

OVERVIEW OF HEALTHCARE QUALITY

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The Focus on Quality

Comparative health dimensions were created to measure the journey to better health outcomes. Health status, health risk factors, healthcare resources, and access to care are some of the established health dimensions that delve into the upstream determinants and resultant outcomes of health. Another such dimension, quality of care, encourages health systems and hospitals to compare the effectiveness of interventions aimed at improving the quality of patient care regionally, nationally, and globally. Despite the United States' significant financial investment in health, metrics continue to highlight that quality outcomes trail those of other countries. The mismatch between health spending and quality outcomes signals the need for substantial reform to ensure high-quality care for all individuals (OECD 2019).

For several decades, health researchers and practitioners have worked to improve the quality of healthcare delivered and the patient outcomes, while also lowering healthcare spending. These efforts stemmed from several reports highlighting the shortcomings of the US healthcare system. Among the major reports driving the imperative for quality improvement, the following stand out:

- “The Urgent Need to Improve Health Care Quality” published by the Institute of Medicine (IOM), renamed National Academy of Medicine in 2015, National Roundtable on Health Care Quality (Chassin and Galvin 1998)
- The IOM’s *To Err Is Human: Building a Safer Health System* (Kohn, Corrigan, and Donaldson 2000)
- The IOM’s *Crossing the Quality Chasm: A New Health System for the 21st Century* (2001)
- The *National Healthcare Quality Report*, published annually by the Agency for Healthcare Research and Quality (AHRQ) since 2003 (the report has since been renamed the *National Healthcare Quality and Disparities Report*)
- The National Academies of Sciences, Engineering, and Medicine’s *Improving Diagnosis in Health Care* (National Academies 2015)

Decades after their initial publication, these reports continue to create ripples throughout the healthcare industry and serve as tremendous, vital statements on the current quality condition. They call for action, draw attention to gaps in care, and identify opportunities to significantly improve the quality of healthcare in the United States. It is up to stakeholders to hold themselves and others accountable and ensure that better quality is achieved.

“The Urgent Need to Improve Health Care Quality”

Published in 1998, the IOM’s National Roundtable report “The Urgent Need to Improve Health Care Quality” first defined healthcare quality and pointed out the United States’ failure in healthcare outcomes. In addition, the report made two notable contributions to the quality movement. The first was an assessment of the state of quality at the time: “Serious and widespread quality problems exist throughout American medicine. These problems occur in small and large communities alike, in all parts of the country, and with approximately equal frequency in managed care and fee-for-service systems of care. Very large numbers of Americans are harmed” (Chassin and Galvin 1998, 1000). The second contribution was the categorization of quality issues into three broad types: underuse, overuse, and misuse. This classification scheme has become a standard for quality defects, and it can be summarized as follows:

- *Underuse* occurs when scientifically sound practices are not used as often as they should be. For example, only 72 percent of women between the ages of 50 and 74 reported having a mammogram within the past two years (White et al. 2015). In other words, nearly one in four women does not receive treatment consistent with evidence-based guidelines.
- *Overuse* occurs when treatments and practices are used to a greater extent than evidence deems appropriate. Examples of overuse include imaging studies for the diagnosis of acute low-back pain and the prescription of antibiotics for acute bronchitis.
- *Misuse* occurs when clinical care processes are not executed appropriately—for example, when the wrong drug is prescribed, or the correct drug is prescribed but incorrectly administered.

Each of these schemas, as these studies and others indicate, has led to inordinate healthcare costs for several stakeholders, despite contributing little to the positive improvement of patient outcomes and often creating waste and inefficiencies as a result.

To Err Is Human: Building a Safer Health System

Although the disconnect between efforts and quality outcomes was not a novel insight when the IOM published *To Err Is Human* in 2000, the report carried significant weight throughout the industry and beyond. Underscoring that reform and improvement are both complex and multifaceted, this thorough report exposed the severity and prevalence of quality problems in a way that captured the attention of a large variety of key stakeholders for the first time. The executive summary of *To Err Is Human* (Kohn, Corrigan, and Donaldson 2000, 1–2) begins with the following headlines:

The knowledgeable health reporter for the *Boston Globe*, Betsy Lehman, died from an overdose during chemotherapy. . . .

Ben Kolb was eight years old when he died during “minor” surgery due to a drug mix-up. . . .

[A]t least 44,000 Americans die each year as a result of medical errors. . . . [T]he number may be as high as 98,000. . . .

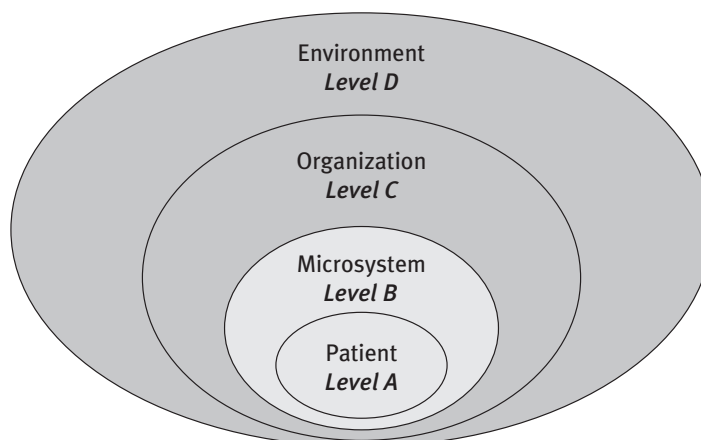
Total national costs . . . of preventable adverse events . . . are estimated to be between \$17 billion and \$29 billion, of which healthcare costs represent over one-half.

Although many individuals and organizations had called for the improvement of healthcare in the past, this report focused specifically on patient harm and medical errors in an unprecedented way, presenting them as the most urgent forms of quality defects. *To Err Is Human* framed the quality problem in a manner that was accessible to the general public, and it demonstrated that the status quo was unacceptable. For the first time, patient safety became a unifying cause for policymakers, regulators, providers, administrators, and consumers.

Crossing the Quality Chasm: A New Health System for the 21st Century

Closely following the publication of *To Err Is Human*, the IOM released *Crossing the Quality Chasm* in March 2001. This comprehensive report offered a new framework for a redesigned US healthcare system. *Crossing the Quality Chasm* provided a blueprint for the future, classifying and unifying the components of quality through six pillar aims for improvement. These aims—commonly viewed as the six dimensions of quality—provide healthcare professionals and policymakers with simple rules for redesigning healthcare. These six dimensions of quality are *safe*, *timely*, *effective*, *efficient*, *equitable*, and *patient centered*, known collectively by the acronym STEEEP (Berwick 2002).

