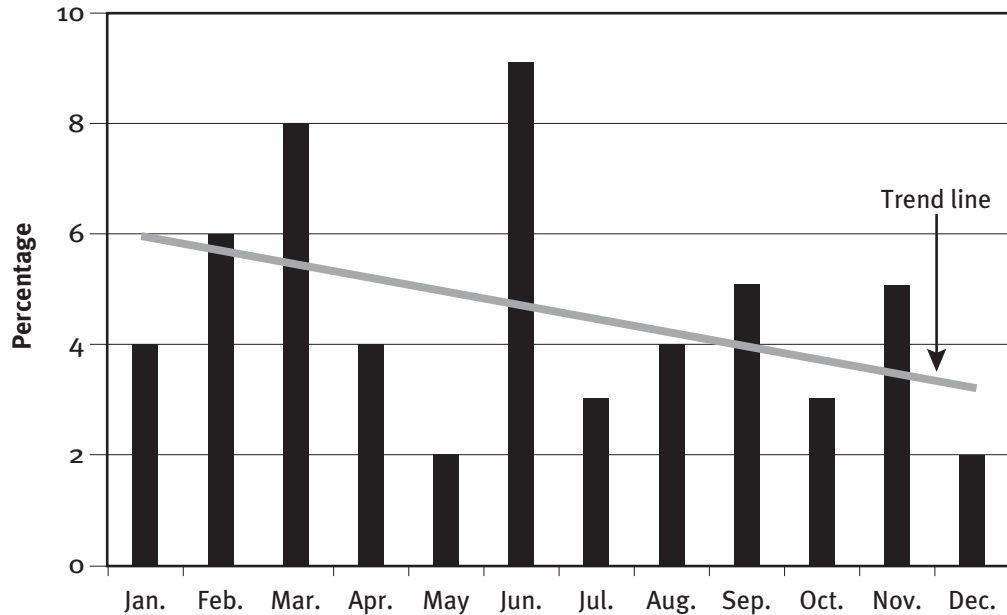
Horizontal
Clustered
Bar Graph
Showing Home
Health Agency
Performance
Measures

**EXHIBIT 4.17**

Vertical Bar
Graph Showing
the Percentage
of Home Health
Services Delivered
on the Day
Scheduled

EXHIBIT 4.18

Bar Graph with
Performance Trend
Line: Percentage
of Outpatient
X-ray Reports Not
Communicated to
Doctors Within 48
Hours



lines. For instance, exhibit 4.18 is a 12-month report of the percentage of outpatient X-ray reports not communicated to patients' doctors within 48 hours of the patients' exams. A trend line has been added to show that the overall percentages are decreasing, even though the monthly rates fluctuate.

Simplicity is the key to reporting performance measurement data, whether for a single period or for many periods. An uncluttered tabular report or graph usually conveys information more effectively than an overly data-laden one does. Several basic principles should be observed when displaying performance results:

- ◆ Make sure the data are accurate and no relevant data are omitted.
- ◆ Minimize the number of measures reported in one table or graph.
- ◆ Ensure that the report is self-explanatory.
- ◆ Use clear and concise labels for the report title, period being measured, data legends, and other explanatory information.
- ◆ Use legends or keys to explain data that may be confusing or subject to misinterpretation.
- ◆ Define abbreviations and symbols.

COMPARE RESULTS WITH EXPECTATIONS

Performance measures should be tied to a pre-defined goal or expectation. Interpretation of measurement results is meaningful only when the results are associated with goals. For instance, if I set a weight-loss goal of five pounds per month, I can compare my weight-loss performance with this goal. If I do not set a target weight, how can I interpret the numbers on my scale?

Measurement without defined performance expectations does not contribute to quality improvement. A passage from Lewis Carroll's (1999) *Alice in Wonderland* best illustrates this concept:

"Cheshire Cat," [Alice] began. "Would you please tell me which way I ought to go from here?"

"That depends on where you want to get to," said the cat.

Without performance expectations, performance results cannot be evaluated objectively. Consider the line graph charting hand-washing compliance in exhibit 4.19. The percentage of caregivers observed washing their hands prior to patient contact shows a steady increase. Does this increase represent good performance? Without knowing the facility's performance goal, all we can say is that more people are washing their hands than before.

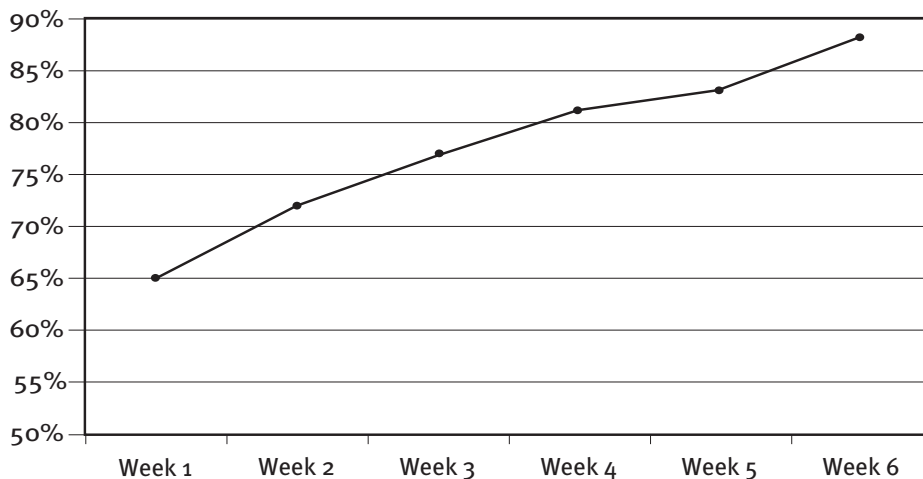


EXHIBIT 4.19
Line Graph
Showing
Percentage
of Caregivers
Observed Washing
Their Hands



LEARNING POINT

Data Displays

Performance measurement data can be presented in many different ways. Tabular reports and bar graphs can be used to report data for a single period or for several periods. Pie charts, scatter diagrams, histograms, Pareto charts, and radar charts are typically used to report performance data from a snapshot of time. Bar and line graphs are most commonly used to display performance data over time.

