

Chapter 1. Introduction and Methods

In 1999, Congress directed the Agency for Healthcare Research and Quality (AHRQ) to produce an annual report, starting in 2003, on “national trends in the quality of health care provided to the American people.”ⁱ With support from the Department of Health and Human Services and private-sector partners, AHRQ has designed and produced the National Healthcare Quality Report (NHQR) to respond to this legislative mandate. The NHQR provides a comprehensive overview of the quality of health care received by the general U.S. population and is designed to summarize data across a wide range of patient needs—staying healthy, getting better, living with chronic illness and disability, and coping with the end of life.

AHRQ was further tasked with producing an annual report that tracks “prevailing disparities in health care delivery as it relates to racial factors and socioeconomic factors in priority populations.”ⁱⁱ The National Healthcare Disparities Report (NHDR) has also been produced since 2003. The referenced priority populations consist of groups with unique health care needs or issues that require special focus, such as racial and ethnic minorities, low-income populations, and people with special health care needs. AHRQ’s charge includes a directive to examine disparities in health care access, utilization, costs, outcomes, satisfaction, and perceptions of care.

The NHQR and NHDR are complementary and are designed to be used together. Combined, they provide an annual snapshot of how our Nation’s health care system is performing and the extent to which health care quality and disparities have improved or worsened over time.

With support from a Department of Health and Human Services (HHS) Interagency Work Group and AHRQ’s National Advisory Council, AHRQ has designed and produced the NHQR and NHDR since 2003. This is the eighth in the series of reports. Over the years, the NHQR and NHDR have introduced refinements to the measure set and methodology, which has led to a focus on a subset of the most important and scientifically supported measures. These are referred to as the core measure set and are again the focus of the reports this year.

Refinements include the addition in 2004 of a second critical goal of the report series: tracking the Nation’s quality improvement progress. The 2005 reports introduced a set of core measures and a variety of new composite measures. The 2006 reports continued to improve data, measures, and methods, adding databases and measures and refining methods for quantifying and tracking changes in health care. The 2007 reports launched a new chapter on health care efficiency. The 2008 reports included an expanded chapter on patient safety, while the 2009 reports included new sections on lifestyle modification, healthcare-associated infection, and care coordination.

From the beginning, the Institute of Medicine (IOM) has helped shape these reports. Early planning for the first NHQR benefited from the IOM reports *Crossing the Quality Chasm* and *To Err Is Human*. Similarly, early planning for the first NHDR profited from the extensive literature review included in the IOM report *Unequal Treatment*. Moreover, before the publication of the first reports, AHRQ specifically requested that the IOM assist the Agency in meeting its congressionally mandated charge. The IOM was tasked with

ⁱ 42 U.S.C. 299b-2(b)(2).

ⁱⁱ 42 U.S.C. 299a-1(a)(6).

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developing a vision for the two quality reports. With rapid changes in health care, AHRQ saw the need to review the reports for their appropriateness to the current health care environment.

In 2008, AHRQ again commissioned the IOM to review past reports and offer recommendations for enhancing future reports and associated products. To this end, the IOM established a consensus committee, the Committee on Future Directions for the National Healthcare Quality and Disparities Reports.ⁱⁱⁱ The committee has offered recommendations on priority areas for health care quality improvement, measure selection, methodological approaches, and formatting and presentation of report findings.^{iv}

This chapter summarizes AHRQ's methodological approach to producing the 2010 reports. While the 2010 reports contain almost all of the same measures tracked in previous versions of the NHQR and NHDR, many of the IOM's recommendations have been implemented, and the organization and content of the reports have changed extensively. Significant enhancements have been made to the reports to strengthen understanding of performance across the multiple dimensions of health care quality, better capture and track trends in disparities, and quantify the potential for future progress in meeting quality goals.

Consistent with past reports, the 2010 reports focus on a specific theme. In the 2010 reports, analyses include contrasts along the urban-rural continuum wherever data are available. With these refinements, the 2010 NHQR and NHDR substantively advance our Nation's understanding of the progress that is being made in improving quality and reducing disparities in the U.S. health care system.

IOM Recommendations for Enhancing the NHQR and NHDR

The 2010 reports begin the process of incorporating suggestions from the IOM about how to maximize the utility of the reports and related products. AHRQ received recommendations from the IOM in April 2010. These recommendations guided the redesign of the 2010 NHQR and NHDR and are reflected throughout these reports. Some of the key recommendations from the IOM Committee are discussed below.

Identify Priority Areas for Quality Improvement

The IOM recommended that AHRQ report on progress in selected priority areas. These priority areas are expected to yield the greatest gains in health care quality. Priorities include six areas identified by the National Priorities Partnership (NPP),^v as well as two areas proposed by the IOM Committee. Measures selected for reporting reflect concepts captured in the priority areas, as listed below:

Priority areas designated by the NPP

- Patient and family engagement
- Population health

ⁱⁱⁱ The committee's report is available at: www.ahrq.gov/research/iomqdrreport.