Improving the quality of healthcare in the STEEEP focus areas requires that change occur at four levels, as shown in exhibit 1.1. Level A is the patient’s experience, as well as the experience of their affected family or community

EXHIBIT 1.1**The Four
Levels of the
Healthcare
System**

Source: Ferlie and Shortell (2001). Used with permission.

during the healthcare encounter. Level B is the microsystem in which care is delivered by small provider teams. Level C is the organizational level—the macrosystem or aggregation of microsystems and all supporting functions. Level D is the external environment, which includes payment mechanisms, policy, and regulatory factors. The environment affects how organizations operate, the macrosystem is influenced by operations and workflows that influence each microsystem housed within organizations, and microsystems, in turn, affect the individual patient. “true north” lies at level A, in the experience of patients, their loved ones, and the communities where they live (Berwick 2002).

National Healthcare Quality Report

Mandated by the US Congress to focus on “national trends in the quality of health care provided to the American people” (42 USC § 299b-2(b)(2)), the AHRQ’s annual *National Healthcare Quality Report* highlighted progress and identified opportunities for improvement. Recognizing that the alleviation of healthcare disparities is integral to achieving quality goals, Congress further mandated that a second report, the *National Healthcare Disparities Report*, focus on “prevailing disparities in health care delivery as it relates to racial factors and socioeconomic factors in priority populations” (42 USC § 299a-1(a)(6)). AHRQ’s priority populations included women, children, people with disabilities, low-income individuals, and the elderly. Together, these two reports are fundamental to ensuring that improvement efforts simultaneously advance the quality of care and work toward eliminating inequities in healthcare outcomes.

These reports use national quality measures to track the state of health-care and address three questions:

1. What is the status of healthcare quality and disparities in the United States?
2. How have healthcare quality and disparities changed over time?
3. Where is the need to improve healthcare quality and reduce disparities greatest?

In its *2019 National Healthcare Quality and Disparities Report* (the new combined report), the AHRQ (2019) noted several improvements that had been achieved, including improved access to healthcare, better care coordination, and improvement in patient-centered care. Despite these improvements, many challenges and disparities remain with regard to income, ethnicity, race, gender, and insurance status.

Improving Diagnosis in Health Care

The National Academies of Sciences, Engineering, and Medicine's 2015 report on *Improving Diagnosis in Health Care* claims that most people will experience at least one diagnostic error—defined as either a missed or delayed diagnosis—in their lifetime. Diagnostic errors are thought to account for up to 17 percent of hospital-related adverse events. Likewise, up to 5 percent of patients in outpatient settings may experience a diagnostic error.

Previous reports had steered clear of discussing diagnostic errors, perhaps fearing that the topic assigned blame to clinicians on a personal level. This report, however, proposed an organizational structure for the diagnostic process, allowing for analysis of where healthcare may be failing and what might be done about it. The report recommended that healthcare organizations involve patients and families in the diagnostic process, develop health information technologies to support the diagnostic process, establish a culture that embraces change implementation, and promote research opportunities on diagnostic errors (National Academies 2015). In doing so, it becomes acceptable to highlight where diagnostic errors are occurring as a means to prevent them.

How Far Has Healthcare Quality Come?

More than two decades after the prevalence of medical errors was brought to light in *To Err Is Human*, healthcare in the United States has seen a call to arms for the improvement of quality and safety. But has anything really changed? A 2016 analysis published by the *British Medical Journal* suggests not. The article, titled “Medical Error—The Third Leading Cause of Death in the US,” delivered a startling picture of the scope of medical error in healthcare following extensive changes and initiatives. Using death certificate records

along with national hospital admission data, the report's authors, Makary and Daniel (2016), concluded that if medical errors are tracked in the same way as diseases, they account for more than 250,000 deaths annually in the United States—outranked only by heart disease and cancer.

Marking the 20-year anniversary of the publication of *To Err Is Human*, Dzau and Shine (2020) evaluated the degree to which the United States has advanced in its quest for quality improvement. Echoing the disappointment expressed in Makary and Daniel's work, the authors also concluded that quality had not improved noticeably even after years of investing in change processes, methodologies, and initiatives.

Even though there is work yet to be done, *To Err Is Human* and *Crossing the Quality Chasm* were catalysts for change in healthcare, and they led to increased recognition and reporting of medical errors and improved accountability measures set by governing bodies. Nonetheless, additional work and diligence is needed to shrink the quality gap still present in US healthcare. The remainder of this chapter will focus on existing frameworks that have led quality improvement efforts while examining measurement concepts and useful models.

Frameworks, Models, and Measurement

The Triple Aim

Though it was introduced after several of these foundational quality-of-care reports, the Triple Aim has served as a framework for healthcare improvement efforts since its publication in 2008. According to the Triple Aim framework, developed by Berwick, Nolan, and Whittington (2008), it is not enough to focus on improving care. True improvement instead relies on interdependent efforts toward three goals, or aims: (1) improving the experience of care; (2) improving the health of (identified) populations; and (3) reducing the per capita cost of healthcare. Focusing on only one of these aims is insufficient. Although focusing on quality of care has led to some improvement efforts, those initiatives remain isolated to a single site of care, rather than following patients through the care continuum. As a result, such efforts can be difficult to replicate.

Healthcare spending and costs of care in the United States remain disproportionately higher than national quality rankings, despite the many resources available to hospitals and systems. The Triple Aim provides a framework for addressing the gaps in care to create long-lasting change. Creating change is without challenges, however. Since the goals of the Triple Aim are interdependent, substantial time after the implementation of efforts is required to see a return on investment or a significant impact.

The Quadruple Aim

The Triple Aim was not a novel theory upon its publication, but rather the articulation of several ideas and concepts that had been attempted by healthcare researchers. It set out to create a better healthcare system but failed to incorporate the perspective of providers and healthcare staff. The Quadruple Aim, introduced in 2014 by Thomas Bodenheimer and Christine Sinsky, corrects this oversight by adding a fourth aim: improving the work life of clinicians and staff. In order for the healthcare system to be optimized, achieving lower costs and improved healthcare quality outcomes, providers and staff need to be engaged, energized, and positively enforced. True change, Bodenheimer and Sinsky claim, happens at the intersection of the four aims.

The Triple and now Quadruple Aim serve as a “true north” for the healthcare industry. Efforts to create long-lasting change require time, investment, and careful coordination between stakeholders. Additional frameworks support these efforts and outline quality measurement.