Alice's journey through Wonderland is similar to a healthcare organization's journey of continuous improvement. Like Alice, organizations must define their destination in terms of performance expectations. Well-defined targets have the following characteristics, known as SMART:

Specific
Measurable
Achievable
Realistic
Time-bound

SETTING EXPECTATIONS

Performance expectations should be established for every measure. These expectations are based in part on internal quality priorities, which are often influenced by the needs of stakeholders (e.g., patients, purchasers). For example, clinic patients do not like to wait a long time in the reception area, so the clinic sets an expectation for wait times to be as short as possible. Purchasers do not want to contract with a hospital that keeps patients hospitalized longer than necessary, so the hospital establishes a target for its average patient stay to be equal to or less than that of its competitors.

Government regulations and accreditation **standards** influence an organization's desired performance level. For example, the Occupational Safety and Health Administration regulations relating to employee radiation exposure state that "during any calendar quarter the dose to the whole body shall not exceed 3 rems" (US Department of Labor 1996). Radiation exposure performance expectations in radiology departments are based on these regulations.

Accreditation standards are sometimes less absolute than government regulations and give organizations leeway in setting performance expectations. For example, nursing care centers accredited by The Joint Commission (2017) are required to use at least two patient or resident identifiers when providing care, treatment, and services. The standards do not define the identifiers that can be used; they only state that the patient's or resident's room number or physical location should *not* be used. The nursing care center can select any other two patient or resident identifiers that would work best in their facility.

Except for healthcare services that must comply with absolute standards (such as standards found in government regulations), **performance targets** may be established on the basis of (1) opinion, (2) criteria, or (3) **performance comparison**.

Opinion

Performance targets may be derived from the opinion of those affected by the measure. A determination is made regarding the acceptable or desired level of performance, which

Standards

Performance expectations established by individuals or groups.

Performance targets

Desired performance.

Performance comparison

Examination of similarities or differences between one organization's performance and the performance of other organizations.

then becomes the goal. This determination is often based on people's subjective belief regarding good performance. For instance, the performance data illustrated in exhibit 4.18 show that the percentage of delayed X-ray reports is gradually declining (as evidenced by the trend line). If continued improvement of this process is a departmental goal, the following year the radiology manager will set an expectation that the percentage be lower than the current year's average rate. If maintaining the status quo is the goal, the radiology manager will set the same expectation for the following year as was achieved for the current year.

People often question why performance targets are based on opinion rather than set at 0 or 100 percent. Is less-than-perfect performance acceptable? Arguments supporting the ideal of perfection are difficult to contest, but the law of diminishing returns must be taken into consideration when setting performance goals. This law implies that larger gains are made when quality performance is low, while incremental gains diminish and become more expensive when quality is already high (Appari, Johnson, and Anthony 2013). For example, as the number of delayed X-ray reports decreases, situations that are unusually difficult to resolve may remain problematic. The manager must decide whether to direct additional efforts at achieving zero report delays or whether these efforts are better directed toward improving low performance in another area.

Criteria

Performance targets should not be established on the sole basis of opinions if relevant, professionally defined criteria are available. Professionally defined criteria are found in the standards, rules, and principles that have been developed by authoritative groups, such as clinical practice guidelines (discussed in chapter 3), consensus statements, and position papers. Physician and staff compliance with the criteria is usually considered voluntary, but organizations are encouraged to consider them when establishing expected levels of performance. For instance, the American College of Radiology (2012) recommends that imaging studies not be performed for patients with an uncomplicated headache. This recommendation may prompt the medical director of radiology to set a goal of zero imaging studies performed for this condition.

Organizations may have justifiable reasons for deviating from professionally defined criteria. In these situations, performance goals are set at less than 100 percent. For instance, the Centers for Disease Control and Prevention (2011) recommends that all healthcare practitioners and persons in training for healthcare professions be vaccinated annually against influenza, but the vaccination may not be **appropriate** for some individuals because of allergies or other contraindications. Plus, some people may choose not to follow the recommendation for personal reasons. Thus, the performance target for completion of influenza vaccinations could be set at less than 100 percent to account for such factors.

Appropriate

Suitable for a particular person, place, or condition.

Performance Comparison

Other organizations' performance is the third influence on quality targets. The use of comparative information to set performance goals is a relatively new phenomenon in healthcare. Before the mid-1980s, hospitals and other providers judged the quality of their performance primarily on the basis of internal historical trends. Organizations reviewed their current performance measurement data and compared the results with their past performance to determine whether their patient mortality rate had increased or decreased over the past year, whether patient complaints had increased or decreased, and so on. This internal attention has been replaced by a broad, externally focused type of comparison made possible by increasingly abundant, publicly available data on other organizations' achievements. Providers can use these external data to establish internal performance expectations. Exhibit 4.20 is a list of online sources of comparative performance data commonly used by healthcare organizations to set performance expectations.

The number of proprietary comparative performance databases continues to expand. For example, more than 2,500 hospitals and outpatient providers nationwide and across the world are involved in various data-sharing efforts sponsored by the National Cardiovascular Data Registry (<https://cvquality.acc.org/NCDR-Home>). Participants in the National Database of Nursing Quality Indicators (NDNQI) (www.pressganey.com/solutions/clinical-quality/nursing-quality) share data on structure, process, and outcome measures of nursing care at the hospital unit level. And orthopedic surgeons can submit data to FORCE-TJR, a nationwide, comprehensive database of total joint replacement surgical and patient-reported outcomes (<https://forceortho.org/>); in exchange, they receive quarterly reports of their results benchmarked to the national norm.