^{iv} In addition to guidance specific to the reports, the IOM provided recommendations about standardizing collection and coding of data on race, ethnicity, and language in the report *Race, Ethnicity, and Language Data*. We continue to seek opportunities to show data in the reports on disparities related to granular ethnicity and language preference, but such health care data are rare.

^v The NPP is a partnership of public and private health care stakeholders who have come together to establish priorities and goals to eliminate harm to patients, eliminate health care disparities, and reduce disease burden and health system waste. More information on the National Priorities Partnership is available at: www.nationalprioritiespartnership.org/Partners.aspx.

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- Safety
- Care coordination
- Palliative care
- Overuse of services

Priority areas designated by the IOM Committee

- Access to care
- Health system infrastructure

Some of these areas mapped directly into existing report sections and are included in those sections of each report. Patient and family engagement is covered in the chapter on Patient Centeredness. Safety is covered in the chapter on Patient Safety. Palliative care is covered in the section on Supportive and Palliative Care in the Effectiveness chapter.

Some areas mapped to sections in one report but not the other. Overuse is covered in the Efficiency chapter of the NHQR, but a corresponding chapter had to be developed for the NHDR. Access is covered in the Access to Care chapter of the NHDR, but a corresponding chapter had to be developed for the NHQR. Care coordination and health systems infrastructure were not covered well in any existing chapter, so new chapters were developed for both reports.

Population health measures cut across several of the quality dimensions and are included in multiple sections throughout both existing reports. Hence, performance on population health measures is not included as a separate chapter in this report. As appropriate, population health performance measures are reported in relevant chapters. For example, the population measure “adults with obesity who ever received advice from a health provider to exercise” is reported in Chapter 2, “Effectiveness,” in the Lifestyle Modification section. The concept of population health is also presented as an important focus of the Highlights.

Adopt Updated Quality Framework

Measures selected for inclusion in the NHQR and NHDR examine performance in each of the priority areas listed above and are organized along the elements of a quality framework developed by the IOM Committee. The framework guiding the 2009 NHQR was focused around five dimensions of quality: (1) effectiveness, (2) patient safety, (3) timeliness, (4) patient/family centeredness, and (5) efficiency. The 2010 reports retain these quality dimensions and, in keeping with the suggestions offered by the IOM, introduce three others: access, care coordination, and health system infrastructure.

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Similarly, the 2009 NHDR encompassed many of the NHQR measures focused on effectiveness of care, as well as access and care rendered to priority populations. The quality framework presented in Figure 1.1 applies equally well to the NHQR and NHDR. As such, the 2010 NHDR substantively expands the dimensions of quality by paralleling the structure and measures presented in the NHQR. “Efficiency,” a dimension of quality that was not included in previous disparities reports, has been added to the 2010 NHDR.

Figure 1.1. Quality Framework for the 2010 NHQR and NHDR

Crosscutting Dimensions		Component of Quality Care	Types of Care			
			Preventive Care	Acute Treatment	Chronic Condition Management	
EQUITY	VALUE	Effectiveness				
		Safety				
		Timeliness				
		Patient/Family Centeredness				
		Access				
		Efficiency				
		Care Coordination				
		Health Systems Infrastructure Capabilities				

Source: Ulmer C, Bruno M, Burke S, eds. Future directions for the National Healthcare Quality and Disparities Reports. Committee on Future Directions of the National Healthcare Quality and Disparities Reports, Institute of Medicine. Washington, DC: National Academies Press; 2010.

The revised quality framework posits that care coordination and health system infrastructure are foundational components that must be in place to achieve quality objectives in each of the other quality areas. Measures corresponding to elements of this quality framework are further described below in the section titled “Measure Set for NHQR and NHDR.”

Use Subnational Data

National data to assess performance and the presence of disparities in health care are unavailable for several key measures of quality. In many cases, these data are simply not being collected. The IOM recommends the use of subnational data (e.g., State-level data) to construct performance measures when national data are unavailable. For example, national data on the quality of care rendered to people with HIV/AIDS are generally unavailable. Data from the HIV Research Network, which represents 18 medical practices across the United States treating more than 14,000 patients with HIV/AIDS, were used in both the NHQR and NHDR to gather information on the care received by this population. Although not nationally representative, the data provide some insight into the care received by people with HIV/AIDS and may serve as a catalyst to expanded data collection at the national level.

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Expand Stratification

The IOM recommended that the NHDR stratify quality measures by the race and ethnicity categories identified by the Office of Management and Budget (OMB), primary language or English proficiency, and socioeconomic and insurance status. Past versions of the NHDR have reported quality measures according to these sociodemographic characteristic. The 2010 NHDR report continues to include these categories and to show economic and insurance strata. The NHQR expands assessments of performance based on geographic region, specifically, analyses of quality and disparities across the urban-rural continuum.

Modify Benchmarking Strategy

Performance and the potential for quality improvement are best evaluated relative to the evidence on what is achievable. Achievable benchmarks, which demonstrate the “best” attained performance on individual quality measures, were incorporated into the 2010 reports, per the recommendation of the IOM Committee. Identical benchmarks were used to characterize performance in both the NHDR and NHQR.