The STEEEP Framework

The six STEEEP aims (Berwick 2002), as presented in the IOM’s *Crossing the Quality Chasm*, provide a valuable framework that can be used to describe quality at any of the four levels of the healthcare system (see exhibit 1.1). The many stakeholders involved in healthcare—including clinicians, patients, health insurers, administrators, and the general public—attach varying levels of importance to particular aims and, as a result, define quality of care differently (Bodenheimer and Grumbach 2009; Harteloh 2004).

Safety

Safety refers to the technical performance of care but also includes other aspects of the STEEEP framework. Technical performance can be assessed based on the success with which current scientific medical knowledge and technology are applied in each situation. Assessments typically focus on the accuracy of diagnoses, the clinical appropriateness of therapies, the skill with which procedures and other medical interventions are performed, and the absence of accidental injuries (Donabedian 1988a, 1980).

Timeliness

Timeliness refers to the speed with which patients receive care or services. It inherently relates to the “degree to which individuals and groups are able to obtain needed services” (IOM 1993, 4) or their ability to access care. Poor access leads to delays in diagnosis and treatment. Timeliness can also manifest as wait times in the patient experience—either the wait in the medical facility or the delay from scheduling an appointment to the actual visit. Timeliness is often a balance between quality of care and speed of care.

Effectiveness

Effectiveness refers to standards of care and how well they are implemented. Perceptions of the effectiveness of healthcare have evolved over the years to increasingly emphasize value. The cost-effectiveness of a given healthcare intervention is determined by comparing the potential for benefit, typically measured in terms of improvement in individual health status, with the intervention's cost (Drummond et al. 2005; Gold et al. 1996). As the amount spent on healthcare services increases, each unit of expenditure yields ever-smaller benefits until no further benefit accrues from additional expenditures on care (Donabedian, Wheeler, and Wyszewianski 1982). Within the microsystem, the effectiveness of care can relate to the ability of an intervention to cure or treat ailments and maladies.

Efficiency

Efficiency refers to how well resources are used to achieve a given result. Efficiency improves whenever fewer, more appropriate resources are used to produce an output. Because inefficient care uses more resources than necessary, it is considered wasteful care, and care that involves waste is deficient—and therefore of lower quality and value—no matter how good it may be in other respects. “Wasteful care is either directly harmful to health or is harmful by displacing more useful care” (Donabedian 1988b, 1745).

Equity

Findings that the amount, type, or quality of healthcare provided can relate systematically to an individual's characteristics—particularly race and ethnicity—rather than to the individual's need for care or healthcare preferences have heightened concerns about equity in health services delivery (IOM 2002; Wyszewianski and Donabedian 1981). Many decades ago, Lee and Jones (1933, 10) asserted that “good medical care implies the application of all the necessary services of modern, scientific medicine to the needs of all the people. . . . No matter what the perfection of technique in the treatment of one individual case, medicine does not fulfill its function adequately until the same perfection is within the reach of all individuals.” Despite the several initiatives and years of research, global problems such as the COVID-19 pandemic reflected the United States' shortcomings in equitable care outcomes (Dzau and Shine 2020).

Patient Centeredness

The concept of patient centeredness, originally formulated by Gerteis and colleagues (1993), is characterized in *Crossing the Quality Chasm* as encompassing “qualities of compassion, empathy, and responsiveness to the needs, values, and expressed preferences of the individual patient” and rooted in the idea that “healthcare should cure, when possible, but always help to

relieve suffering” (IOM 2001, 50). The report states that the goal of patient centeredness is “to modify the care to respond to the person, not the person to the care” (IOM 2001, 51). Initiatives such as precision medicine aim to incorporate individualized approaches to healthcare to improve outcomes. Recent efforts have targeted specific diagnoses with the hope of expanding to all of healthcare. In addition, it is suggested that patient-centered care can improve the overall patient experience and increase patient satisfaction scores. The patient’s perception of their quality of care often correlates with their understanding and experience of the STEEEP aims during an encounter. Therefore, patients tend to make decisions about their care based on their assessments of the factors they are best able to evaluate—patient centeredness, amenities, wait times, and reputation (Cleary and McNeil 1988; Sofaer and Firminger 2005).

Quality Improvement Models

Several models exist to guide the process of quality improvement. These quality improvement models address the complexities involved in the process and structure the approach to health system improvement. All the quality improvement models were initially developed for industries outside of healthcare and later applied to the industry. Their adaptation to the field of healthcare quality improvement demonstrates the field’s ability to learn from the success of other industries, but it also reflects the recentness of the quality movement in the healthcare arena. The quality improvement models have different names, but they share several core commonalities. Most follow the same basic format:

1. Identify the problem
2. Measure current performance
3. Perform a cause analysis
4. Develop and implement an improvement strategy
5. Measure the effect of the intervention
6. Modify, maintain, or spread the intervention

The idea that “form follows function,” a concept rooted in the field of architecture, stresses the importance of understanding what you are trying to accomplish before you determine how you are going to do it. Applied to healthcare quality improvement, this phrase highlights the need to understand the purpose behind the effort—the goal—at the individual, departmental, and organizational levels before deciding which improvement process or approach

to adopt. The following approaches, though not an exhaustive list, are most commonly applied:

- The Plan-Do-Study-Act cycle
- Model for Improvement
- Lean, or the Toyota Production System
- Six Sigma
- Human-centered design

These models are discussed in detail in chapter 2.

Measurement

Frameworks, stakeholders, and models are useful for advancing our understanding of quality of care, but they rely heavily on measurement, particularly with respect to quality improvement initiatives. Without appropriate measurement metrics and benchmarks, there is little clarity for those performing quality improvement work. Measurement must be an organic part of any quality improvement model or framework.

Donabedian Model: Structure, Process, and Outcome

As Avedis Donabedian (1966) first noted, all evaluations of the quality of care can be classified in terms of one of three measures: structure, process, or outcome.

Structure

In the context of measuring the quality of care, structure refers to characteristics of the individuals who provide care and of the settings where care is delivered. These characteristics include the education, training, and certification of professionals who provide care and the adequacy of the facility's staffing, equipment, and overall organization.

Evaluations of quality based on structural elements assume that well-qualified people working in well-appointed and well-organized settings provide high-quality care. However, although good structure makes good quality more likely, it does not guarantee it (Donabedian 2003). Licensing and accrediting bodies rely heavily on structural measures of quality because they are relatively stable, and thus easier to capture and compare, and because they reliably identify providers or practices lacking the means to deliver high-quality care. The Quadruple Aim takes a more direct approach to incorporating and considering providers and clinical staff, highlighting the structural elements that are necessary for healthcare quality improvement.