Another source of comparison data is published research. Reports on studies often provide information about performance rates. Keep in mind, however, that data from literature sources should not be blindly adopted as performance targets. For example, data from NDNQI were used by researchers to determine the prevalence of patient falls in adult medical, medical-surgical, and surgical hospital nursing units. During the study period of July 1, 2006, through September 30, 2008, a total of 315,817 falls occurred, representing a rate of 3.56 falls per 1,000 patient days (Bouldin et al. 2013). Could this fall rate be used to set a performance expectation in a hospital with similar units? The managers of the similar units would need to answer several questions to ensure a reasonably valid comparison:

- ◆ What is the NDNQI definition of a *patient fall*? Do we define *patient fall* the same way?
- ◆ How reliably did caregivers at the hospitals participating in the NDNQI report patient falls? If they did not report falls consistently, would the number of patient falls have been higher if the caregivers had reported more reliably?

- ◆ The researchers reported the number of patient falls per 1,000 patient days. Do we use the same reporting methodology? Do we count the number of patients who have fallen, or do we count the number of falls? (Each patient could fall more than once.)
- ◆ Are the patients in the hospitals participating in the NDNQI similar or dissimilar to our patient population?
- ◆ Does our physical environment differ from that of the hospitals participating in the NDNQI?

The term *benchmarking* is typically used to describe performance comparison activity (e.g., “We are benchmarking against other hospitals”), but it involves more than simple comparison with other organizations. **Benchmarking** uses the level of performance achieved by an exemplary or world-class organization as the standard for comparison (Sower, Duffy, and Kohlers 2007). In other words, it functions more like a scoreboard that determines whether an organization is performing above or below standard. This standard may come from an exemplary healthcare organization or from an organization outside the healthcare industry recognized for its superior performance. For example, comparison data from a hotel, a car rental company, or an airline with an excellent check-in procedure could be used to set performance goals for the patient registration process in a hospital or clinic.

Comparison data are not available for many aspects of healthcare services. However, any performance results from other organizations (or world-class companies) that are available should be considered when setting internal performance targets. Organizations that have achieved superior performance demonstrate the possibility that all organizations can do the same. For instance, in 2012 Maricopa Integrated Health System launched a campaign to reduce hospital-acquired infections. The campaign involved new infection prevention practices, education for the more than 4,000 staff members, and formation of the multidisciplinary Infection Prevention Champions team to investigate and recommend various other infection control strategies. As of June 2014, the system’s pediatric intensive care unit had gone 457 days without a central line–associated bloodstream infection event, compared with an average interval of 79 days between events in 2011 (Maricopa Integrated Health System 2014). It is hoped that this example will stimulate other

Benchmarking

Learning about the best practices in other companies for the purpose of using them in your own organization.

**LEARNING POINT**
Performance Goals

Performance goals are quantifiable estimates or results expected for a given period. Performance goals are set at 100 percent for aspects of healthcare that have absolute standards. In the absence of absolute standards, performance targets are based on one or more of the following factors:

- Opinion
- Criteria
- Performance comparison

EXHIBIT 4.20Online Sources
of Performance
Comparison Data

Sponsor	Description of Publicly Available Data
Agency for Healthcare Research and Quality (AHRQ) (www.ahrq.gov/research/findings/nhqdr/)	The National Healthcare Quality & Disparities Report includes national estimates of numerous performance measures, including dimensions of healthcare quality, stages of healthcare, clinical conditions, settings of care, and access to healthcare.
AHRQ Consumer Assessment of Healthcare Providers and Systems (CAHPS) (www.cahpsdatabase.ahrq.gov/cahpsidb/)	The CAHPS reporting system is an online repository for data from selected CAHPS surveys. The system contains comparative data for the CAHPS Health Plan Survey and the CAHPS Clinician & Group Survey.
American College of Surgeons Commission on Cancer (www.facs.org/quality-programs/cancer/ncdb/)	The National Cancer Database (NCDB) contains information on cancer care in the United States, including tumor staging and histology characteristics, type of first-course treatment administered, disease recurrence, and survival information.
American College of Surgeons National Trauma Data Bank (NTDB) (www.facs.org/quality-programs/trauma/ntdb/)	The NTDB annual adult and pediatric reports contain descriptive information about trauma patients, including demographics, injury information, and outcomes.
California Office of Statewide Health Planning and Development (www.oshpd.ca.gov/HID/#Find)	The office provides quality of care, patient safety, and outcomes data for California hospitals.
Centers for Disease Control and Prevention (CDC) (www.cdc.gov/hai/surveillance/)	The CDC provides information about national and state healthcare-associated infection rates.
Centers for Medicare & Medicaid Services (CMS) (https://data.medicare.gov)	CMS provides various performance measurement data for hospitals, nursing homes, home health agencies, and dialysis facilities.
The Commonwealth Fund (www.whynotthebest.org)	WhyNotTheBest.org is a resource for healthcare professionals interested in tracking performance on various measures of healthcare quality.
Department of Veterans Affairs (www.medicare.gov/hospitalcompare/VADData/main.html)	VA Hospital Compare contains information for consumers about the quality and safety of healthcare provided by the Veterans Health Administration.
Healthcare Cost and Utilization Project, sponsored by AHRQ (http://hcupnet.ahrq.gov)	The Healthcare Cost and Utilization Project includes health statistics and information on hospitals, including pediatric and emergency department utilization and AHRQ quality indicators.
The Joint Commission (www.qualitycheck.org)	Quality Checks are reports on the performance of accredited organizations in key areas of patient care.
The Leapfrog Group (www.leapfroggroup.org)	The Leapfrog Group conducts a hospital survey of quality and safety, focusing on hospital structures, processes of care, and outcomes.
National Committee for Quality Assurance (NCQA) (https://reportcards.ncqa.org)	NCQA provides health plan and managed behavioral healthcare organization performance measurement results for quality of care, access to care, and member satisfaction with health plans and doctors.

hospitals to work toward achieving similarly low infection rates.

STATISTICAL PROCESS CONTROL

In addition to comparing performance with pre-defined goals, healthcare organizations increasingly use **statistical process control (SPC)** to assess performance. This technique, which has traditionally been applied in industries other than healthcare, allows the user to highlight variations in performance that should be investigated. Performance variation can sometimes be a bigger problem than can consistently average performance.

