

CHAPTER 3

MEASURING PERFORMANCE

LEARNING OBJECTIVES

After reading this chapter, you will be able to

- apply structure, process, and outcome measures to evaluate quality;
- describe common performance measures of healthcare services;
- demonstrate the steps involved in developing performance measures;
- identify national groups influencing healthcare performance measurement priorities;
- recognize how healthcare organizations select performance measures;
- describe the difference between measures of healthcare services and measures of clinical decision-making; and
- identify the role of balanced scorecards in performance measurement.

KEY WORDS

- Activity-level measures
- Agency for Healthcare Research and Quality (AHRQ)
- Average
- Balanced scorecards (BSCs)
- Check sheet
- Clinical practice guidelines
- Customer service
- Denominator
- Electronic clinical quality measures (eCQMs)
- Evidence-based measures
- Healthcare Effectiveness Data and Information Set (HEDIS)
- Interrater reliability
- Line graph
- Measures
- Metrics
- National Quality Forum (NQF)
- Numerator
- ORYX performance measurement
- Outcome measures
- Patient experience measures
- Performance
- Performance measures
- Process measures
- Quality indicators
- Ratio
- Reliable
- Sample
- Structure measures
- System-level measures
- Valid
- Validity

Measures

Instruments or tools used to gather information.

The purpose of measurement is to gather information. For example, the dashboard on my car displays lots of data. I can see how much gasoline is left in my tank, how fast I am traveling, and so on. These **measures** provide me with information about my car and my current driving situation. I decide how to use this information. Do I need to refill my gas tank soon, or can I wait a day or two? Do I need to slow down, or can I speed up a bit? My reaction to the information is partially based on personal choices, such as my willingness to risk running out of gas or incurring a speeding ticket.

It is also influenced by external factors, such as the distance to the nearest gas station and the speed limit.

Information must be accurate to be useful. If the “check engine” light on my dashboard malfunctions—blinks when the engine is functioning properly—I quickly learn to ignore it. Information also must tell me something I want to know; otherwise, I do not pay attention to it. For instance, I do not understand why a dial on my car’s dashboard shows the engine RPM (revolutions per minute). This information may be important to someone, but I do not find it useful.

If the information is accurate and useful to me, I need to be able to interpret it. On more than one occasion, my car’s speedometer display has mysteriously changed from miles per hour to kilometers per hour, leaving me wondering how fast I’m going. If I want to compare information, the **metrics** must be consistent. Evaluating the gasoline efficiency of two automobiles would be challenging if one rating is reported in miles per gallon and the other in liters per kilometer.

The purpose of measurement in quality management is similar to the purpose of dashboard indicators. Companies measure costs, quality, productivity, efficiency, customer satisfaction, and so on because they want information. They use this information to understand current **performance**, identify where improvement is needed, and evaluate how changes in work processes affect performance. Like the information displayed on a car dashboard, the data must be accurate, useful, easy to interpret, and reported consistently.

Metrics

Any type of measurement used to gauge a quantifiable component of performance.

Performance

The way in which an individual, a group, or an organization carries out or accomplishes its important functions and processes.

MEASUREMENT IN QUALITY MANAGEMENT

As shown in exhibit 3.1, measurement is the starting point of all quality management activities. The organization uses measurement information to determine how it is performing. In the next step, assessment, the organization judges whether its performance is acceptable. If its performance is acceptable, the organization continues to measure it to ensure performance does not deteriorate. If its performance is not acceptable, the organization advances to the improvement step. In this step, process changes are made. After the changes are in place for a specified time, the organization continues measuring to determine whether the changes are producing the desired result.

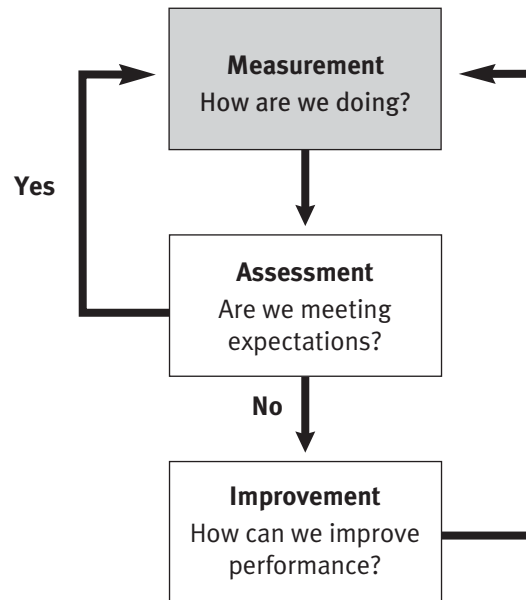
CASE STUDY

The following case study illustrates the use of measurement information for quality management purposes.

The Redwood Health Center is a multispecialty clinic that employs ten care providers—nine physicians and one nurse practitioner. Quality customer service is a priority for every staff person in the clinic.

EXHIBIT 3.1

Cycle of
Measurement,
Assessment, and
Improvement

**MEASUREMENT: HOW ARE WE DOING?****Customer service**

A series of activities
designed to attend to
customers' needs.

To judge **customer service**, the clinic regularly measures patient satisfaction. A locked, ballot-style feedback box is located in the waiting area. It is clearly labeled: "Please tell us how we're doing. Your feedback will help us make things better." Next to the box is a container holding pens and pencils and a stack of blank feedback forms. The one-page feedback form includes the following questions:

1. What is the date of your clinic visit?
2. How would you rate the *quality of the medical care* you've received? (Please circle one.)
(poor) 0 - 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10 (perfect)
3. How would you rate the *quality of the customer service* you've received? (Please circle one.)
(poor) 0 - 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10 (perfect)
4. What did you like *best* about this visit?
5. What did you like *least* about this visit?
6. Please suggest one or more ways we could make things better.

At the end of each week, the clinic manager collects the feedback forms from the locked box. The results are tabulated and shared with the clinic staff every month.

At one monthly meeting, the clinic manager reports that many patients have complained about the amount of time they must wait before they are seen by a care provider. The providers expect clinic staff to bring patients to the exam room within ten minutes of the patient's arrival. To determine whether this goal is being met, the clinic gathers data on patient wait times for three weeks. Patients are asked to sign in and indicate their arrival time on a sheet at the registration desk. The medical assistant then records the time each patient is brought to an exam room.

ASSESSMENT: ARE WE MEETING EXPECTATIONS?

Patient wait time data for the three weeks are tallied. On most days, patient wait times are ten minutes or less. However, the average wait times are longer than ten minutes on Monday afternoons and Thursdays. Further investigation shows that the clinic serves a large number of walk-in patients on Monday afternoons. The clinic's nurse practitioner does not work on Thursdays, so physicians must see more patients on those days.

IMPROVEMENT: HOW CAN WE IMPROVE PERFORMANCE?

The wait time data help the clinic pinpoint where improvements are needed. The clinic manager meets with the care providers to discuss ways of changing the current process to reduce bottlenecks and improve customer satisfaction. The physicians ask that fewer patients be scheduled for appointments on Monday afternoons to give them more time to see walk-in patients. The nurse practitioner agrees to work on Thursday mornings.

MEASUREMENT: HOW ARE WE DOING?

To test whether these changes have improved outcomes, the clinic continues to gather feedback on overall patient satisfaction and periodically collects and analyzes patient wait time data.

MEASUREMENT CHARACTERISTICS

Measurement is a tool—usually in the form of a number or statistic—used to monitor the quality of some aspect of healthcare services. These numbers are called **performance**



LEARNING POINT

Measurement and Quality Management

Measurement is an element of all quality management activities. Performance is measured to determine current levels of quality, identify improvement opportunities, and evaluate whether changes have improved performance.

Performance measures

Quantitative tools used to evaluate an element of patient care; also called *quality measures*.

Quality indicators

Measures used to determine the organization's performance over time; also called *performance measures*.

Average

The numerical result obtained by dividing the sum of two or more quantities by the number of quantities; sometimes called an *arithmetic mean*.

measures or quality indicators. Measurement data can be communicated in many ways. Examples of measures and the most common numbers or statistics used to report data for healthcare quality management purposes are shown in exhibit 3.2.

A measure expressed as a percentage is generally more useful than a measure expressed as an absolute number, because a percentage more clearly communicates a measure's prevalence in a population. For example, the percentage of nursing home residents who develop an infection is more meaningful than the number of nursing home residents who develop an infection. To provide even more information, both the percentage and number of residents who develop an infection can be reported.

An **average**, sometimes called an *arithmetic mean*, is the sum of a set of quantities divided by the number of quantities in the set. For instance, we can calculate the average nurse salary by adding up all the nurses' salaries and dividing by the number of nurses. In some situations, however, averages can be misleading. If a few of the numbers in the data set are unusually large or small (called *outliers*), they are commonly excluded when calculating an average. The excluded outliers are examined separately to determine why they occurred.

EXHIBIT 3.2

Measurement
Data for
Healthcare Quality
Management
Purposes

Number/Statistic	Measure Example
Absolute number	• Number of patients served in the health clinic • Number of patients who fall while in the hospital • Number of billing errors
Percentage	• Percentage of nursing home residents who develop an infection • Percentage of newly hired staff who receive job training • Percentage of prescriptions filled accurately by pharmacists
Average	• Average patient length of stay in the hospital • Average overall score on patient satisfaction surveys • Average charges for laboratory tests
Ratio	• Nurse-to-patient ratio • Cost-to-charge ratio • Technician-to-pharmacist ratio

A **ratio** is used to compare two things. For instance, the nurse-to-patient ratio reports the number of hospital patients cared for by each nurse. In the same month, one hospital unit may report a ratio of 1 nurse for every 5.2 patients, while another unit reports a ratio of 1 nurse for every 4.5 patients and yet another reports a ratio of 1 nurse for every 4.8 patients. A consistently calculated ratio facilitates comparison between units.

Regardless of how a measure is communicated, to be used effectively for quality management purposes it must be accurate, useful, easy to interpret, and consistently reported.