Process

Process—the series of events that take place during the delivery of care—can also be a basis for evaluating the quality of care. The quality of the process can vary on three aspects: (1) appropriateness—whether the right actions were taken; (2) skill—the proficiency with which actions were carried out; and (3) the timeliness of the care.

Ordering the correct diagnostic procedure for a patient is an example of an appropriate action. However, to fully evaluate the process in which this particular action is embedded, we also need to know how promptly the procedure was ordered and how skillfully it was carried out. Similarly, successful completion of a surgical operation and a good recovery are not enough evidence to conclude that the process of care was of high quality; they only indicate that the procedure was performed skillfully. For the entire process of care to be judged as high quality, one also must ascertain that the operation was appropriate for the patient and that it was carried out in time. Finally, as is the case for structural measures, the use of process measures for assessing the quality of care rests on a key assumption—that if the right things are done and they are done right, good results (i.e., good outcomes of care) are more likely to be achieved.

Outcome

Outcome measures capture whether healthcare goals were achieved. The goals of care can be defined broadly, so these outcome measures often include the costs of care as well as patients' satisfaction with their care (Iezzoni 2013). In many instances, the outcomes focus on indicators of health status, such as whether a patient's pain subsided or condition cleared up, or whether the patient regained full function (Donabedian 1980).

Clinicians tend to have an ambivalent view of outcome measures. Clinicians are aware that many of the factors that determine clinical outcomes—including genetic and environmental factors—are not under their control. At best, they control the process, and a good process only increases the likelihood of good outcomes; it does not guarantee them. Some patients do not improve despite the best treatment that medicine can offer, whereas other patients regain full health even though they receive inappropriate care. Despite this complexity, clinicians view improved outcomes as the ultimate goal of quality initiatives. Clinicians are unlikely to value the effort involved in fixing a process-oriented gap in care if it is unlikely to result in an improvement in outcomes.

Which Is Best?

Of structure, process, and outcome, which is the best measure of the quality of care? The answer is that none is inherently better, and the appropriateness of each measure depends on the circumstances (Donabedian 2003). However, many are inclined to believe that outcome measures are superior to the others.

The outcome addresses the ultimate purpose—the bottom line—of all caregiving: Was the condition cured? Did the patient improve?

However, there are times when a good outcome may occur even when the care (i.e., process) is clearly deficient. The reverse is also possible: despite excellent provision of care, the outcomes might not be as good because of factors that are outside clinicians' control, such as a patient's external environment. To meaningfully assess outcomes across providers, one must account for such factors by performing complicated risk-adjustment calculations (Goode et al. 2011; Iezzoni 2013).

What a particular outcome ultimately indicates about the quality of care crucially depends on whether the outcome can be directly attributed to the care provided. In other words, the link between the outcome and the antecedent structural and process measures needs to be examined to determine whether the care was appropriate and provided skillfully. Structures and processes are essential but not sufficient for a good outcome.

Metrics and Benchmarks

To assess quality using structure, process, or outcome measures, metrics and benchmarks need to be established to provide guidance on what constitutes a good structure, a good process, and a good outcome. Metrics are specific variables that form the basis for assessing quality. Benchmarks quantitatively express the level that the variable must reach to satisfy existing expectations about quality. The way healthcare metrics and benchmarks are derived has changed throughout the past few decades. Before the 1970s, quality-of-care evaluations relied on consensus among groups of clinicians selected for their clinical knowledge, experience, and reputation (Donabedian 1982). In the 1970s, however, the importance of scientific literature to the evaluation of healthcare quality gained new visibility through the work of Cochrane (1973), Williamson (1977), and

EXHIBIT 1.2
Examples of
Metrics and
Benchmarks
for Structure,
Process, and
Outcome
Measures in
Healthcare

| Type of Measure | Focus of Assessment | Metric | Benchmark |
|-----------------|---|---|---|
| Structure | Nurse staffing in nursing homes | Hours of nursing care per resident day | At least four hours of nursing care per resident day |
| Process | Patients undergoing surgical repair of hip fracture | Percentage of patients who receive prophylactic antibiotics on the day of surgery | 100 percent receive antibiotics on the day of surgery |
| Outcome | Hospitalized patients | Rate of falls per 1,000 patient days | Fewer than five falls per 1,000 patient days |

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others. At about the same time, Brook and colleagues (1977) at RAND began using systematic reviews and evaluations of scientific literature as the basis for defining criteria and standards for quality. The evidence-based medicine movement of the 1990s, which advocated medical practice guided by the best evidence about efficacy, reinforced the focus on the literature and stressed consideration of the soundness of study design and validity (Evidence-Based Medicine Working Group 1992; Straus et al. 2005). As a result, the derivation of metrics and benchmarks now revolves around the strength and validity of scientific evidence rather than the unaided consensus of experts (Eddy 2005, 1996). Exhibit 1.2 provides examples of metrics and benchmarks for structure, process, and outcome measures in healthcare.

The main insight that can be drawn from a deeper understanding of the measurement of healthcare quality is that the type of measure used—structure, process, or outcome—matters less than the measure’s relationship to the other types. For example, structure measures are only as good and useful as the strength of their link to desired processes and outcomes. Similarly, process and outcome measures must relate to each other in measurable and reproducible ways—as demonstrated by efficacy studies—to be truly valid measures of quality.

Quality Improvement Tools

Understanding the difference between quality improvement models and quality improvement tools is difficult. Quality improvement *models*, discussed earlier in this chapter, focus on the design of quality improvement efforts. Quality improvement *tools* are the tangible materials and activities that take the design from an abstract concept to a concrete structure. In quality improvement, different tools have different functions and are used at distinct stages of the quality improvement process. We can observe people using the tools of the system, but the system or model itself (e.g., Six Sigma, Lean) is invisible and cannot be observed.

Quality improvement tools can be organized into seven categories, following a framework developed by the American Society for Quality (Tague 2004):

1. Cause analysis
2. Evaluation and decision-making
3. Process analysis
4. Data collection and analysis
5. Idea creation
6. Project planning and implementation
7. Knowledge transfer and spread techniques

Chapter 2 provides more detail regarding quality improvement tools.