Consider the following situation: A 450-bed urban hospital uses a centralized call center to schedule all outpatient tests, such as imaging and blood tests. Because many of its competitors offer similar outpatient services in the area, callers typically do not wait on hold for a scheduler for more than 30 to 40 seconds before hanging up. Management views a lost call as lost business.

The call center regularly measures how long callers wait on hold, and the wait time performance goal is an average of 30 seconds or less. The call center meets this performance goal each month, yet many callers hang up before a scheduler takes their call. Why? Average performance is fine; performance variation is the problem. When schedulers are busy, callers are forced to wait longer in the phone queue than they would like to. Performance appears to be acceptable when long wait times are averaged together with short wait times, but managers need a better picture of call center performance: They should apply SPC to measure variation in wait times as well as average wait time performance.

SPC concepts and methods are primarily based on the importance of reducing **process variation** to consistently achieve desired results over time. Using SPC methods, performance data are graphically displayed and analyzed to determine whether performance is in a state of statistical control. When performance reaches a state of stability and the conditions or factors present at that time remain constant, future performance is likely to stay in the same range.

The following example illustrates how SPC is used to determine whether performance is stable (in a state of statistical control) or unstable (out of statistical control). Performance stability is evaluated by determining the amount of variation.

Suppose that every day you plot on a line graph the number of minutes you take to run three miles. After a 30-day period, your daily run times vary but likely remain in a predictable range (some variation is expected in any process). At what point is your run time significantly different from the norm? To answer this question, you use data from the past 30 days to calculate the upper and lower limits of your run time norm. When you plot the current day's time on the graph, you can see whether the time lies in the normal range.



DID YOU KNOW?

In the 1860s, Florence Nightingale pioneered the systematic collection, analysis, and dissemination of comparative hospital outcomes data to understand and improve performance.

Statistical process control (SPC)

Application of statistical methods to identify and control performance.

Process variation

Fluctuation in process output.

Normal distribution

A spread of information (such as performance data) in which the most frequently occurring value is in the middle of the range and other probabilities tail off symmetrically in both directions; sometimes called the *bell-shaped curve*.

Standard deviation

A measure of the dispersion of a collection of values.

Common cause variation

Variation in performance that does not result from a specific cause but is inherent in the process being measured.

Special cause variation

Unexpected variation in performance that results from a non-random event.

The upper and lower limits of your run time norm are derived from the statistical theory of **normal distribution**. About 68 percent of values drawn from a normal distribution are within one **standard deviation** of the mean (average), about 95 percent of the values are within two standard deviations, and about 99 percent lie within three standard deviations (Research Methods Knowledge Base 2006). If the upper and lower limits of your normal run time are set at three standard deviations from the mean, you have little chance of registering a run time outside of these parameters.

If your times remain stable (that is, they always lie in the normal range), your running performance is in a state of statistical control. The only way you can achieve better run times is to change a fundamental aspect of the process (e.g., run a different route, wear new shoes for your run). Suppose one day your run time is outside the limits of your norm. Because these limits have been statistically calculated on the basis of your past performance, you know that something unusual occurred. You will want to identify and correct the cause of the longer time.

Performance Variation

While working for Western Electric Company in the 1920s, Walter Shewhart recognized that a process can contain two types of variation: one resulting from random causes and one resulting from assignable causes (Provost and Murray 2011). W. Edwards Deming later used the expressions **common cause variation** to describe variation resulting from random causes and **special cause variation** to describe variation resulting from assignable causes (Provost and Murray 2011). Common cause variation is inherent—always present—in every process. The effect of this type of variation on performance is usually minimal and results from the regular rhythm of the process.

The different types of outpatient diagnostic tests scheduled by the hospital call center described earlier are one example of factors that can create common cause variation in a process. Each test is different, so the time required to schedule each one varies. The call center manager cannot change the fact that the tests are different; the differences are just part of the scheduling process and have to be considered when managing call wait time performance.

Special cause variation results from factors that are not inherent in the process and somehow find their way into it. They do not frequently affect the process, but when they do, their impact on performance can be huge. As an example, consider a part-time employee who works in the hospital's call center. Presume this employee is slower at scheduling test appointments than other schedulers are. Immediately, you deduce that the variation in the time callers wait on hold can be attributed to this employee's poor methods. This variation occurs infrequently (when the employee is working), has a large impact on performance (more callers on hold for longer periods), and is not a normal part of the process. To eliminate this special cause variation, the employee could receive further training or be dismissed.

You will always find some variation when you measure performance over time. During the performance assessment step, your reaction to this variation is important. Using SPC techniques, you can differentiate between common cause and special cause variation. Suppose you take an average of 29 minutes to run three miles. One day, you take 37 minutes. Does this longer time indicate a special cause variation that should be investigated and eliminated, or does it indicate a common cause variation that does not need to be investigated and eliminated?

One aspect of quality management first articulated by Shewhart (1925) is a phenomenon known as **tampering**. Tampering occurs when some action is taken in reaction to a performance result without knowing whether the result was caused by natural variation in the process (common cause) or an unusual occurrence (special cause). Process changes made in response to an instance of undesirable performance when it is just normal performance variance can damage the process further.

Tampering

Doing something in reaction to a particular performance result without knowing whether it was caused by natural variation or some unusual occurrence.

STATISTICAL PROCESS CONTROL TOOLS

Line graphs and control charts are commonly used SPC tools, in part because variations in performance data plotted on these graphs are easy to interpret. A few basic rules, discussed in detail in the following sections, should be remembered when identifying common cause variation (the process is considered stable) and special cause variation (the process is considered unstable).

Line Graph

SPC techniques can be applied to data displayed in a line graph without calculating upper and lower limits of the normal range. Only the average, or mean, of the data is calculated, and it is displayed as a center line on the graph. Ideally, the line graph has a minimum of 15 data points; some statisticians suggest a minimum of 20 data points (Woodall 2000). Performance results plotted on the graph are compared with the center line to locate significant performance shifts or trends. A shift or trend represents potentially unstable performance that needs to be investigated.