Ratio

One value divided by another; the value of one quantity in terms of the other.

ACCURACY

Performance measures must be accurate. Accuracy relates to the correctness of the numbers. For example, in the case study, the time the patient entered the clinic must be precisely recorded on the registration sign-in sheet. Otherwise, the wait time calculation will be wrong. Accuracy also relates to the **validity** of the measure. Is the measure gathering the information it is supposed to be gathering? For example, the clinic asks patients to provide feedback on its performance. One question on the feedback form is, “How would you rate the quality of the customer service you’ve received?” Each patient who rates the clinic’s customer service may have something different in mind when answering the question. Because of these differences, the feedback is not a **valid** measure of just one aspect of clinic performance—for example, just the patient registration process. However, the average customer service rating is a good measure of patients’ satisfaction with overall clinic performance.

Validity

The degree to which data or results of a study are correct or true.

Valid

Relevant, meaningful, and correct; appropriate to the task at hand.

USEFULNESS

Performance measures must be useful. Measurement information must tell people something they want to know. Computers have made data collection easier, but volume and variety do not necessarily translate to relevance. For instance, the computerized billing system of a health clinic contains patient demographic information (e.g., age, address, next of kin, insurance coverage). The clinic manager could use this information to report several performance measures, such as the percentage of patients with prescription drug insurance benefits or the percentage of patients who live more than 20 miles from the clinic. Although this information might be interesting, it won’t be helpful for evaluating performance unless it is important or relevant to those using the information.

**LEARNING POINT**

Measurement Information

Measurement data are most commonly reported as discrete numbers, percentages, averages, and ratios. The number or statistic used to report the data can influence the interpretation of the measurement information.

**LEARNING POINT****Effective Use of Measures**

Measurement provides information for quality management purposes. For the measures to be used effectively, they must be accurate, useful, easy to interpret, and reported consistently.

Line graph

A graph in which trends are highlighted by a line connecting data points.

EASE OF INTERPRETATION

Performance measures must be easy to interpret. Suppose the clinic manager in the case study reported the wait times for each patient on each day of the week. An excerpt from the report for one day is shown in exhibit 3.3.

The purpose of performance measurement is to provide information, not to make people sort through lots of data to find what they want to know. Having to read through several pages of

wait time data to identify improvement opportunities would be tedious. A much better way to report the patient wait time data is illustrated in exhibit 3.4. Using a **line graph**, the clinic manager displays the average wait times for the morning and afternoon of each day of the week. The clinic's providers can easily identify trends and improvement opportunities from the graph.

CONSISTENT REPORTING

Performance measures must be uniformly reported to make meaningful comparisons between the results from one period and the results from another period. For example, suppose the clinic manager starts calculating patient wait time information differently.

EXHIBIT 3.3

Excerpt from
Larger Report of
Wait Time Data for
Each Patient

Monday

Patient 1	12 minutes
Patient 2	9 minutes
Patient 3	17 minutes
Patient 4	7 minutes
Patient 5	9 minutes
Patient 6	13 minutes
Patient 7	21 minutes
Patient 8	11 minutes
Patient 9	7 minutes
Patient 10	8 minutes

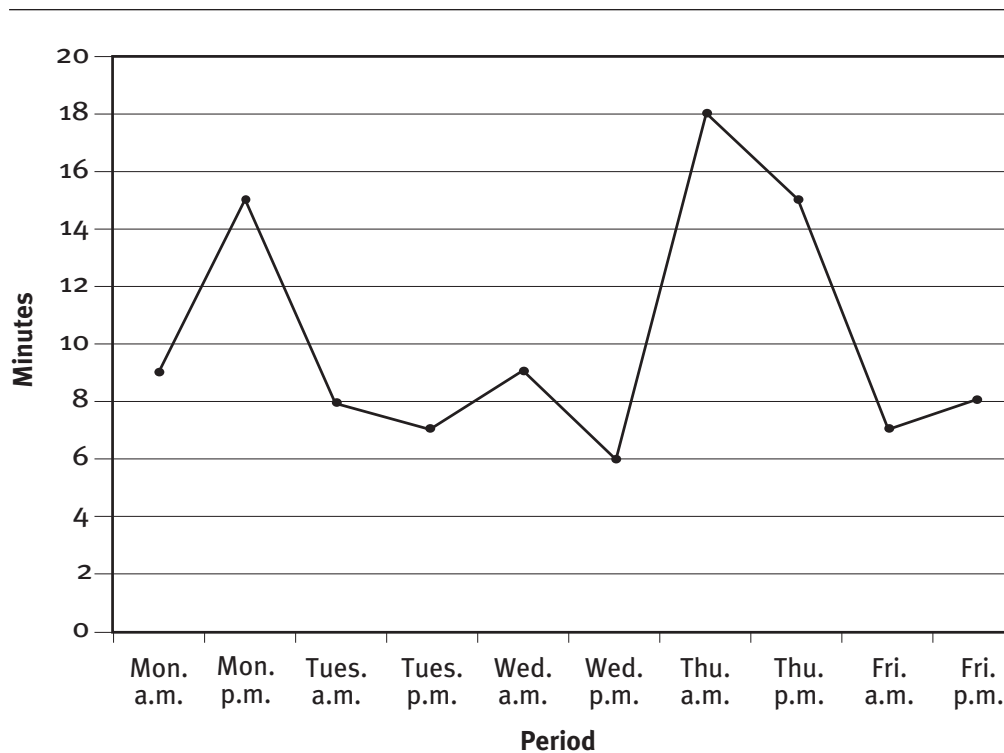


EXHIBIT 3.4
Line Graph
Showing Average
Patient Wait Times

He changes the wait time end point from the time the patient leaves the reception area to the time the patient is seen by a care provider. This slight change in the way wait times are calculated could dramatically affect performance results. The care providers would see an increase in average wait times and interpret it as a problem when in fact the increase was caused by the different measurement criteria, not a change in performance. This new measure can still be used, but it should be reported separately, as shown in exhibit 3.5.

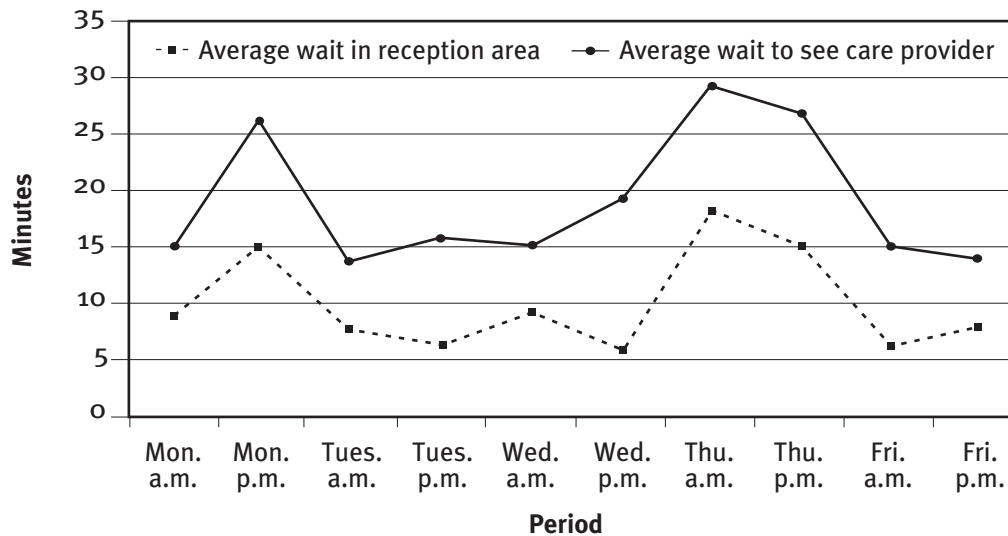
MEASUREMENT CATEGORIES

Hundreds of measures can be used to evaluate healthcare performance. These measures are grouped into four categories:

- ◆ Structure measures
- ◆ Process measures
- ◆ Outcome measures
- ◆ Patient experience measures

EXHIBIT 3.5

Line Graph
Showing Two
Measures of
Patient Wait Times

**Structure measures**

Used to judge the adequacy of the environment in which patient care is provided.

Process measures

Used to judge whether patient care and support functions are properly performed.

Outcome measures

Used to judge the results of patient care and support functions.

Patient experience measures

Patient-reported information used to judge “whether something that should happen in a health care setting (such as clear communication with a provider) actually happened or how often it happened” (AHRQ 2016).

Structure, process, and outcome measurement categories were first conceptualized in 1966 by Avedis Donabedian, MD (1980). His research in quality assessment resulted in a widely accepted healthcare measurement model that is still used today. Donabedian contended that the three measurement categories—structure, process, and outcome—represent different characteristics of healthcare service. To fully evaluate healthcare performance, Donabedian recommended that performance in each dimension be measured.

Structure measures are used to judge the adequacy of the environment in which patient care is provided. **Process measures** are used to judge whether patient care and support functions are properly performed. **Outcome measures** are used to judge the results of patient care and support functions.

Donabedian classified patient satisfaction into the outcome category. Increased attention to patient-centered healthcare has placed greater emphasis on measuring more than satisfaction. This has led to the development of **patient experience measures** (LaVela and Gallan 2014). Measures of patient experience are based on patient-reported information. Patients are asked to judge “whether something that should happen in a health care setting (such as clear communication with a provider) actually happened or how often it happened” (AHRQ 2016).

Performance measures for most departments in a healthcare facility, whether the functions are directly involved in patient care or not, would fall into these same four categories. Exhibit 3.6 provides examples of structure, process, outcome, and patient/customer experience measures that could be used to evaluate the performance of an organization’s emergency department (ED) and human resources (HR) department.