Conclusion

An organization's success depends not only on the foundation on which it is built but also the strength of the systems, processes, tools, and methods it uses to sustain benchmark levels of performance and to improve performance when expectations are not being met. Quality improvement theory and methodologies have been available since the early twentieth century, but their widespread acceptance and application have been slower in healthcare than in other industries (e.g., manufacturing). Two landmark IOM publications—*To Err Is Human* (2000) and *Crossing the Quality Chasm* (2001)—addressed significant concerns about the US healthcare system and prompted a movement that greatly increased healthcare institutions' focus on better care and patient safety (Leape and Berwick 2005). However, the culmination of technical complexity, system fragmentation, traditions of autonomy, and hierarchical authority structures presents, in the words of Leape and Berwick (2005, 2387), a “daunting barrier to creating the habits and beliefs of common purpose, teamwork, and individual accountability.” As revisited reports and updates on *To Err Is Human* demonstrate, overcoming this barrier will require continued focus and commitment. Through this commitment, improvement efforts can become sustainable.

Sustainable improvement is defined through will, ideas, and execution. Nolan (2007, 1) writes, “You have to have the will to improve, you have to have ideas about alternatives to the status quo, and then you have to make it real—execution.” The principles described in this chapter, when applied with will, have demonstrated success in many healthcare organizations. As technology advances and access to care improves, healthcare must continue to develop these principles as it strives to reach and maintain benchmark levels of performance. Successful coordination of care across the healthcare continuum will consistently provide the right care for every patient at the right time.

Case Study: Mr. Roberts and the US Healthcare System

Note: This patient story was edited by Matthew Fitzgerald, director of the Center for Health Data Analysis at Social & Scientific Systems. It was originally composed by Heidi Louise Behforouz, MD, assistant professor of medicine at Harvard Medical School, associate physician in the Division of Global Health Equity at Brigham and Women's Hospital, and medical and executive director of the Prevention and Access to Care and Treatment Project.

Mr. Roberts is a 77-year-old gentleman who is retired and living in Florida with his wife. A child of the Depression, he grew up to become an accomplished, affluent person. At age 13, he began working as a longshoreman and barracks builder. He started to experience back pain in his early 20s. At that time, he did not receive particularly good medical advice and did not pursue alternative therapies. World War II, 25 years in Asia, and life as a busy executive took priority, and the pain became a constant but secondary companion.

At age 50, the pain became unbearable. He returned to New York and spent the better part of a year “on his back.” In 1980, he underwent the first of four major spine surgeries. Since then, he has had multiple intervertebral discs partially or completely removed. Despite these operations, his pain has been worsening over the past two to three years, and his functional status has been decreasing.

Living with pain is difficult, and Mr. Roberts is not sure he deals with it very well. He does not want to take narcotics, because they interfere with his ability to stay sharp and active, and he has stomach problems that prohibit the use of many non-narcotic medications. Most of the time, he experiences only mild or temporary relief of his pain.

The pain is exhausting and limits his ability to do what he wants, but Mr. Roberts remains active and gets out as much as he can, even taking his wife dancing on Saturday nights. The worst thing about the pain is that it is changing—worsening—and he is uncertain of its future trajectory. As the pain increases, how will he survive? What are the possibilities that he will remain active and independent?

Mr. Roberts states that he has had “reasonably good” doctors. He is also well informed, assertive, and an active participant in his healthcare. He feels he is privileged because he has connections and advocates for himself, enabling him to expand his healthcare options and seek the best providers and institutions. Nonetheless, even though his overall experience in the healthcare system has been favorable, many instances of his care have been less than ideal.

Communication Deficits and Lack of a Team Approach

Mr. Roberts has observed that the lack of communication between providers is a huge problem. He has multiple specialists who care for different parts of his body; however, no one person is mindful of how these systems interact to create the whole person or illness. He is never sure whether one physician knows what the other is doing or how one physician’s prescriptions might interfere or interact with another’s. The physicians never seem

(continued)

inclined to “dig deeply” or communicate as team members treating one person. On many occasions, physicians have recommended therapies that have already been tried and failed. On other occasions, they disagree on an approach to a problem and leave Mr. Roberts to decide which advice to follow. No system is in place to encourage teamwork. “Unless the physician is extremely intelligent, on the ball, or energetic, it just doesn’t happen,” he says.

Seldom do physicians listen to his full story or elicit his thoughts before jumping to conclusions. Mr. Roberts suggests that physicians should carefully analyze their therapeutic personalities. They cannot assume that all patients are alike or that all patients will react similarly to a given intervention. Each patient needs to be treated as an individual, and service needs to be respectful of individual choice.

Record keeping and transfer of information are also faulty. Despite the fact that the physicians take copious notes, the information is often not put to use. Mr. Roberts has expended a great deal of time and energy ensuring that his medical records are electronically available to a new consultant’s office, only to find within a few minutes of the encounter that the consultant has not reviewed the chart or absorbed the information. This realization has affected how he uses care. For instance, at one point, Mr. Roberts’s stomach problems were worsening. His gastroenterologist was away on vacation for four weeks, and there was no covering physician. The thought of amassing his patient records for transfer to another physician (who likely would not review them and would suggest the same tests and therapies) was so unpleasant that he chose to go without care.

Removing the Question Mark from Patient–Provider Interactions

Mr. Roberts is particularly concerned with patients’ inability to know the true qualifications of their physicians or evaluate their prescriptions. At one point, he was experiencing severe arm and finger pain. Assuming these symptoms were related to his spine, he sought the advice of a highly recommended chief of neurosurgery at a premier academic center. After eliciting a brief history and performing a short examination, the chief admitted him to the hospital.

The following day, an anesthesiologist came into the room to obtain his consent for surgery. Mr. Roberts had not been told that surgery was under consideration. He asked to speak to the neurosurgeon and insisted on additional consultations. Three days later, a hand surgeon reassured him that his problem was likely self-limiting tendonitis and prescribed

conservative therapy. Within a few weeks, his pain had been resolved. Mr. Roberts was grateful that he had followed his instinct but was concerned for other patients who might not have asserted themselves in this manner.

Mismatch Between Supply and Demand

Mr. Roberts also noticed a profound disconnect between supply and demand in the healthcare system. In 1992, his pain had become particularly disabling, and his mobility was extremely restricted. His physicians suggested that he see a neurosurgeon, but there was only one neurosurgeon in the county. Despite his health emergency, he was not able to make an appointment to see this neurosurgeon for more than ten weeks. No other solutions were offered.