A significant shift in performance is evident when one of the following situations occurs:

- ◆ Seven consecutive data points appear above or below the center line on a line graph that shows fewer than 20 data points (ignore data points that fall on the center line).
- ◆ Eight consecutive data points appear above or below the center line on a line graph that shows 20 or more data points (ignore data points that fall on the center line).

A significant performance trend is evident when one of the following situations occurs:

- ◆ Seven consecutive data points move steadily upward or downward on a line graph that shows fewer than 20 data points (points may fall on or cross the center line).
- ◆ Eight consecutive data points move steadily upward or downward on a line graph that shows 20 or more data points (points may fall on or cross the center line).

The line graph of clinic wait time data shown in exhibit 4.21 illustrates how this SPC technique is applied during performance assessment. Starting at week 10, the wait time slightly increases. By week 16, the wait time has increased seven consecutive times—a signal that the upward trend is likely to continue. As with unusual shifts in performance, trends should be investigated.

Control chart

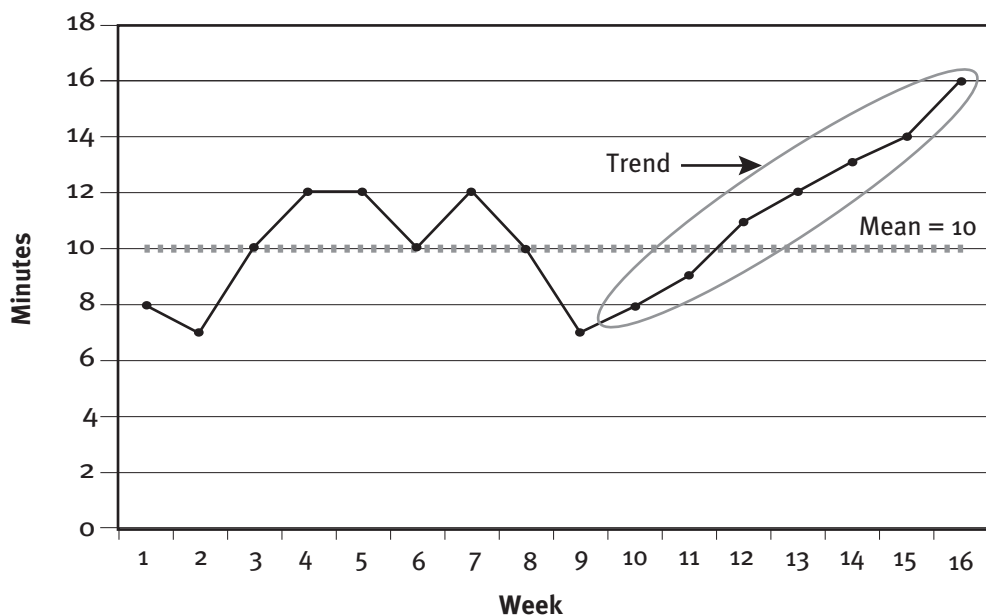
A line graph that includes statistically calculated upper and lower control limits. (Examples of control charts are found in exhibits 4.22–4.25.)

Control Chart

A line graph that contains a mean line and upper and lower limits of the normal range (known as *control limits*) is called a statistical **control chart**. Developed by Shewhart (1925)

EXHIBIT 4.21

Line Graph of Clinic Wait Time Data Displaying a Significant Trend



in 1924, it has become a primary tool of modern performance assessment. A set of observations (such as your run times for 30 days) is plotted on the control chart along with the mean line, called the *center line* (CL); the upper limit of the normal range, called the **upper control limit** (UCL); and the lower limit of the normal range, called the **lower control limit** (LCL). The CL almost always represents the arithmetic mean of the data. Shewhart recommended that control limits be set at plus and minus three standard deviations from the mean (Nelson 2003). In situations where performance variation must be kept to a minimum, control limits may be set at plus and minus two or even one standard deviation from the mean.

Exhibit 4.22 is a control chart showing your hypothetical three-mile run times for a 30-day period. The run times for each day are different, but these differences are normal process variation (common cause variation) because the times are within the statistically calculated UCL and LCL. Thus, according to the data in exhibit 4.22, your performance is in a state of statistical control, meaning your performance is stable and will likely remain within the control limits unless some aspect of the running process changes.

When performance data are displayed on a control chart with statistically calculated UCL and LCL, the type of variation (common cause or special cause) prompting the changes in performance is easy to determine. Exhibit 4.23 is a control chart showing performance data from a large multispecialty outpatient clinic. Each month, the clinic counts the number of insurance claims rejected because of incomplete information.

Upper control limit

The upper boundary below which data plotted on a control chart can vary without the need for change or correction.

Lower control limit

The lower boundary above which data plotted on a control chart can vary without the need for change or correction.