Measurement Category	Performance Measures for an ED	Performance Measures for an HR Department
Structure	Number of hours per day that a person skilled in reading head CT scans is available	Number of certified HR professionals in the department
Process	Percentage of ED patients ≤ 13 years old with a current weight in kilograms documented in the ED record	Percentage of facility job positions for which HR has conducted a market salary survey within the past three years
Outcome	Median time from ED arrival to ED departure for patients admitted to the hospital	Median time from an applicant's contingent offer of employment until all background checks have been completed for the applicant
Patient/Customer Experience	Percentage of parents who reported whether they were kept informed about their child's care in the emergency room	Percentage of department managers who reported whether HR staff provided very helpful recommendations for handling employee discipline issues

EXHIBIT 3.6

Structure, Process, Outcome, and Patient/Customer Experience Performance Measures

STRUCTURE MEASUREMENT

Measures of structure evaluate the physical and organizational resources available to support healthcare delivery—the organization's capacity or potential for providing quality services. As such, measures of structure are indirect measures of performance. For example, an HR department may be staffed with certified professionals, but staff could misfile personnel records. An ED might have someone available 24 hours a day to interpret special tests, but that person could misread the results. To ensure quality, measures of process and outcome also must be taken.

? DID YOU KNOW?

Performance measurement in healthcare is not a recent phenomenon. As early as 1754, the Pennsylvania Hospital in Philadelphia was collecting and analyzing patient outcomes data, tabulated by diagnostic group.

PROCESS MEASUREMENT

Measures of process evaluate whether activities performed during the delivery of services are performed satisfactorily. For instance, if an HR department has a policy requiring issuance

of ID badges to new hires before their first day of employment, we would measure whether this policy was being followed. If an ED expects that all patients who present with symptoms of an ischemic stroke have a computed tomography (CT) scan within 25 minutes of arrival, we would measure caregivers' compliance with this expectation to determine whether their performance is acceptable.

In healthcare quality management, process measures are the most commonly used category of metrics. They provide important information about performance at all levels in the organization. However, good performance does not automatically translate to good results. In the previous ED example, even if all patients with symptoms of a stroke have a CT scan within 25 minutes of arrival, some may not recover. For this reason, another dimension of healthcare quality—outcome—must be measured.



LEARNING POINT

Characteristics to Measure

To gain an understanding of current performance, healthcare organizations must measure four characteristics: structure, process, outcome, and patient experience. For example, if a manager of outpatient physical rehabilitation services wants to measure each characteristic of the unit's performance, he might ask the following questions:

- *Structure:* Is the unit staffed with a sufficient number of registered physical therapists?
- *Process:* How consistently do therapists measure and document a patient's level of pain?
- *Outcome:* How much improvement did patients have in their physical functional health after receiving therapy?
- *Patient experience:* How many patients report that their therapist clearly explained the treatment plan?

OUTCOME MEASUREMENT

Measures of outcome evaluate the results of healthcare services—the effects of structure and process. A common outcome measure is patients' health status following treatment to determine whether the interventions were successful. Healthcare facilities also measure patient mortality (death) and complication rates to identify opportunities for improvement. In addition, outcome measures are used to evaluate the use of healthcare services. Average length of hospital stay and average cost of treatment are two examples of outcome measures that examine the use of services.

Although measuring health service outcomes is important, the results can be affected by factors beyond providers' control. For example, patient mortality rates at one hospital may be higher than rates at other hospitals because the hospital cares for more terminally ill cancer

patients than the others do. This healthcare organization may do all the right things but appears to be an underperformer because of the population it serves. When evaluating measurement data, many factors affecting patient outcomes must be considered.

Outcome measures can also be used to evaluate performance in departments that do not provide direct patient care. For instance, the average time between an insurance

company's request for copies of a patient's health record and receipt of the record is an outcome measure for the health information management department.

PATIENT EXPERIENCE MEASURES

Measures of patient experience are a combination of process and outcome measures. For instance, a survey of hospitalized patients asks if staff always explained medicines before giving them. The task of explaining medicines to patients is part of the hospital's medication administration process. In answering this survey question, patients are providing their perspective on whether this process is working well. An outcome-related measure on this survey asks if the patient's pain was always well controlled (CMS 2017c).

The **Agency for Healthcare Research and Quality (AHRQ)** started a multiyear initiative in October 1995 to support and promote the measurement of consumers' experiences with healthcare. The initial focus was on health plans, and it has now been expanded to address a wide range of healthcare services. The Consumer Assessment of Healthcare Providers and Systems (CAHPS) program is designed to meet the information needs of healthcare consumers, purchasers, health plans, providers, and policy makers. The survey instruments and tools generated by this initiative are found on the CAHPS website (www.cahps.ahrq.gov).

In addition to experiencing direct care services, patients interact with administrative areas such as registration and billing services. Some providers add questions about administrative services to the CAHPS survey or get patient perception feedback in other ways. Patient experiences interacting with one business function—billing services—has been linked to overall satisfaction. The 2014 Connance Annual Consumer Impact Study found that 95 percent of patients who reported being satisfied with the billing process were likely to return to that hospital for another procedure. Facilities interested in improving performance should measure patient experiences with both clinical and administrative services.

SELECTING PERFORMANCE MEASURES

Healthcare organizations use two tiers of measures to evaluate performance: system-level measures and activity-level measures. The percentage of health clinic patients who are satisfied with the quality of customer service is an example of a **system-level measure**. This measure is a snapshot of overall clinic performance.

Agency for Healthcare Research and Quality (AHRQ)

The health services research arm of the US Department of Health and Human Services; the lead federal agency for research on healthcare quality, costs, outcomes, and patient safety.

? DID YOU KNOW?

In the early 1980s marketing researchers in service industries (e.g., hotels, restaurants) began measuring the quality of service encounters against the customer's expectations.

System-level measures

Data describing the overall performance of several interdependent processes or activities.

**Activity-level
measures**

Data describing the
performance of one
process or activity.

Because many activities in a health clinic influence the quality of customer service, performance also needs to be evaluated at the activity level to assess patient satisfaction. The percentage of time reception staff telephone patients to remind them of upcoming clinic appointments is an example of an **activity-level measure**.

Consider how the performance of an automobile is evaluated. A common measure of car performance is the number of miles the car can travel per gallon of gasoline. This system-level measure, miles per gallon, is just a snapshot of the car's overall performance, however. Many actions affect an automobile's fuel economy. Activity-level measures can be used to evaluate these actions. For example, average time between engine tune-ups is an activity-level measure of an action that affects car performance. By using a combination of system- and activity-level measures, the owner can judge not only overall fuel economy but also actions (or lack thereof) that might be affecting it.

A mix of system- and activity-level measures allows a healthcare organization to judge whether overall performance goals are being met and where frontline improvements may be needed. The relationship between performance goals and system- or activity-level measures in two healthcare settings is shown in exhibit 3.7.

MEASUREMENT PRIORITIES

The system- and activity-level measures used by a healthcare organization for quality management purposes are influenced by external and internal factors. On the external side, numerous government regulations, accreditation standards, and purchaser requirements directly affect measurement activities. The number and type of measures used to evaluate performance vary in proportion to the number of external requirements the organization must meet. For example, critical concept 3.1 lists 9 of the more than 50 different performance measures that Medicare-certified home health agencies were required to use for quality management purposes in 2017. The quality measurement categories specific to the home health industry are process measures, outcome measures, and potentially avoidable events. The potentially avoidable events reported are outcome measures in the sense that they represent a change in health status between start or resumption of care and discharge or transfer to an inpatient facility (CMS 2017e).

The performance measurement requirements of the federal government, the largest purchaser of healthcare services, continue to increase in response to quality improvement and cost-containment efforts. Like most purchasers, the Centers for Medicare & Medicaid Services (CMS) is interested in obtaining the most value for its healthcare expenditures. The measures of performance required of healthcare organizations help purchasers assess value in terms of the six Institute of Medicine (IOM 2001) quality aims described in chapter 1: Healthcare should be safe, effective, patient centered, timely, efficient, and equitable. In addition, CMS considers the current National Quality Strategy when selecting measures.

Setting	Organization-wide Performance Goal	System-Level Measure	Activity-Level Measures
University student health center	Inform and educate students on wellness and prevention issues relevant to their age group	Percentage of incoming freshmen who are vaccinated for meningococcal meningitis within three months of first semester	• Number of hours the vaccination clinic is open each month • Percentage of incoming freshmen who receive written information about the meningococcal meningitis vaccine • Percentage of incoming freshmen who complete and return the vaccination survey
Hospital	Reduce incidence of hospital-acquired infections	Percentage of patients who develop an infection while in the hospital	• Rate of staff compliance with hand-hygiene procedures • Percentage of central vein line catheter insertions done according to protocol • Percentage of staff immunized for influenza

EXHIBIT 3.7

Performance Goals and Measures in Two Healthcare Settings

Clinical quality measurement expectations were part of the Health Information Technology for Economic and Clinical Health (HITECH) Act, enacted as part of the American Recovery and Reinvestment Act of 2009. The HITECH Act established financial incentives for Medicare-eligible hospitals and healthcare professionals to adopt electronic health records (EHRs) and use the technology in a meaningful way (CMS 2012). A core objective of EHR use is the ability to electronically report performance measurement data to CMS or to the state. The **electronic clinical quality measures (eCQMs)** to be reported periodically change with new measures added and some retired. Starting in 2017, the measures to be reported electronically by Medicare-eligible healthcare professionals were

Electronic clinical quality measures (eCQMs)

Data from EHR and/or health information technology systems to measure healthcare quality. These data are used by CMS in a variety of quality-reporting and incentive programs (CMS 2017a).

**CRITICAL CONCEPT 3.1****2017 Performance Measures for Medicare-Certified Home Health Agencies***Process measures*

- Percentage of home health episodes of care in which the start or resumption of care date was either on the physician-specified date or within two days of the referral date or inpatient discharge date, whichever is later.
- Percentage of home health episodes of care during which patients received influenza immunization for the current flu season.
- Percentage of home health quality episodes in which patients had a multifactor fall risk assessment at the start or resumption of care.

Outcome measures

- Percentage of home health episodes of care that ended with the patient being admitted to the hospital.
- Percentage of home health episodes of care during which the patient got better at bathing self.
- Percentage of home health episodes of care during which patients are confused less often.