In pain and unable to walk because of progressively worsening foot drop and muscle weakness, he sought the help of a physician friend. This friend referred him to a “brash, iconoclastic” Harvard-trained neurologist, who in turn referred him to a virtuoso neurosurgeon at a county hospital 100 miles away. After only 20 minutes with this neurosurgeon, he was rushed to the operating room and underwent a nine-hour emergency procedure. Apparently, he had severe spinal cord impingement and swelling. The neurosurgeon later told him that he would have been a paraplegic or died had he not undergone surgery that day.

Mr. Roberts subsequently had a series of three more spinal operations. Postoperative care was suboptimal; he had to travel 100 miles to see the surgeon for follow-up. Eventually, this surgeon chose to travel to a more centralized location twice per month to accommodate patients in outlying areas.

Mr. Roberts states that we need to “overcome petty bureaucracies” that do not allow matching of supply with demand. The ready availability of quality care should be patient driven and closely monitored by a third party that does not have a vested interest in the market.

Knowledge-Based Care

Mr. Roberts is concerned about the status of continuing medical education. He guesses that physicians in large, urban, teaching hospitals can easily research to keep abreast of the latest diagnostic and therapeutic advances but that the majority of other physicians may not have similar opportunities. The system does not necessarily encourage physicians to keep up to date. This lack of current, in-depth knowledge is particularly important as issues of supply and demand force consumers to seek care in “instant med clinics.” For example, Mr. Roberts believes “emergency care” to be an oxymoron.

(continued)

On many occasions, he has gone to the emergency department and had to wait four to five hours before being treated. This experience is unpleasant and forces people to seek alternative facilities that may not provide the best care for complex, chronically ill patients.

Mr. Roberts also feels that we need to learn from our errors as well as from our successes and that groups of physicians should be required to regularly review cases and learn how to deliver care in a better way. This analysis needs to occur internally within institutions as well as externally across institutions. Ideally, the analysis would directly involve patients and families to gain their perspectives. In addition, the learning should be contextual; we should not only learn how to do better the next time but also know whether what we are doing makes sense within our overall economic, epidemiological, and societal context.

Mr. Roberts believes that high-quality healthcare is knowledge based. This knowledge comes not only from science but also from analysis of mistakes that occur in the process of delivering care. Patients should be involved in the collection and synthesis of these data. The transfer of knowledge among patients, scientists, and practitioners must be emphasized and simplified.

Nonphysician/Nonhospital Care

Mr. Roberts has been impressed with the quality of the care he has received from nonphysician clinicians, and he believes the growth of alternative healthcare provider models has been a definite advance in the system. As an example, Mr. Roberts cites the effectiveness of his physical therapists as healthcare providers; they have been alert, patient conscious, conscientious, and respectful. Mr. Roberts believes that their interventions “guide people to better life,” and his functional status has improved as a result of their assistance. In addition, these providers are careful to maintain close communication with physicians. They function as members of a team.

Postoperative care also has improved. At the time of his first surgery more than two decades ago, Mr. Roberts spent two weeks in the hospital. Now, after three days he is discharged to a rehabilitation facility that is better equipped to help him recuperate and regain full function.

Mr. Roberts knows how crucial his family and friends are to his medical care. Without their support, recommendations, constant questioning, and advocacy, his condition would be more precarious. The system needs to acknowledge patients’ other caregivers and involve them in shared decision-making and knowledge transfer.

Case Study: Stopping Catheter-Related Bloodstream Line Infections at Johns Hopkins University Medical Center and Hospitals Across the United States

Evidence indicates that medical errors result in part from the lack of a patient safety culture—a culture that encourages detection of quality problems—and from poor communication and teamwork in addressing quality problems. In response to these findings, in 2001 a team of researchers at the Johns Hopkins University Quality and Safety Research Group developed an innovative, comprehensive program to improve patient safety at the Johns Hopkins Hospital, a 1,015-bed tertiary care facility that treats more than 268,000 patients annually from across the United States and around the world. This case illustrates many of the improvement concepts and tools described in this chapter.

The efforts of the Johns Hopkins team led to the creation of the Comprehensive Unit-Based Safety Program (CUSP). CUSP is a program of continuous measurement, feedback, and improvement that was designed to:

- be implemented sequentially in work units,
- improve the culture of safety,
- enable staff to focus safety efforts on unit-specific problems, and
- include rigorous data collection through which tangible improvements in patient safety are empirically derived to educate and improve awareness about eliminating central line–associated bloodstream infections (CLABSI).

It engages frontline staff and uses a combination of tools and compliance reports to achieve improvement goals.

Implementation of CUSP consists of five major steps:

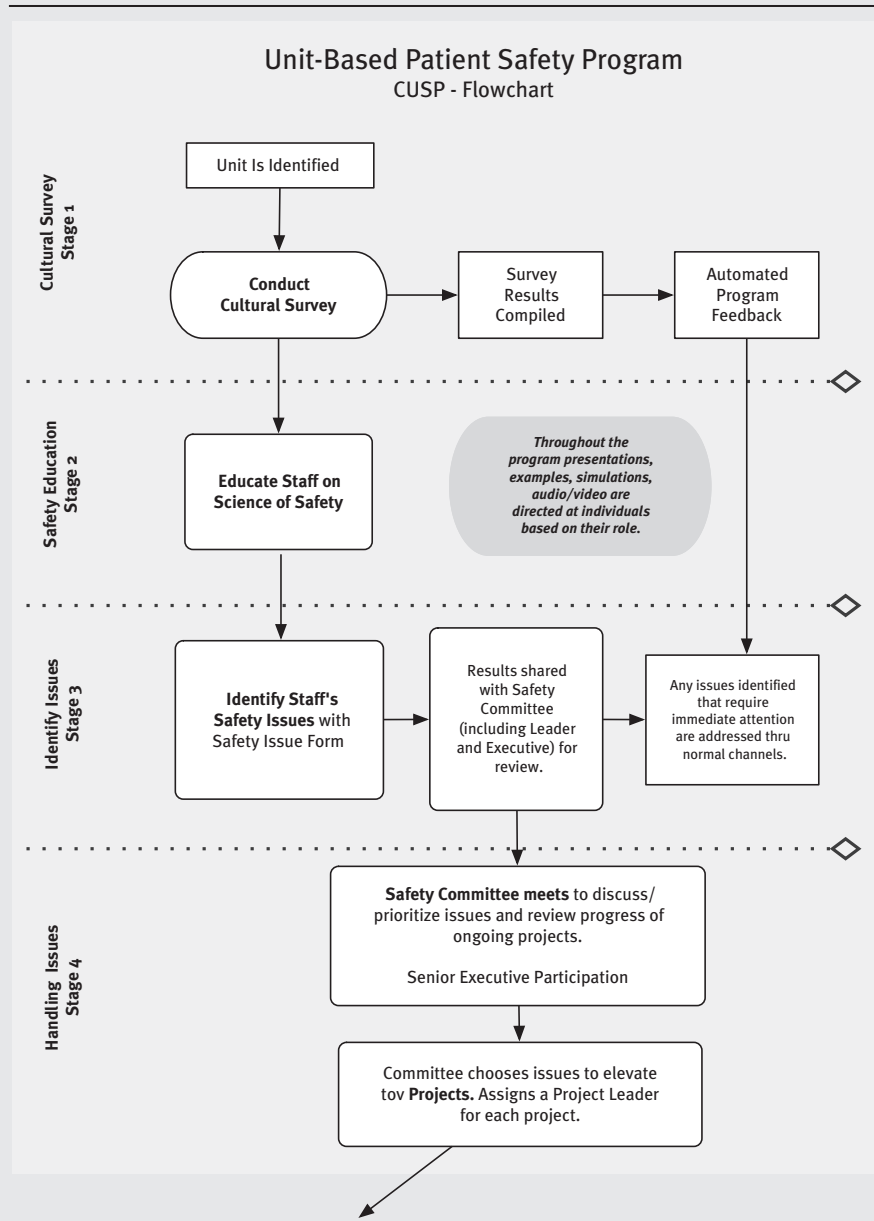
1. Train staff in the science of safety (e.g., basic strategies for safe design, including standardized processes and independent checklists for key processes).
2. Engage staff in identifying defects (e.g., ask staff how the next patient could be harmed on their unit).
3. Perform senior executive partnership/safety rounds (i.e., have hospital executives interact and discuss safety issues with staff on hospital units).
4. Continue to learn from defects by answering four questions:
 - a. What happened?
 - b. Why did it happen?