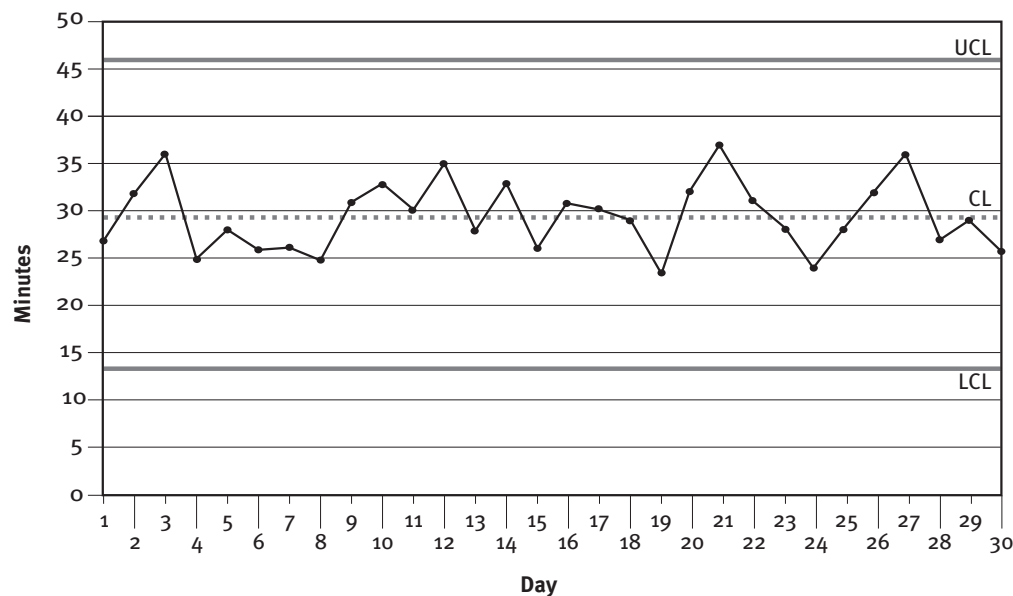


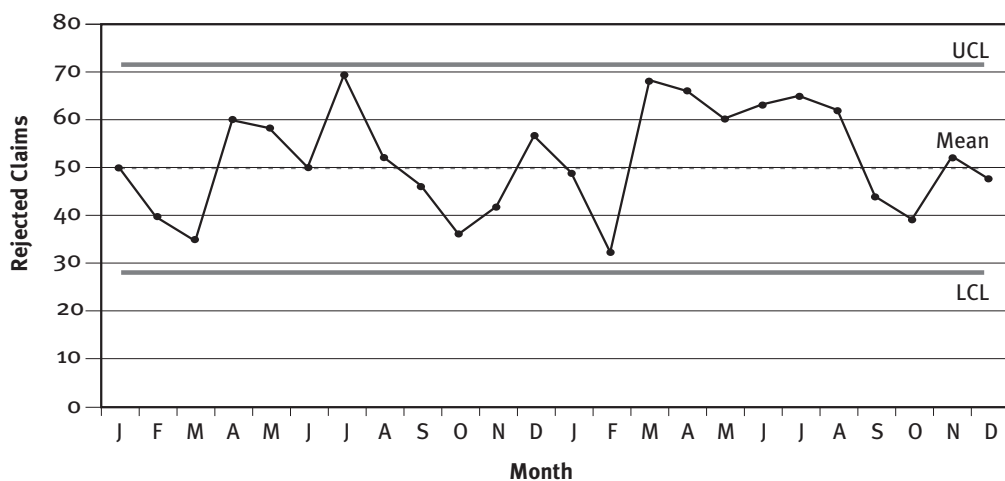
EXHIBIT 4.22
Control Chart of
Three-Mile Run
Times

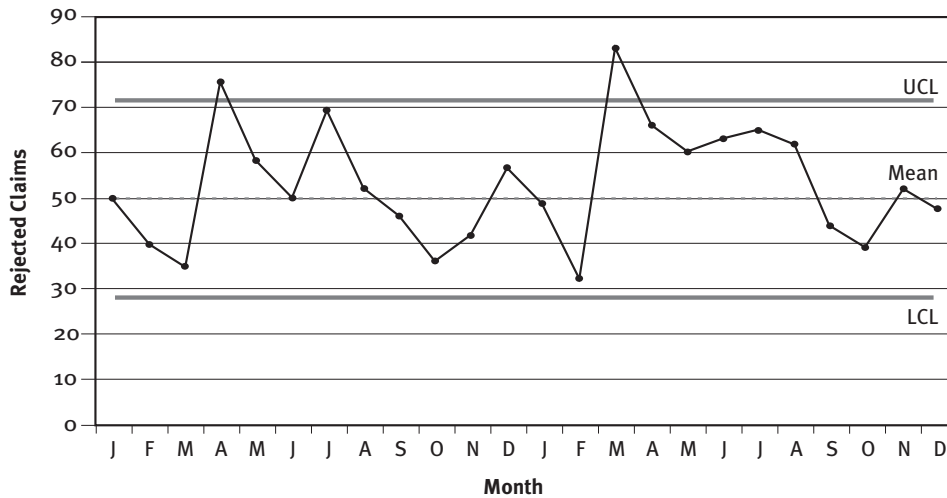
The billing office manager has set a performance goal of no more than 60 rejections per month. Some months this target is exceeded, but the manager knows the increases result from common cause variation because the number of rejected claims is not higher than the UCL. Because performance is in a state of statistical control, the manager knows that the number of rejected claims will eventually decline and that changes to the process are not necessary. Tampering with what appears to be a stable process could make performance worse.

Exhibit 4.24 is a similar report of rejected insurance claims. As in the previous example, the performance target of no more than 60 rejections per month is exceeded in some months, but in two of these months, the number of rejections is greater than the UCL. This increase signals that an unusual occurrence—a special cause variation—took place in those months. When the manager detects that the performance target for that month has been exceeded and sees evidence of special cause variation, further investigation is needed. For example, the manager may find that two new employees were not properly trained in April. Training is provided, and the number of rejected claims declines in May. The following March, the number of rejected claims again exceeds the UCL—a signal of special cause variation. In early April, the manager investigates and discovers that in mid-March, an insurance company changed its claim submission requirements without notifying the hospital. The situation returned to normal, and as shown by the graph in exhibit 4.24, the number of insurance claim rejections in April is again in a state of statistical control.

Control charts are also useful for assessing the impact of performance improvement activities. Suppose the clinic billing office manager changes the performance target

EXHIBIT 4.23
Control Chart
of Number of
Rejected Insurance
Claims—Process
in Control



**EXHIBIT 4.24**

Control Chart
of Number of
Rejected Insurance
Claims—Process
Not in Control

for rejected insurance claims from no more than 60 rejections per month to no more than 40 rejections per month. To achieve this goal, employees in the billing office are trained in January to use new claims management software that is electronically linked to the clinic's new electronic health record system. In March, the manager again begins to plot the number of claim rejections each month on a control chart. The CL, UCL, and LCL are recalculated to reflect the lower target. Exhibit 4.25 shows the performance results from six months prior to the process change and the results following the process change. Not only has the number of claim rejections decreased but performance has remained in control as well. The data prove the improvement initiative was successful.