Potentially avoidable events

- Percentage of residents or patients with pressure ulcers that are new or worsened.
- Percentage of home health episodes of care during which patients developed a bladder or urinary tract infection.
- Percentage of home health quality episodes during which the patient's ability to take his or her medicines correctly (by mouth) got much worse.

Source: CMS (2017e).

transitioned to the new Quality Payment Program that is part of the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA) legislation (CMS 2017f). Current information about the eQMs and CMS measurement expectations for various projects can be found on the websites listed at the end of this chapter.

The number of performance measures providers are required to report to CMS and other groups has exploded in the last ten years. Costs associated with gathering, reporting, and analyzing measurement data are significant for providers, and often the data are not useful for improvement purposes (Schuster, Onorato, and Meltzer 2017). This has led to increasing calls to limit the number of performance measures to a small set of high-priority measures (Blumenthal and McGinnis 2015).

State licensing regulations often require healthcare organizations to evaluate structural issues, such as compliance with building safety and sanitation codes. Licensing regulations may also include specific requirements for process and outcome measures related to patient care. A list of clinical performance data that must be collected by ambulatory surgical treatment centers in Illinois is shown in critical concept 3.2.

Certain state and federal regulations apply only to specific healthcare units, such as radiology and laboratory departments. These regulations contain many quality control requirements with corresponding system- and activity-level performance measurement obligations. For instance, any facility that performs laboratory testing on human specimens must adhere to the quality standards of the Clinical Laboratory Improvement Amendments, passed by Congress in 1988 to ensure the accuracy, reliability, and timeliness of patient test results regardless of where the test is performed (US Food and Drug Administration 2014).

The standards of healthcare accreditation groups often contain system- and activity-level performance measurement requirements. Accreditation standards may duplicate those mandated by government regulations and purchasers. However, some measurement requirements found in accreditation standards are unique. For example,



LEARNING POINT

Examples of eQMs Reported to CMS by Hospitals

These are some of the eQMs for 2018 reporting for the Hospital Inpatient Quality Reporting Program and the Medicare and Medicaid EHR Incentive programs for Eligible Hospitals and Critical Access Hospitals:

- Median elapsed time from ED arrival to ED departure for patients discharged from the ED
- The number of mothers undergoing elective vaginal deliveries or elective cesarean births between 37 and 39 weeks' gestation
- The proportion of newborns screened for hearing loss before hospital discharge
- Acute myocardial infarction patients with ST-segment elevation on the electrocardiogram taken closest to arrival time who receive primary percutaneous coronary intervention (PCI) during the hospital stay with a time from hospital arrival to PCI of 90 minutes or less

Source: Adapted from CMS (2017d).

**CRITICAL CONCEPT 3.2** Illinois Regulations for Data Collection in Ambulatory Surgical Treatment Centers

Each ambulatory surgical treatment center (ASTC) shall collect, compile and maintain the following clinical statistical data at the facility:

1. The total number of surgical cases treated by the ASTC;
2. The number of each specific surgical procedure performed;
3. The number and type of complications reported, including the specific procedure associated with each complication;
4. The number of patients requiring transfer to a hospital for treatment of complications. The procedure performed and the complication that prompted each transfer shall be listed;
5. The number of deaths, including the specific procedure that was performed; and
6. The results of the monitoring of the ASTC's hand hygiene program.

Source: Reprinted from Illinois General Assembly, Joint Committee on Administrative Rules (2014).

ORYX performance measurement

Performance measurement project sponsored by The Joint Commission.

Healthcare Effectiveness Data and Information Set (HEDIS)

Health plan performance measurement project sponsored by the National Committee for Quality Assurance.

hospitals accredited by The Joint Commission (2017) are expected to collect data on the timeliness of diagnostic testing and reporting (an activity-level measure) to determine how quickly important test results are communicated to the patient's doctor and where improvement opportunities may exist. Some accredited organizations also must participate in the **ORYX performance measurement** reporting project, which involves gathering and sharing measurement data with The Joint Commission. Measurement activities currently required of accredited organizations can be found on The Joint Commission's website (www.jointcommission.org). As much as possible, The Joint Commission coordinates its core measurement requirements with the measurement activities mandated by CMS to lighten the workload for organizations subject to the regulations and standards of both groups.

Health plans accredited by the National Committee for Quality Assurance (NCQA) must participate in the **Healthcare Effectiveness Data and Information Set (HEDIS)** measurement project. HEDIS measures address a broad range of health and customer service issues, including the following (NCQA 2017):

- ◆ Asthma medication use
- ◆ Persistence of beta-blocker treatment after a heart attack
- ◆ Controlling high blood pressure
- ◆ Comprehensive diabetes care
- ◆ Breast cancer screening
- ◆ Antidepressant medication management
- ◆ Childhood and adolescent immunization status
- ◆ Childhood and adult weight/body mass index assessment

In 2017, HEDIS included 91 measures across 7 domains of care. Health plans accredited by NCQA are not required to gather information for all the HEDIS measures. In addition to NCQA-accredited health plans, government-funded health plans, such as Medicaid and the Indian Health Service, are required to gather HEDIS measurement data. More than 90 percent of US health plans use HEDIS measures to evaluate performance on important dimensions of care and service (NCQA 2017). Information about the current HEDIS measures can be found on the NCQA website (<http://ncqa.org>).

A growing number of external groups are mandating that healthcare organizations gather specific performance measures for quality management purposes. When selecting performance measures, organizations must consider the most current measurement directives of relevant government regulations, accreditation bodies, and purchasers.

Externally mandated measurement requirements do not always address all of an organization's internal quality priorities. The service elements an organization wants to measure may differ from the measurement priorities of external groups. Consider a home health agency with a particularly large hospice patient population. Hospice patients have a limited life expectancy and require comprehensive clinical and psychosocial support as they enter the terminal stage of an illness or a condition. The measures required of Medicare-certified home health agencies do not address some of the performance issues unique to hospice patients and their families. Consequently, the home health agency must identify and gather its own performance measures of hospice services in addition to collecting the measures required to maintain Medicare certification.



LEARNING POINT Choosing Measures

Healthcare organizations measure many aspects of performance. Some of the measures are mandated by external regulatory, licensing, and accreditation groups. Some are chosen to evaluate performance issues important to the organization. And some measures serve both purposes: The measure is required by an external group *and* provides performance information important to the organization.

Exhibit 3.8 lists examples of performance measures that the Redwood Health Center, the subject of the case study presented earlier in the chapter, uses to evaluate various aspects of quality, with explanations as to why the clinic selected them.

EXHIBIT 3.8**Clinic Measures of
Performance and
Their Purposes**

Data are gathered for the following measures because the clinic is required to share results with Medicare and two managed care organizations. Also, care providers want to know the clinic's performance in these measures compared with the performance of other clinics in the state.

- Percentage of patients with diabetes who have an annual eye examination
- Percentage of pregnant patients screened for HIV (human immunodeficiency virus)
- Percentage of adult patients who receive an influenza immunization annually
- Percentage of patients with newly diagnosed osteoporosis who receive counseling on vitamin D and calcium intake and exercise

Data are gathered for the following measures because care providers want to know whether these important aspects of patient care are in compliance with internal expectations.

- Number of patients who call back after an office visit to clarify instructions
- Percentage of charts that have patient medication allergies prominently displayed
- Percentage of visits that involve an interpreter (not a family member) to communicate with patients who do not speak English
- Percentage of Pap smear samples that are nondiagnostic as a result of improper collection techniques

Data are gathered for the following measures because care providers and the clinic administrator want to know about patient experiences with the clinic's services.

- Percentage of patients completing the satisfaction survey who indicated they would refer a friend or family member to the clinic
- Percentage of patients who reported whether their provider included them in decisions about their treatment or care
- Number of complaints received about an insufficient number of handicap parking spaces
- Percentage of patients who reported how often they were able to get care quickly

Data are gathered for the following measures because care providers and the clinic administrator want to know whether the clinic is providing efficient, customer-friendly services in a timely manner.

(continued)

-
- Average number of days between patient request for an annual physical examination and first available physician appointment
 - Average number of days between patient request for a non-urgent care visit and first available physician or nurse practitioner appointment
 - Average visit cycle time: total patient time in the clinic from walk-in to walk-out
 - Percentage of phone calls abandoned (customer hangs up while on hold)

Data are gathered for the following measures because the clinic administrator and the business office manager want to know how well the clinic is faring financially and what can be done to improve net revenues and speed up collection of outstanding accounts.

- Percentage by which revenues exceed expenses
- Percentage of bills returned to the clinic because of outdated patient demographic information
- Percentage of patients who have a copayment and are asked for this payment at the time of service
- Average supply cost per patient office visit

Data are gathered for the following measures because the state health department requires the clinic to evaluate the safety of the environment.

- Average temperature of the clinic medication/supply refrigerator
 - Percentage of smoke detectors, fire alarms, and sprinklers in compliance with local fire codes during biannual inspection
 - Number of medication samples found to be outdated during quarterly inspection of medication sample cabinet
 - Percentage of equipment maintenance checks performed within two weeks of deadline
-

EXHIBIT 3.8

Clinic Measures of Performance and Their Purposes
(continued)

CONSTRUCTING MEASURES

Measures to be reported to external groups have already been constructed and the measurement specifications shared with providers. Measures used by a provider to evaluate internal quality priorities also need to be systematically constructed. These three steps should be followed to ensure each measure yields information that is accurate, useful, easy to interpret, and consistently reported:

1. Identify the topic of interest.
2. Develop the measure.
3. Design the data collection system.

These steps can be time consuming but are essential to ensuring that the measures are useful for quality management purposes.

IDENTIFY THE TOPIC OF INTEREST

The first step to constructing a performance measure is to determine what you want to know. Consider just one function—for example, taking patient X-rays in the radiology department. This function involves several steps:

1. The patient's doctor orders the X-ray exam.
2. The radiology department schedules the exam.
3. The patient registers on arrival in the radiology department.
4. The X-ray exam is performed.
5. The radiologist interprets the X-rays.
6. The radiologist informs the patient's doctor of the X-ray results.