(continued)

- c. What was done to reduce risk?
- d. How do we know that risk was actually reduced?
5. Implement tools for improvement (e.g., morning briefs, daily goals checklists, operating room debriefings).

A detailed flowchart of CUSP is provided in exhibit 1.3.

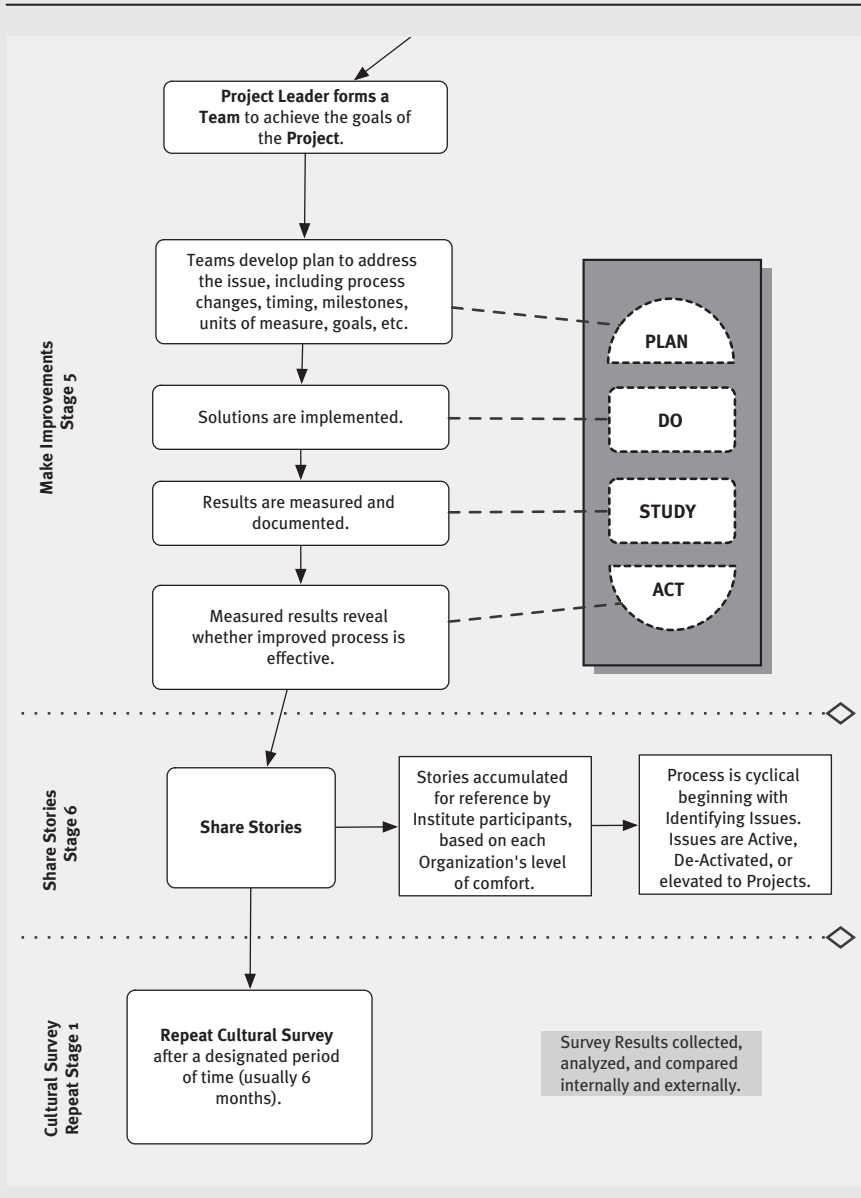
EXHIBIT 1.3
Comprehensive
Unit-Based
Safety Program
(CUSP)
Flowchart



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EXHIBIT 1.3
Comprehensive
Unit-Based
Safety Program
(CUSP)
Flowchart



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The program was first piloted in two Johns Hopkins Hospital surgical intensive care units (ICUs). Errors are more common in ICUs because of the severity of the patients' conditions. Furthermore, errors in ICUs are likely to cause significant adverse outcomes because of the high-risk nature of the patient population.

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In implementing the program, at least one physician and one nurse from each unit were required to participate. These individuals had to dedicate four to eight hours per week to CUSP implementation and serve on the improvement team. Program expenses were the costs associated with CUSP team members' time.