Different types of control charts (customarily denoted by letters such as np , p , c , u , $\bar{X}$, and $\bar{S}$) are appropriate for different situations (Provost and Murray 2011). Selecting the right chart requires an understanding of the type of performance measurement data that will be plotted on the chart. Additional resources on constructing and interpreting control charts appear at the end of this chapter.

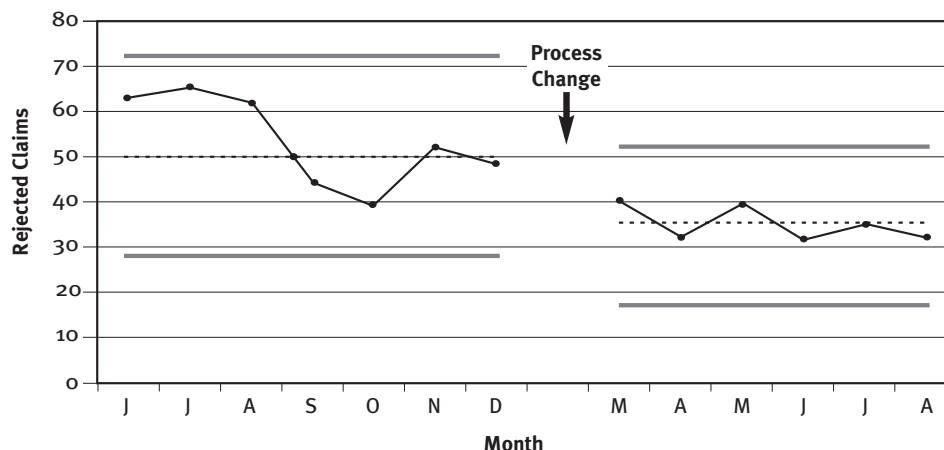
**LEARNING POINT**

Statistical Process Control

SPC concepts, techniques, and tools (usually line graphs and control charts) are used to distinguish between common cause and special cause variations in performance. Common cause variation is the result of normal performance fluctuations. If staff consistently follow the same procedures and all else remains unchanged, performance rates will likely exhibit only common cause variation. Unnecessary adjustments made to a process in response to common cause variation could make performance worse. If something unnatural occurs, performance rates will show signs of special cause variation. Special cause variation should be investigated, and the problem inducing atypical performance should be fixed.

EXHIBIT 4.25

Control Chart
of Number
of Rejected
Insurance Claims—
Improvement
Following Process
Change

**DETERMINE NEED FOR ACTION**

In the final phase of performance assessment, the need for further action is decided. At this point, the measurement results have been reported and performance quality is evident. If measurement data are displayed in a control chart, the extent of performance variation is also apparent. Any of the following situations might signal the need to advance to the next step—performance improvement:

- ◆ Performance does not meet expectations; no signs of special cause variation are evident.
- ◆ Performance meets expectations; signs of special cause variation are evident.
- ◆ Performance does not meet expectations; signs of special cause variation are evident.

If none of the above situations exists, further investigation is unnecessary. Performance measurement should continue to ensure results do not change; sustained good performance should be celebrated with staff.

Some opportunities for improvement cannot be acted on immediately. Improvement projects are resource intensive, and an organization's leaders often need to set improvement priorities. Questions to consider when selecting topics for improvement include—but are not limited to—the following (Spath 2005):

- ◆ Does the issue relate to one of the organization's high-priority improvement goals?

- ◆ Does the issue pose a substantial risk to the safety of patients or staff?
- ◆ Will the organization receive substantial negative publicity or face the loss of licensure or accreditation if the concern is not addressed?
- ◆ If the improvement project is not executed, will staff and physician morale deteriorate or will they lose trust in leaders' commitment to ensuring high-quality patient care?

After an organization decides to advance to the performance improvement step, the people involved in the processes affecting performance investigate the **performance gap**—the problem causing the difference between actual and expected performance. Once the underlying causes are well understood, effective improvement interventions can be designed and implemented. The steps involved in performance improvement are covered in the next chapter.

Performance gap

The difference between actual and expected performance.

CONCLUSION

Performance assessment is the evaluation stage of quality management. Measurement data are reported and analyzed in this stage. The purpose of assessment is to determine whether improvement opportunities exist. Performance measurement data can be judged by comparing results with internally set performance expectations, comparing results with the achievements of other facilities, or determining whether performance is in a state of statistical control. When a gap between expected and actual performance exists or performance is unstable, further investigation is needed to determine the cause. Investigation of the cause is the starting point of performance improvement.

FOR DISCUSSION

1. The Centers for Medicare & Medicaid Services (CMS) Nursing Home Compare website (www.medicare.gov/nursinghomecompare/) allows you to compare performance at nursing homes throughout the United States. Go to this site and search for nursing homes within 50 miles of your location.
 - a. Which facilities rate highest in each of the following measurement categories?
 - Health inspections
 - Staffing
 - Quality measures

- b. Explore the Nursing Home Compare site and review the data for each measurement category. Which performance measures in these categories are most important to consumers of nursing home services? Which performance measures are least important to consumers? Are consumers using the data on the Nursing Home Compare website to select a facility? What other factors might influence consumer choice?
2. The CMS Hospital Compare website (www.medicare.gov/hospitalcompare) allows you to compare performance at hospitals throughout the United States. Go to this site and review the data for each measurement category. Which performance measures in these categories are most important to consumers of hospital services? Which performance measures are least important to consumers? Are consumers using the data on the Hospital Compare website to select a hospital? What other factors might influence consumer choice?
3. The Joint Commission Quality Check website (www.qualitycheck.org) provides performance ratings for accredited organizations. Go to this site and look up hospitals in your area. What is different about the performance measures reported on the Quality Check website versus what is reported on the CMS Hospital Compare website? Are there any similarities? Which website provides the most detailed information about performance at the hospitals? Which website is easiest for consumers to use for performance assessment purposes?