To select performance measures for X-ray procedures, consider IOM's (2001) six dimensions of healthcare quality and the corresponding performance questions listed in exhibit 3.9. Answers to these questions can help the radiology department gauge its performance in each quality dimension. The department will determine which quality characteristics it will need to measure regularly and which questions will provide the most useful answers for measurement purposes. Factors the radiology manager will take into consideration when selecting performance measures for the department are summarized in exhibit 3.10. Aspects of service that will be measured to answer performance questions must be stated explicitly. Without this knowledge, measures cannot be developed.

DEVELOP THE MEASURE

Once performance questions have been identified, the next step is to define the measures that will be used to answer the questions. Suppose the radiology manager chooses to address the question of timely reporting of X-ray exam results to patients' doctors. The department policy states that results are to be telephoned, e-mailed, or faxed within 48 hours of an exam. To turn the question into a performance measure, the manager determines the percentage of results communicated to doctors within 48 hours of completion of an outpatient X-ray exam.

To ensure she knows what information this measure will provide, the manager rewrites the measure in terms of the data that will be used to calculate it, as follows:

$$\frac{\text{Number of outpatient exam results reported to doctor within 48 hours}}{\text{Total number of exams performed}} \times 100$$

By writing the performance measure in fundamental measurement units, the manager is able to identify the data she needs to generate the measure. The top number in the fraction is the **numerator**, and the bottom number is the **denominator**. To calculate the percentage of results communicated to the doctor within 48 hours of exam completion, the top number is divided by the bottom number and then multiplied by 100.

Examples of performance measures, along with the numerators and denominators that would help answer some of the questions in exhibit 3.9, are provided in exhibit 3.11.

Numerator

The number written above the line in a common fraction, which signifies the number to be divided by the denominator.

Denominator

The number written below the line in a common fraction, which functions as the divisor of the numerator.

Quality Dimension	Performance Questions
Safe	- How many patients react adversely to the X-ray dye? - Are pregnant patients adequately protected from radiation exposure?
Effective	- Are significant (e.g., life threatening) X-ray findings quickly communicated to the patient's doctor? - How often are presurgery X-ray findings confirmed at the time of surgery?
Patient centered	- Do patients often complain about a lack of privacy in the X-ray changing rooms? - How many patients are greeted by the receptionist upon arrival in the department?
Timely	- How long do patients wait in the reception area before an exam? - Are outpatient X-ray results reported to the patient's doctor in a timely manner?
Efficient	- How often must X-ray exams be repeated because the first exam was not performed properly? - How often is equipment unavailable because of unscheduled downtime?
Equitable	- Do uninsured patients receive the same level of service as insured patients do? - How often is the mobile mammography unit available to people living in rural areas?

EXHIBIT 3.9

Quality Dimensions and Performance Questions for Radiology Services

EXHIBIT 3.10

		Yes	No
Consider When Selecting Performance Measures	Is the measure mandated by government regulations or accreditation standards?	_____	_____
	Is reimbursement linked to good performance in this measure?	_____	_____
	Is the organization's performance in this measure available to the public?	_____	_____
	Does the measure evaluate an aspect of service that is linked to one of the organization's improvement goals?	_____	_____
	Does the measure evaluate an aspect of service that is linked to one of the department's improvement goals?	_____	_____
	Are affected physicians and staff members likely to be supportive of initiatives aimed at improving performance in this measure?	_____	_____
	Are resources available to collect, report, and analyze the measurement results?	_____	_____
	Is the information gained from this measurement worth the costs associated with collecting, reporting, and analyzing the measurement results?	_____	_____

Some performance measures, typically structure measures, do not have denominators. For instance, health plans usually want to know whether a hospital is accredited. Evidence of accreditation is a structure measure. Only two measurement results are possible—the hospital is accredited or it is not accredited. As another example, a common measure of a healthcare organization's compliance with environmental safety is the number of fire drills it conducts each year. This measure is an absolute number; a denominator is not necessary.

DESIGN THE DATA COLLECTION SYSTEM**Reliable**

Yielding the same or compatible results in different situations.

To ensure that useful and accurate performance information is gathered, valid and **reliable** data sources must be identified. Recall that a valid data source is one that contains the correct information needed to create the performance measure. A reliable data source is one that consistently contains the information needed to create the performance measure. Reliable data are not necessarily valid. For example, clinic medical technicians may consistently document a patient's weight, but if the scale does not function properly, the data in the patient's record are invalid.

EXHIBIT 3.11
Performance
Questions and
Measures for
the Radiology
Department

Performance Question	Measure	Numerator	Denominator
How many patients react adversely to the X-ray dye?	Percentage of patients who react adversely to the X-ray dye	Number of patients who react adversely to the X-ray dye	Total number of patients receiving an X-ray dye injection
Are pregnant patients adequately protected from radiation exposure?	Percentage of women of childbearing age who are asked about pregnancy status before X-ray exam	Number of women of childbearing age asked about their pregnancy status before X-ray exam	Total number of women of childbearing age who undergo an X-ray exam
How often must X-ray exams be repeated because the first exam was not performed properly?	Percentage of X-ray exams repeated because of wrong patient positioning on first exam	Number of X-ray exams repeated because of wrong patient positioning on first exam	Total number of X-ray exams performed
How often is equipment unavailable because of unscheduled downtime?	Percentage of time equipment is unavailable because of unscheduled downtime	Number of hours equipment is unavailable because of unscheduled downtime	Total number of hours equipment is scheduled to be available
Do uninsured patients receive the same level of service as insured patients do?	Percentage of service complaints received from uninsured patients	Number of service complaints received from uninsured patients	Total number of service complaints received from all patients
How often is the mobile mammography unit available to people living in rural areas?	Percentage of time mobile mammography unit is available in rural areas	Number of hours the mobile mammography unit is open for business in locations more than 30 miles from the hospital	Total number of hours the mobile mammography unit is open for business

Computerized databases and handwritten documents, such as those listed next, are used to collect data for the numerator, denominator, and other elements necessary to calculate a measure:

- ◆ *Administrative files.* The organization's billing database is an administrative file often used to gather performance data. This file typically contains information such as patient demographics, codes that identify diagnoses and procedures performed, and charges billed. Count data, such as the number of patients who have X-rays taken, can be gathered from the billing database. Other databases include those maintained by pharmacies and insurance companies.

- ◆ *Patient records.* Treatment results are found in patient records. Patient records are often the only source of data for outcome measures, such as the percentage of patients who reacted adversely to X-ray dyes. Gathering data from electronic patient records is usually easier and less time consuming than gathering data from paper-based records.
- ◆ *Miscellaneous business and clinical information.* Performance measurement data may also be available from patient and employee surveys; patient care logs maintained by clinics and EDs; and the results of special studies, such as observation reviews that evaluate compliance with patient care requirements.

Any data source has advantages and drawbacks to its use. For example, patient databases used by pharmacies and health insurance companies may lack pertinent clinical details. Providers' billing databases, designed primarily for financial and administrative uses, often lack information needed to measure quality (e.g., measures requiring a time stamp are not included in most billing databases). Patient records also may lack information needed to measure quality. For instance, patient records used by clinics often include the names of prescribed medications but may not include documentation confirming that the physician counseled the patient about the medication's side effects. To know how often counseling occurs, the physician would need to document this activity or the information would have to be collected via another source, such as observation. No data source is perfect; trade-offs must always be considered.

When planning for data collection, first look for existing information sources. Often, data are readily available and easily gathered. In some situations, however, the data needed to calculate a measure are not easy to obtain and new data sources must be developed. Let's look at the radiology department example to learn how to identify data sources for a performance measure.

The radiology manager wants to gather data to determine the percentage of results communicated to patients' doctors within 48 hours of an outpatient X-ray exam. To create this measure, the manager needs to collect two sets of data: (1) the date and time each outpatient X-ray exam is performed and (2) the date and time each outpatient exam report is telephoned, e-mailed, or faxed to the doctor. The manager also notes that a calculation is required to generate the measure. He will need to count the number of hours between completion of an outpatient X-ray exam and the report to the patient's doctor to determine whether that period is shorter than 48 hours.

The manager investigates whether the data necessary to create the measure are currently available. Ideally, they are already being collected and will only need to be retrieved to generate the measure. The manager finds that the department's X-ray technicians document

the date and time of each exam in the department's electronic information system. These data will be easy to retrieve.

The date and time that exam results are reported to the patient's doctor will not be as easy to gather. The manager discovers that doctors receive outpatient X-ray exam results in two different ways. Sometimes the radiologist telephones preliminary results to the doctor and later faxes or e-mails the report to the doctor's office. At other times, the radiologist does not telephone preliminary results to the doctor and only faxes or e-mails the report. Clerical staff in the radiology department document the date and time that reports are faxed or e-mailed, but the radiologists do not record the date and time preliminary results are phoned to the doctor. To create the measure, the manager needs the radiologists to enter the date and time of these telephone communications in the department's electronic information system.

To finish designing the data collection system, the manager must make four more decisions, addressing the what, who, when, and how of data collection.

What

What refers to the population that will be measured. Will the denominator represent a **sample** of the population to be measured or the entire population? For some measures, the answer is evident. A calculation determining the percentage of a nursing home's new hires who undergo required background checks would be inaccurate if only half of the new hire population were included in the denominator, unless this half was representative of the whole. For some measures, the entire population does not need to be included in the denominator if the data are derived from a sample that is representative of the entire population. For instance, data on all prescriptions filled by the pharmacist are not necessary to determine the percentage accurately filled. A sample of filled prescriptions can provide reliable measurement data.

The Joint Commission and CMS encourage healthcare organizations to use sampling to measure performance, where appropriate. National quality measurement projects, such as those sponsored by CMS and The Joint Commission, have data specifications that must be followed by the organizations submitting data. These specifications may indicate whether samples can be used and the minimum acceptable sample size for each measure. Following are the sample size requirements for facilities that submitted measurement data in 2017 to the CMS national quality program and to The Joint Commission (CMS and Joint Commission 2016):

- ◆ For a monthly population of fewer than 51, review 100 percent of the population.
- ◆ For a monthly population of 51–254, review 51 cases from the population.