Upon initial investigation of the work, researchers uncovered encouraging findings:

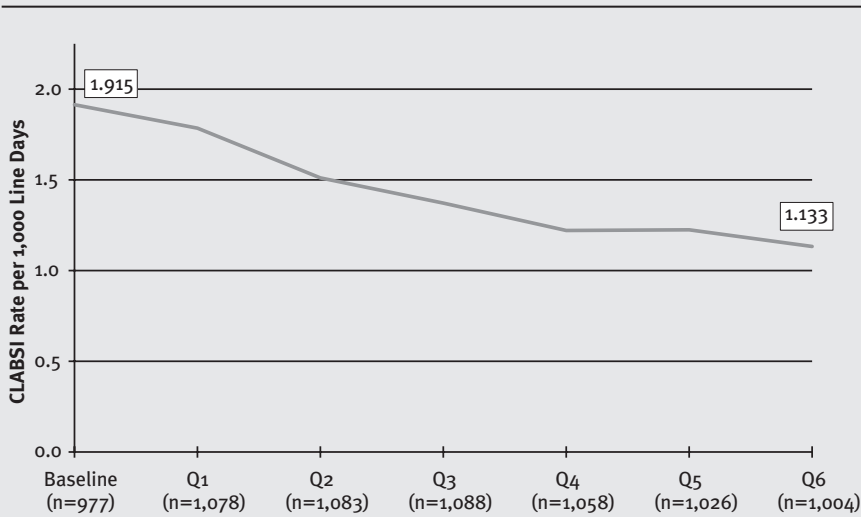
- *Length of stay (LOS)*: LOS decreased from 2 days to 1 day in one unit and from 3 days to 2.3 days in the other unit.
- *Medication errors*: The medication error rate dropped from 94 percent to 0 percent in one unit and from 40 percent to 0 percent in the other unit.
- *Nursing turnover*: The nurse turnover rate decreased from 9 percent to 2 percent in one unit and from 8 percent to 2 percent in the other unit.
- *Safety culture*: The percentage of staff who self-reported a positive safety climate increased from 35 percent to 52 percent in one unit and from 35 percent to 68 percent in the other unit.

Because of the considerable success of the pilot program, CUSP was implemented in approximately 170 clinical areas across the Johns Hopkins Hospital. Subsequently, CUSP was implemented at hospitals across the state of Michigan in collaboration with the Michigan Health and Hospital Association's Center for Patient Safety and Quality.

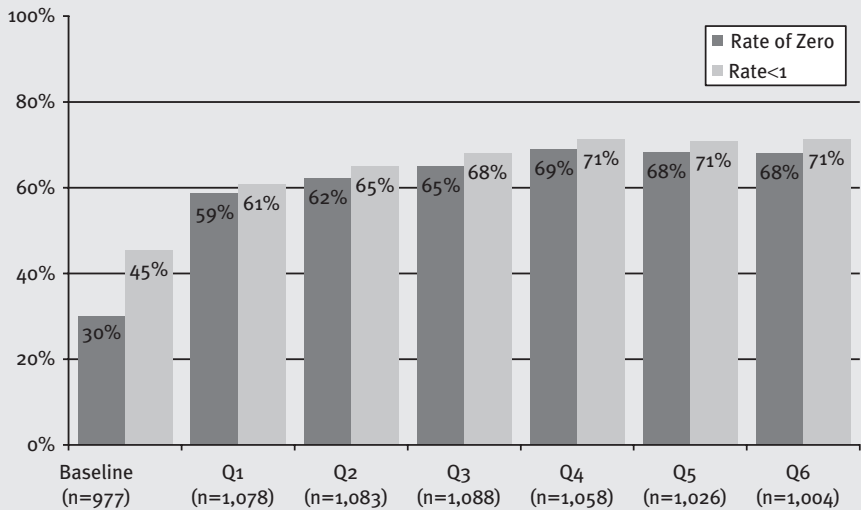
A total of 108 ICUs initially participated in the Michigan program. The program brought about dramatic decreases in CLABSI rates in Michigan hospitals, from a mean of 2.7 infections per 1,000 catheter days to 0 infections per 1,000 catheter days 18 months after implementation.

The success of the program did not go unnoticed. AHRQ awarded the Health Research and Educational Trust (HRET), a nonprofit research and educational affiliate of the American Hospital Association, an \$18 million contract to spread CUSP to hospitals across the United States to reduce CLABSI. The new program, called On the CUSP: Stop BSI, was implemented in 44 states as well as throughout Spain and England. More than 1,000 hospitals and 1,800 hospital units across the 44 states, the District of Columbia, and Puerto Rico have collectively reduced the national CLABSI rate from a baseline of 1.915 infections per 1,000 line days to 1.133 infections, a relative reduction of 41 percent (see exhibit 1.4).

The percentage of participating units with a 0 percent CLABSI rate also increased drastically, from 30 percent to 68 percent of all units (see



Source: AHRQ (2012). Used with permission.



Source: AHRQ (2012). Used with permission.

EXHIBIT 1.4

Average
CLABSI Rates
(infections per
1,000 catheter
days) per Unit

EXHIBIT 1.5

Percentage of
Reporting Units
with CLABSI
Rate of 0/1,000
or Less Than
1/1,000 Central
Line Days

exhibit 1.5). Additionally, the percentage of units reporting a CLABSI rate of less than one per 1,000 line days increased over time from 45 percent to 71 percent.

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Building on the success of the On the CUSP: Stop BSI program, HRET also led the implementation of a neonatal CLABSI prevention program in partnership with the Perinatal Quality Collaborative of North Carolina. This effort resulted in a decrease in CLABSI rates from 2.043 at baseline in August 2011 to 0.855 in August 2012—a 58 percent relative reduction.

In addition to the expanded efforts to reduce CLABSI rates, the CUSP toolkit is now being applied to address other hospital-acquired infections, most notably catheter-associated urinary tract infections (CAUTI). HRET is working with numerous partners on the On the CUSP: Stop CAUTI project to reduce CAUTI rates by 25 percent over 18 months.

The path to improvement has not been simple; it has required collaboration between a variety of multidisciplinary stakeholders. Nonetheless, the perseverance of clinical leaders and organizations across the United States continues to make the On the CUSP: Stop BSI program and its many successive iterations a notable success.

Sources: AHRQ (2017); Health Research and Educational Trust, Johns Hopkins University Quality and Safety Research Group, and Michigan Health and Hospital Association Keystone Center for Patient Safety and Quality (2013, 2011); Johns Hopkins Medicine (2018); Pronovost et al. (2006).

Study Questions

1. Think of an experience you, a family member, or a friend has had with healthcare. Gauge the experience against IOM's six aims and identify any opportunities for improvement.
2. Provide examples of measures of STEEEP if you were looking at the quality of care provided in the emergency room.
3. Provide examples of measures of structure, process, and outcome as it relates to the quality of asthma care in the office of a primary care physician.

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