WEBSITES

- Association for Benchmarking Health Care
www.abhc.org
- Healthcare-Associated Infections Data Analysis and Presentation Standardization Toolkit available from the Council of State and Territorial Epidemiologists
www.cste.org/general/custom.asp?page=HAIToolkit
- YouTube videos produced by the Institute for Healthcare Improvement:
 - Learning About Variation by Counting Candy
<https://youtu.be/gliODQlozWQ>
 - Measurement Data and Monitoring Data: Which Is Better?
<https://youtu.be/BFHYPwV2jtk>
 - Understanding Patient Experience Data
https://youtu.be/yW_g_G_V6I
 - What Do We Mean by Measurement for Judgment?
<https://youtu.be/O2dcydR97dg>

STATISTICAL PROCESS CONTROL RESOURCES

- Benneyan, J. C., R. C. Lloyd, and P. E. Plsek. 2003. "Statistical Process Control as a Tool for Research and Health Care Improvement." *Quality and Safety in Healthcare* 12 (6): 458–64.
- Carey, R. 2003. *Improving Healthcare with Control Charts: Basic and Advanced SPC Methods and Case Studies*. Milwaukee, WI: American Society for Quality.
- Kelley, D. L. 1999. *How to Use Control Charts for Healthcare*. Milwaukee, WI: American Society for Quality.
- Marsteller, J. A., M. M. Huizinga, and L. A. Cooper. 2013. *Statistical Process Control: Possible Uses to Monitor and Evaluate Patient-Centered Medical Home Models*. AHRQ Publication No. 13-0031-EF. Rockville, MD: Agency for Healthcare Research and Quality. <https://pcmh.ahrq.gov/page/statistical-process-controlpossible-uses-monitor-and-evaluate-patient-centered-medical-home>.
- MoreSteam.com. n.d. "Statistical Process Control (SPC)." www.moresteam.com/toolbox/statistical-process-control-spc.cfm.
- Provost, L. P., and S. K. Murray. 2011. *The Health Care Data Guide: Learning from Data for Improvement*. San Francisco: Jossey-Bass.
- Thor, J., J. Lundberg, J. Ask, J. Olsson, C. Carli, K. P. Harenstam, and M. Brommels. 2007. "Application of Statistical Process Control in Healthcare Improvement: Systematic Review." *BMJ Quality & Safety* 16 (5): 387–99.
- Wheeler, D. J. 2000. *Understanding Variation: The Key to Managing Chaos*, 2nd ed. Knoxville, TN: SPC Press.

REFERENCES

- American College of Radiology. 2012. "Don't Do Imaging for Uncomplicated Headache." Updated June 29, 2017. www.choosingwisely.org/clinician-lists/american-college-radiology-imaging-for-uncomplicated-headache/.
- Appari, A., M. E. Johnson, and D. L. Anthony. 2013. "Meaningful Use of Electronic Health Record Systems and Process Quality of Care: Evidence from a Panel Data Analysis of U.S. Acute-Care Hospitals." *Health Services Research* 48 (2 Pt 1): 354–75.

Bouldin, E. D., E. M. Andresen, N. E. Dunton, M. Simon, T. M. Waters, M. Liu, M. J. Daniels, L. C. Mion, and R. I. Shorr. 2013. "Falls Among Adult Patients Hospitalized in the United States: Prevalence and Trends." *Journal of Patient Safety* 9 (1): 13–17.

Carroll, L. 1999. *Alice's Adventures in Wonderland*, 1st US ed. Cambridge, MA: Candlewick Press.

Centers for Disease Control and Prevention. 2011. "Immunization of Health-Care Personnel: Recommendations of the Advisory Committee on Immunization Practices (ACIP)." *Morbidity and Mortality Weekly Report*. Published November 25. www.cdc.gov/mmwr/preview/mmwrhtml/rr6007a1.htm.

Joint Commission. 2017. *National Patient Safety Goals Effective January 2017: Nursing Care Center Accreditation Program*. Accessed November 5. www.jointcommission.org/assets/1/6/NPSG_Chapter_NCC_Jan2017.pdf.

Juran, J. M. 1974. *Quality Control Handbook*, 3rd ed. New York: McGraw-Hill.

Kumar, N. 2017. "Using Data Analytics Techniques to Evaluate Performance." In *Applying Quality Management in Healthcare: A Systems Approach*, by P. L. Spath and D. L. Kelly, 126–202. Chicago: Health Administration Press.

Maricopa Integrated Health System (MIHS). 2014. "MIHS Targets Zero Hospital-Acquired Infections (HAIs)." Accessed November 5, 2017. www.mihs.org/article/mihs-targets-zero-hospital-acquired-infections-hais--.

Nelson, L. S. 2003. "When Should the Limits on a Shewhart Control Chart Be Other Than a Center Line ± 3 -Sigma?" *Journal of Quality Technology* 35 (4): 424–25.

Provost, L. P., and S. K. Murray. 2011. *The Health Care Data Guide: Learning from Data for Improvement*. San Francisco: Jossey-Bass.

Research Methods Knowledge Base. 2006. "Statistical Terms in Sampling." Published October 20. www.socialresearchmethods.net/kb/sampstat.php.

Scholtes, P. R. 1992. *The Team Handbook*. Madison, WI: Joiner Associates.

Shewhart, W. A. 1925. "The Application of Statistics as an Aid in Maintaining Quality of Manufactured Product." *Journal of the American Statistical Association* 20: 546–48.

Sower, V., J. A. Duffy, and G. Kohlers. 2007. *Benchmarking for Hospitals: Achieving Best-in-Class Performance Without Having to Reinvent the Wheel*. Milwaukee, WI: ASQ Press.

Spath, P. L. 2005. *Leading Your Healthcare Organization to Excellence: A Guide to Using the Baldrige Criteria*. Chicago: Health Administration Press.

US Department of Labor, Occupational Health and Safety Administration. 1996. "Occupational Safety and Health Standards—29 CFR, Part 1910, Toxic and Hazardous Substances, Ionizing Radiation, No. 1910.1096." Accessed November 5, 2017. www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10098.

Woodall, W. H. 2000. "Controversies and Contradictions in Statistical Process Control." *Journal of Quality Technology* 32 (4): 341–50.