Sample

A representative portion of a larger group.

- ◆ For a monthly population of 255–509, review 20 percent of the initial population size.
- ◆ For a monthly population of 510 or more, review 102 cases from the population.

Measurement specifications in national quality projects can change. Organizations participating in these projects should comply with the most up-to-date requirements.

Who

Who refers to the data collectors. Will the manager gather all data needed for performance measurement purposes? Will employees be asked to collect some data? Will information specialists in the organization be asked to retrieve data from clinical or administrative databases? If more than one person is responsible for data collection, how will the collectors ensure they are gathering data consistently (i.e., demonstrating **interrater reliability**)?

Once identified, data collectors often need training. They must know what data are necessary to create each measure and how to gather accurate information. For example, what is the definition of “adverse reaction to X-ray dye”? What symptoms are documented when a patient reacts adversely? Where are they documented? What should the data collector do if the documentation is ambiguous? If these questions are not clearly answered, the accuracy and consistency of information gathered for measurement purposes are jeopardized.

When

When refers to the frequency of data collection and reporting. How often will information be gathered? How frequently will performance measure results be reported? What are the cost implications of different data collection and reporting intervals? These decisions may be left to managers, or the organization may set the reporting frequency (e.g., monthly, quarterly) on the basis of external reporting requirements and internal priorities.

How

How refers to the process used to gather data. Several methods can be used to retrieve information for performance measures, including questionnaires, observations, electronic database queries, reviews of paper documents, and check sheets. The case study at the beginning of this chapter describes a questionnaire used to gather satisfaction data from clinic patients. Exhibit 3.12 shows a form used by data collectors to record information found in hospital patient records. The information helps to measure nurses’ compliance with Joint Commission patient education standards. If nurses are using an EHR to document

Interrater reliability

The probability that a measurement is free from random error and yields consistent results regardless of the individuals gathering the data. (For example, a measure with high interrater reliability means that two or more people working independently will gather similar data.)

Patient's medical record number:

Date of discharge:

Nursing unit:

Date of record review:

EXHIBIT 3.12

Form Used to
Collect Data from
Hospital Patient
Records

ASSESSMENT OF PATIENT'S LEARNING NEEDS	YES	NO	N/A
<i>Does the assessment of learning needs based on the admission assessment include the following data:</i>			
• Cultural and religious beliefs?			
• Emotional barriers?			
• Desire and motivation to learn?			
• Physical or cognitive limitations and barriers to communication?			
<i>Is comprehension of education provided to patient and family documented?</i>			
MEDICATION EDUCATION	YES	NO	N/A
<i>Medication education documented in:</i>			
• Patient education intervention			
• Nurses' notes			
<i>Educated patient on food/drug interactions:</i>			
• Coumadin			
• Diuretics			
• Antidiabetics			
PATIENT EDUCATION AND TRAINING	YES	NO	N/A
<i>Is there documentation that the patient and/or family were educated about the following as appropriate:</i>			
• Plan for care, treatment, and services?			
• Basic health and safety practices?			
• Safe and effective use of medications?			
• Nutrition interventions, modified diets, and oral health?			
• Safe and effective use of medical equipment or supplies when provided by the hospital?			
• Techniques used to help reach maximum independence?			
<i>Is there documentation that the patient and/or family were educated about pain, including the following:</i>			
• Understanding pain?			
• The risk of pain?			
• The importance of effective pain management?			
• The pain assessment process?			
• Methods for pain management?			

patient education activities, it may be possible to electronically download the data needed to measure compliance.

The data-gathering process must be carefully planned so the information derived will be accurate and useful. Revisit the radiology department example to learn how data are gathered for one performance measure. To evaluate the safety of department services,

the radiology manager wants to know how often the pregnancy status of women of child-bearing age is confirmed before an X-ray exam. Because the department serves many patients in this age category, gathering information about the entire population would be burdensome, so the manager chooses a sample of records. Each month, a radiology clerk reviews 25 randomly selected records from this population to look for documentation of pregnancy status. Data are collected on patients seen for different exams on different days and at different times each month to ensure the results are representative of what happens for the entire population.

Check sheet

A form on which data can be sorted into categories for easier analysis.

Using hatch marks on a check sheet, the clerk records the review findings. A **check sheet** is a data-gathering tool that presents the data in a way that enables their conversion into useful information for decision-making. When 25 records have been reviewed and the findings recorded, the clerk tabulates the results for the manager.

Exhibit 3.13 is a completed check sheet for a three-month period (each hatch mark represents one X-ray patient record). The percentage of patients asked about their pregnancy status is calculated by dividing the number of hatch marks in the first row by 25 (the total number of randomly selected films each month). The performance results for each month are as follows:

January: 88 percent of patients were asked about pregnancy status before X-ray exam

February: 76 percent of patients were asked about pregnancy status before X-ray exam

March: 92 percent of patients were asked about pregnancy status before X-ray exam

UNDERSTAND MEASURE SPECIFICATIONS

Most of the performance measures required by purchasers and external regulatory, licensing, and accreditation groups have gone through a rigorous development and validation process. These have already defined the topic and identified the data necessary to create the measure, so healthcare organizations do not need to start from scratch. Exhibit 3.14

EXHIBIT 3.13

X-ray Patient
Pregnancy Status
Check Sheet

Status Documented?	Month: January	Month: February	Month: March
Yes			
No			

shows measurement specifications for one of the measures that Medicare-eligible hospitals submit to CMS. This measure is used to evaluate the quality of care provided to patients receiving treatment for a stroke.

Detailed measurement specifications for all agencies and organizations that sponsor quality measurement projects can be found on their websites.

		EXHIBIT 3.14 Measurement Specifications for CMS Measure of Care Provided to Hospital Patients Treated for a Stroke
Measure	Percentage of ischemic or hemorrhagic patients who were assessed for rehabilitation services (CMS Measure ID: CMS102v6)	
Initial Patient Population	Patients age 18 and older discharged from inpatient care (nonelective admissions) with a principal diagnosis of ischemic or hemorrhagic stroke and a length of stay less than or equal to 120 days that ends during the measurement period	
Denominator Statement	Initial Population	
Denominator Exclusions	• Patients with comfort measures documented. • Patients discharged to another hospital. • Patients who left against medical advice. • Patients who expired. • Patients discharged to a healthcare facility for hospice care. • Patients admitted for elective carotid intervention. This exclusion is implicitly modeled by only including nonelective hospitalizations.	
Numerator Statement	Ischemic or hemorrhagic patients assessed for or who received rehabilitation services	
Numerator Exclusions	Not applicable	
Denominator Exceptions	None	
Improvement Notation	Improvement noted as an increase in rate	
Guidance	The Non-elective Inpatient Encounter value set intends to capture all nonscheduled hospitalizations. This value set is a subset of the Inpatient Encounter value set, excluding concepts that specifically refer to elective hospital admissions. Nonelective admissions include emergency, urgent, and unplanned admissions.	

Source: Adapted from CMS (2017b).

As more healthcare facilities adopt EHRs, the data elements available for performance measurement purposes continue to expand. Yet mining these data can be challenging. Data are often stored in many different databases and may not be consistently reliable and

valid. Varying naming conventions, inconsistent definitions, and varying field lengths and values for the same data element can lead to significant data collection problems, including poor data quality (Davoudi et al. 2015). For example, inconsistent data definitions occur when a patient's sex is captured as *M*, *F*, or *U* in a hospital's admit-discharge-transfer system but captured as *male*, *female*, or *other* in the same hospital's radiology department database. To prevent such inconsistencies, healthcare organizations should have an approved data dictionary that lists the descriptive name of each data element captured electronically along with a definition for the data element and its attributes (American Health Information Management Association 2016).

The purpose of the data dictionary is to standardize definitions and ensure consistency of use within an organization. For performance measurement purposes, the dictionary is useful

for identifying what electronic data are available and where the data reside.

Many externally mandated measures are reviewed and approved for use by the **National Quality Forum (NQF)**, a public–private partnership composed of representatives from provider organizations, regulatory and accreditation bodies, medical professional societies, healthcare purchasers, consumer groups, and other healthcare quality stakeholders. NQF was formed in 1999 to develop and implement a national strategy for improving healthcare quality. Part of this effort has focused on identifying valid and reliable performance measures to assess quality across the healthcare continuum. Subcommittees of the NQF use four criteria to assess a measurement for endorsement (NQF 2017b):

1. *Importance.* Is there a gap in performance? Is there potential for improvement?
2. *Scientific acceptability.* Is the measure reliable, valid, and precise?
3. *Usability.* Can measurement information be used to make decisions and/or take actions? Are the performance results statistically and clinically meaningful?



LEARNING POINT

Creating Measures

Construction of performance measures involves three main steps:

1. Identify the topic of interest.
2. Develop the measure.
3. Design the data collection system.

These steps can be time consuming but are essential to ensuring that the measures are consistent and reliable for quality management purposes. Most performance measures required by purchasers and external regulatory, licensing, and accreditation groups have gone through a rigorous development and validation process.

National Quality Forum (NQF)

A public–private partnership formed in 1999 to develop and implement a national strategy for improving healthcare quality.

4. *Feasibility.* Can the measurement data be obtained within the normal flow of patient care? Can the measure be implemented by a healthcare organization without undue burden?

In 2017, about 300 NQF-endorsed measures were used by all types of public and private payers for a variety of purposes, including feedback, benchmarking, public reporting, and incentive-based payment (NQF 2017a).

MEASURES OF CLINICAL DECISION-MAKING

Many healthcare performance measures are similar to those used in other service industries. Hotels, for example, are service oriented. The measures of quality used by a hotel focus on topics such as customer satisfaction, timeliness of registration and checkout, billing accuracy, personal safety, and cleanliness of the property. One aspect of healthcare performance not found in other service industries is clinical decision-making. This is the process by which physicians and other clinicians determine which patients need what and when. For instance, when you have a migraine headache and seek treatment, your doctor decides which tests are needed, if any, and which treatment is right for you.

Healthcare organizations measure both the service aspects of performance and the quality of clinical decision-making. The same principles of measurement applicable to the service aspects of healthcare also apply to clinical decision-making.

Process measures are used to determine whether clinicians are making the right patient management choices. Outcome measures are used to evaluate the results of those choices. Clinical decision-making measures undergo the same three-step construction process: (1) identify the topic of interest, (2) develop the measure, and (3) design the data collection system.



LEARNING POINT

Evidence-Based Clinical Measures

Many performance measures that healthcare organizations use for quality management purposes are similar to those found in other service industries. One aspect of healthcare not found in most service industries is the clinical decision-making process, which must be evaluated with performance measures derived from clinical practice guidelines developed by medical professional groups. These measures are referred to as *evidence-based measures*.

FACTORS SPECIFIC TO CLINICAL DECISION-MAKING

One factor particular to measures of clinical decision-making is the basis for measurement. The radiology manager in the previous case scenario established a departmental performance expectation that X-ray results are to be telephoned, e-mailed, or faxed to the ordering physician within 48 hours of an exam. He then measured how often this expectation was met.

Clinical practice guidelines

“Statements that include recommendations intended to optimize patient care that are informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options” (Graham et al. 2011, 4).

Performance expectations related to clinical decision-making are established in a different manner. They are often found in **clinical practice guidelines** developed by medical professional organizations. Clinical practice guidelines are defined by Graham and colleagues (2011, 4) as “statements that include recommendations intended to optimize patient care that are informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options.”

Guidelines are important to healthcare quality improvement because they can reduce variations in practice and change physician behavior to promote the use of interventions supported by the best evidence available. Guideline recommendations are based on current medical research and professional consensus. For instance, the American Association of Neurological Surgeons recommends against CT scans for children with mild head injuries

unless the child exhibits signs that a severe injury has occurred (Kuppermann et al. 2009). These recommendations can be translated into measurable performance expectations.

Another factor unique to measures of clinical decision-making is the number of possible measurements. To evaluate the service aspects of healthcare performance, an organization can select from an almost limitless number of measures. Conceivably, each step of every patient care and business process could be measured to determine current performance. Because the resources needed to gather data for these measures would be extensive, organizations set measurement priorities.

Clinical decision-making is difficult to measure reliably and often involves uncertainty because many treatments could be effective for a patient. Measurable performance expectations can be established only for clinical decisions supported by clear and generally irrefutable research evidence or expert consensus. For this reason, measures of clinical decision-making are referred to as **evidence-based measures**. Most healthcare

organizations use evidence-based measures to evaluate the quality of clinical decision-making. Some of these measures are mandated by external regulatory and accreditation groups. Exhibit 3.15 lists examples of evidence-based measures found in HEDIS, which is sponsored by NCQA (2016) and used by many state Medicaid programs for evaluating provider performance.

Evidence-based measures

Data describing the extent to which current best evidence is used in making decisions about patient care.

 DID YOU KNOW?

In 2010, Howard Brody, MD, professor of family medicine at the University of Texas Medical Branch in Galveston, called on US medical specialty societies to identify five tests and treatments that were overused in their specialty and did not provide meaningful benefit for patients. Brody's proposal was initially taken up by the National Physicians Alliance, which piloted the Five Things concept through the American Board of Internal Medicine (ABIM) Foundation. This led to the Choosing Wisely campaign, launched in April 2012 as a partnership between the ABIM Foundation and *Consumer Reports*. This initiative seeks to advance a national dialogue on avoiding wasteful or unnecessary medical tests, treatments, and procedures. Many medical specialty societies have now identified overused tests and treatments, and the number of recommendations increases each year. More information can be found on the Choosing Wisely website, www.choosingwisely.org (Wolfson, Santa, and Slass 2014).

Topic of Interest	Evidence-Based Measure
Management of low back pain	Percentage of adults 18–50 years of age with a primary diagnosis of low back pain who did not have an imaging study (plain X-ray, MRI or CT scan) within 28 days of the diagnosis
Breast cancer screening	Percentage of women 50–74 years of age who had at least one mammogram to screen for breast cancer in the past two years
Management of chronic obstructive pulmonary disease (COPD)	Percentage of adults 40 years of age and older who have a new diagnosis of COPD or newly active COPD, who received spirometry testing to confirm the diagnosis
Immunizations for Adolescents	Percentage of adolescents 13 years of age who had one dose of meningococcal vaccine and one Tdap vaccine or one tetanus, diphtheria toxoids vaccine (Td) by their 13th birthday

Source: Reprinted with permission from National Committee for Quality Assurance, *HEDIS® 2017 Volume 1: Narrative*. Washington, DC: NCQA. Copyright © 2016.

EXHIBIT 3.15

Examples of Evidence-Based Performance Measures

To promote widespread use of quality measures by the healthcare community, AHRQ (2017) sponsors the National Quality Measures Clearinghouse (NQMC), a database of evidence-based performance measures developed by governmental, accreditation, and medical professional groups around the world. To be added to the NQMC, the measures must meet inclusion criteria, including reliability and validity assessments.

BALANCED SCORECARD OF MEASURES

Originally developed as a framework for measuring private industry performance, **balanced scorecards (BSCs)** are structures healthcare organizations use to evaluate achievement of operational objectives. Many healthcare organizations use some type of BSC to measure system-level performance (McLaughlin and Olson 2017). In addition to an overall “corporate” strategic scorecard, scorecards can be set up for each business unit in an organization. Scorecard measures are typically sorted into four strategic perspectives (McLaughlin and Olson 2017):

Balanced scorecards (BSCs)

Frameworks for displaying system-level performance measures; components of structured performance management systems that align an organization’s vision and mission with operational objectives.

1. Financial
2. Customer
3. Internal business process
4. Learning and growing

Kaplan and Norton (1996) suggested that a BSC include no more than five measures for each category. Examples of system-level measures in the four typical BSC categories are provided in exhibit 3.16. Some of the measures are included more than once in different categories. For instance, measures related to patient satisfaction can be reported for both the customer perspective and the internal business process perspective. Healthcare organizations are not consistent as to the kind and number of measures they report on scorecards or how they categorize them.

EXHIBIT 3.16

Balanced
Scorecard
Categories and
Examples of
System-Level
Measures

Category	Measures
Financial	• Volume growth by key service lines • Dollars generated from new contracts • Dollar amount of community donations (e.g., corporate gifts) • Growth in net revenues • Operating margin • Days of cash on hand • Days in accounts receivable • Debt service coverage ratio • Amortization and expense expressed as percentage of net revenue • Cost per case • Cost per discharge • Operating room supply expense per surgical case
Customer	• Percentage of patients who would recommend the facility • Number of new managed care contracts each year • Percentage of patients satisfied with services • Percentage of payers satisfied with services • Number of service complaints • Rate of employee turnover/retention rate • Percentage of physicians satisfied with services • Dollar amount of charitable donations • Average number of patients who rate hospital food as “exceeding expectations” • Percentage of patients who report their pain was adequately controlled • Dollar amount of community donations (e.g., corporate gifts)

(continued)

Category	Measures
Internal business process	• Average patient length of stay • Percentage of patients readmitted for same/similar condition • Rate of patient falls • Rate of medication errors • Number of employee occupational injuries • Call center response times • Cost per case • Percentage of occupied beds • Percentage of emergency patients seen within 15 minutes of arrival • Number of patient complaints • Percentage of claims rejected by insurance companies because of inaccuracies • Average time from provision of service to bill creation
Learning and growth	• Percentage of capital expenditures spent on key infrastructure targets • Dollar amount of employee tuition reimbursement • Number of continuing education credits per full-time employee • Percentage of clinical staff trained in teamwork • Number of new services offered • Number of new research projects • Rate of employee turnover/retention rate • Percentage of staff attending at least one formal training session • Percentage of staff with postgraduate qualifications

EXHIBIT 3.16

Balanced Scorecard Categories and Examples of System-Level Measures
(continued)

CONCLUSION

Measurement is the starting point of all quality management activities and an integral part of the quality management cycle (see exhibit 3.1). Measurement results, usually in the form of numbers or statistics, are used by decision-makers to evaluate the performance of patient care and business processes. To be effective for quality management purposes, measures and data collection systems must be carefully developed, and measurement results must be accurate, useful, easy to interpret, and consistently reported.

Healthcare organizations use a combination of system- and activity-level measures to evaluate four dimensions of service: structure, process, outcome, and patient experience. Many healthcare organizations must gather information for performance measures required by purchasers and external regulatory, licensing, and accreditation groups. In addition, healthcare organizations select performance measures to evaluate aspects of patient care that are important to their strategic goals.

Measurement information alone does not improve quality. In chapter 4, we discuss the second step of the quality management cycle—assessment—in which data must be analyzed to determine whether performance is acceptable and to identify areas needing improvement.

FOR DISCUSSION

1. For any healthcare activity, four performance factors can be measured: structure, process, outcome, and patient experience. Identify one measure from each of these categories that could be used to evaluate the following ambulatory surgery center admission process:

Upon arrival, the patient reports to the center's registration or admitting area. The patient completes paperwork, provides an identification card, and supplies insurance information, if insured. Money for the patient's insurance copay or self-pay deposit is collected at this time. Often, patients register on the surgery center's website before the date of admission to facilitate the registration process. An identification bracelet, including the patient's name and doctor's name, is placed around the patient's wrist. Before any procedure is performed the patient is asked to sign a consent form. If the patient is not feeling well, a family member or caregiver can help the patient complete the admission process.

2. Describe, in fundamental terms, each measure you selected to evaluate the surgery center's admission process. What are the numerator and denominator? If the measure does not require a numerator and denominator, explain why.
3. Suppose the manager of the surgery center's registration area wants to gather data to report performance results for the measures you have chosen. What data sources could be used to gather information for the measures? Why would these data sources be best for gathering reliable data?
4. Identify one structure measure, one process measure, one outcome measure, and one customer experience measure that could be used to evaluate a manager's process for hiring a new employee. The common steps in this process are as follows: Review candidate's application, schedule interview, conduct interview, collect feedback from references, prepare employment offer, submit offer to candidate, and hire candidate if offer is accepted.
5. In your opinion, what is the greatest barrier to ensuring the quality of data used for performance measurement purposes? Support your opinion with literature references.
6. Search the NQMC (www.qualitymeasures.ahrq.gov) and identify five evidence-based performance measures related to prescribing the correct medications for patients. The measures should focus on choosing the right medication for a patient's condition. List each measure, the organization or group that developed the measure, and the date the measure was published.

WEBSITES

- AHRQ Quality Measure Tools and Resources
www.ahrq.gov/professionals/quality-patient-safety/quality-resources/index.html
- AHRQ State Snapshots (state-specific healthcare quality information)
www.ahrq.gov/research/data/state-snapshots/index.html
- Balanced Scorecard Institute
www.balancedscorecard.org/
- CMS Ambulatory Surgical Center Quality Reporting
www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/ASC-Quality-Reporting/index.html
- CMS Electronic Clinical Quality Measures
<https://ecqi.healthit.gov/ecqms>
- CMS Quality of Care Center
www.cms.gov/Center/Special-Topic/Quality-of-Care-Center.html
- CMS Quality Payment Program (MACRA)
<https://qpp.cms.gov>
- Consumer Assessment of Healthcare Providers and Systems (CAHPS) program: Surveys and Guidance
www.cahps.ahrq.gov
- *Designing and Implementing Medicaid Disease and Care Management Programs, Section 7: Measuring Value in a Care Management Program*
www.ahrq.gov/professionals/systems/long-term-care/resources/hcbs/medicaidmgmt/medicaidmgmt7.html
- *Encyclopedia of Measures* (2017), published by the American Hospital Association/Health Research & Educational Trust
www.hret-hiin.org/resources/display/encyclopedia-of-measures-eom
- Glossary of Statistical Terms
<http://stats.oecd.org/glossary>
- Healthcare Financial Management Association
www.hfma.org
- Joint Commission
www.jointcommission.org

- Leapfrog Group (hospital surveys)
www.leapfroggroup.org
- National Committee for Quality Assurance
<http://ncqa.org>
- National Quality Forum
www.qualityforum.org
- National Quality Measures Clearinghouse
www.qualitymeasures.ahrq.gov
- National and state performance measures of key indicators of maternal and child health, published by the US Health Resources & Services Administration
<https://mchb.tvisdata.hrsa.gov/>
- Pharmacy Quality Alliance performance measures
<http://pqaalliance.org/measures/default.asp>
- Sample size calculator
www.surveysystem.com/sscalc.htm
- Toolkit for Using the AHRQ Quality Indicators
www.ahrq.gov/professionals/systems/hospital/qitoolkit/index.html
- *Turning Point Guidebook for Performance Measurement* in public health, published by Public Health Foundation
www.phf.org/resourcestools/Documents/PMCguidebook.pdf

REFERENCES

- Agency for Healthcare Research and Quality (AHRQ). 2017. "Quality Measures Clearinghouse." Accessed November 1. www.qualitymeasures.ahrq.gov.
- . 2016. "What Is Patient Experience?" Published October. www.ahrq.gov/cahps/about-cahps/patient-experience/index.html.
- American Health Information Management Association. 2016. "Practice Brief: Managing a Data Dictionary (2016 Update)." Accessed July 31, 2017. http://bok.ahima.org/doc?oid=302014#.WX_RkumQzcc.
- Blumenthal, D., and J. M. McGinnis. 2015. "Measuring Vital Signs: An IOM Report on Core Metrics for Health and Health Care Progress." *Journal of the American Medical Association* 313 (19): 1901–2.

Centers for Medicare & Medicaid Services (CMS). 2017a. "About Electronic Clinical Quality Measures (eCQMs)." Accessed November 1. <https://ecqi.healthit.gov/ecqms>.

———. 2017b. "Assessed for Rehabilitation: eCQMs for 2018 Reporting Period." Updated October 25. <https://ecqi.healthit.gov/ecqm/measures/cms102v6>.

———. 2017c. "CAHPS® Hospital Survey." Accessed November 1. www.hcahpsonline.org.

———. 2017d. "Eligible Hospital / Critical Access Hospital eCQMs." Accessed November 1. <https://ecqi.healthit.gov/eligible-hospital-critical-access-hospital-ecqms>.

———. 2017e. "Home Health Quality Initiative: Quality Measures." Accessed November 1. www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HomeHealthQualityInits/HHQIQualityMeasures.html.

———. 2017f. "Quality Payment Program." Accessed November 1. <https://qpp.cms.gov>.

———. 2012. "Meaningful Use Regulations." Accessed November 1, 2017. www.healthit.gov/policy-researchers-implementers/meaningful-use-regulations.

Centers for Medicare & Medicaid Services (CMS) and The Joint Commission. 2016. *Specifications Manual for National Hospital Inpatient Quality Measures*, version 5.2a. Published October 20. www.jointcommission.org/specifications_manual_for_national_hospital_inpatient_quality_measures.aspx.

Connance. 2014. "2014 Connance Consumer Impact Study Shows Link Between Business Office, Patient Payment Behaviors and Patient Satisfaction." Press release. Published December 2. www.connance.com/wp-content/uploads/6-Connance_Consumer_Impact_Study_on_12-1-14_FINAL.pdf.

Davoudi, S., J. A. Dooling, B. Glondys, T. D. Jones, L. Kadlec, S. M. Overgaard, K. Ruben, and A. Wendicke. 2015. "Data Quality Management Model (2015 Update)." *Journal of AHIMA*. Published October. <http://bok.ahima.org/doc?oid=107773>.

Donabedian, A. 1980. *Explorations in Quality Assessment and Monitoring, Volume 1: The Definitions of Quality and Approaches in Assessment*. Chicago: Health Administration Press.

- Graham, R., M. Mancher, D. M. Wolman, S. Greenfield, and E. Steinberg (eds.). 2011. *Clinical Practice Guidelines We Can Trust*. National Academies Press. Accessed November 1, 2017. <http://nationalacademies.org/hmd/Reports/2011/Clinical-Practice-Guidelines-We-Can-Trust.aspx>.
- Illinois General Assembly, Joint Committee on Administrative Rules. 2014. "Administrative Code, Title 77: Public Health, Chapter I: Department of Public Health, Subchapter b: Hospital and Ambulatory Care Facilities, Part 205: Ambulatory Surgical Treatment Center Licensing Requirements, Section 205.620: Statistical Data." Accessed November 1, 2017. www.ilga.gov/commission/jcar/admincode/077/077002050Fo6200R.html.
- Institute of Medicine (IOM). 2001. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC: National Academies Press.
- Joint Commission. 2017. "2017 Hospital National Patient Safety Goals." Accessed November 1. www.jointcommission.org/assets/1/6/2017_NPSG_HAP_ER.pdf.
- Kaplan, R., and D. P. Norton. 1996. *The Balanced Scorecard: Translating Strategy into Action*. Boston: Harvard Business School Press.
- Kuppermann, N., J. F. Holmes, P. S. Dayan, J. D. Hoyle, S. M. Atabaki, R. Holubkov, F. M. Nadel, D. Monroe, R. M. Stanley, D. A. Borgialli, M. K. Badawy, J. E. Schunk, K. S. Quayle, P. Mahajan, R. Lichenstein, K. A. Lillis, M. G. Tunik, E. S. Jacobs, J. M. Callahan, M. H. Gorelick, T. F. Glass, L. K. Lee, M. C. Bachman, A. Cooper, E. C. Powell, M. J. Gerardi, K. A. Melville, J. P. Muizelaar, D. H. Wisner, S. J. Zuspan, J. M. Dean, and S. L. Wootton-Gorges. 2009. "Identification of Children at Very Low Risk of Clinically-Important Brain Injuries After Head Trauma: A Prospective Cohort Study." *Lancet* 374 (9696): 1160–70.
- LaVela, S. L., and A. S. Gallan. 2014. "Evaluation and Measurement of Patient Experience." *Patient Experience Journal* 1 (1): 28–36.
- McLaughlin, D. B., and J. R. Olson. 2017. *Healthcare Operations Management*, 3rd ed. Chicago: Health Administration Press.
- National Committee for Quality Assurance (NCQA). 2017. "HEDIS® and Quality Compass®." Accessed November 1. www.ncqa.org/hedis-quality-measurement/what-is-hedis.
- . 2016. *HEDIS® 2017 Volume 1: Narrative*. Accessed November 1, 2017. www.ncqa.org/hedis-quality-measurement/hedis-measures/hedis-2017.

- National Quality Forum (NQF). 2017a. "NQF's Work in Quality Measurement." Accessed November 1. www.qualityforum.org/about_nqf/work_in_quality_measurement.
- . 2017b. "What NQF Endorsement Means." Accessed November 1. www.qualityforum.org/Measuring_Performance/ABCs/What_NQF_Endorsement_Means.aspx.
- Schuster, M. A., S. E. Onorato, and D. O. Meltzer. 2017. "Measuring the Cost of Quality Measurement: A Missing Link in Quality Strategy." *Journal of the American Medical Association* 318 (13): 1219–20.
- US Food and Drug Administration, Center for Devices and Radiological Health. 2014. "Clinical Laboratory Improvement Amendments (CLIA)." Accessed November 1, 2017. www.fda.gov/medicaldevices/deviceregulationandguidance/ivdregulatoryassistance/ucm124105.htm.
- Wolfson, D., J. Santa, and L. Slass. 2014. "Engaging Physicians and Consumers in Conversations About Treatment Overuse and Waste: A Short History of the Choosing Wisely Campaign." *Academic Medicine* 89 (7): 990–95.