Benchmarks have been identified based on data from the top-performing States. In identifying the top-performing States, we calculated performance on selected measures separately with data from each of the 50 States.

States were ranked in order of performance and the top 10% were identified. The average performance among these top- ranking States was designated as the measure benchmark. Because data were not always available to estimate performance for each State, the 10% criterion was used only when data for a minimum of 30 States were reported.

Create Action-Oriented Products

The NHQR and NHDR and related products should guide or support action. These reports may be made more actionable by including priority areas and benchmarks. Including examples of “best practices” would further emphasize the opportunities available to improve quality and reduce disparities.

Track Access Better

The NHDR has traditionally included a chapter on access to care, identifying the facilitators and barriers to care and health care utilization experiences of subgroups defined by race and ethnicity, income, education, and type of health insurance. Pursuant to the IOM’s recommendations, a chapter on access to care, which has not been specifically tracked in the NHQR, has been added to the 2010 NHQR.

How This Report Is Organized

NHQR and NHDR chapters are organized along the elements of the quality framework. Several of the proposed priority areas that are reflected in this framework have been monitored in previous quality and disparities reports; however, labels and organization of measures within chapters slightly differed. Measures that reflect the concepts underlying the newly defined priority list have been carried over to the 2010 reports

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and organized in chapters corresponding to the revised quality framework. Measures corresponding to priority areas that are new to the 2010 reports were identified with the assistance of the Interagency Work Group and are noted in the description of chapters below.

For the first time, key findings from the NHDR are incorporated into relevant sections of the NHQR and major findings from the NHQR are mentioned in the NHDR. Integration of findings across the two reports emphasizes the interrelatedness of the two reports and provides a more robust description of the health care system's performance overall and for population subgroups.

Continuing Chapters From Past Reports

- **Highlights**, which precedes this chapter, provides information to understand patterns of performance within priority areas, insight on the progress that has been made in advancing health care quality in the United States, and implications of report findings for meeting national performance objectives. The Highlights incorporate findings from both the NHQR and NHDR and the same Highlights chapter is used in both reports.
- **Chapter 1: Introduction and Methods** describes changes that have occurred between the 2009 and 2010 reports, such as modifications to the quality framework, measures added and excluded, and methodological changes in estimating and presenting data. An overall description of the measure set is also presented.
- **Chapter 2: Effectiveness** examines effectiveness of health care in the general U.S. population. The 2010 report is organized around eight clinical areas: cancer, diabetes, end stage renal disease (ESRD), heart disease, HIV and AIDS, maternal and child health, mental health and substance abuse, and respiratory diseases. Three types of health care services that typically cut across clinical conditions are also examined: lifestyle modification, functional status preservation and rehabilitation, and supportive and palliative care.
- **Chapter 3: Patient Safety** tracks measures of safety, including healthcare-associated infections, postoperative and other hospital complications, and preventable hospital deaths.
- **Chapter 4: Timeliness** examines the delivery of time-sensitive clinical care and patient perceptions of how quickly they receive care.
- **Chapter 5: Patient Centeredness** examines patients' experiences with care in an office or clinic setting, as well as during a hospital stay. Measures reported in this chapter focus on perceptions of communication with providers and satisfaction with the physician-patient relationship.
- **Chapter 10: Priority Populations** continues to be unique to the NHDR. This chapter summarizes quality and disparities in care for populations identified as particularly significant to quality improvement efforts:
 - Racial and ethnic minorities.
 - Low-income groups.
 - Women.
 - Children.
 - Older adults.
 - Residents of rural areas and inner cities.
 - Individuals with disabilities or special health care needs.

New Chapters for the 2010 Reports

- **Chapter 6: Care Coordination** is new to both the NHQR and NHDR. This chapter presents data to assess the performance of the U.S. health care system in coordinating care across providers or services. The quality framework identifies care coordination as a foundational dimension of quality, a component that facilitates the achievement of other health care system goals. Care coordination is represented by systems and processes that help patients successfully navigate across often disconnected health care components (e.g., physicians, hospitals, postacute services, social services) to meet their ongoing health needs. Measures of care coordination in the 2010 NHQR and NHDR address NPP goals, focusing on the adequacy of medical information received or obtained by providers, facilitators and barriers to care coordination, and outcomes associated with poorly coordinated care.

Measures included in both the quality and disparities reports are:

- Heart failure patients who receive complete discharge information.
 - Readmissions for congestive heart failure.
 - Provider communication with other physicians concerning a patient's medications.
 - Hospital electronic exchange of information.
 - Preventable emergency department visits for asthma.
- **Chapter 7: Efficiency** focuses in part on overuse of health services. Measures of health system efficiency, which capture information on how well the health care system promotes quality, affordable care, and appropriate use of services, have typically been reported in the NHQR but not the NHDR. For the first time, the 2010 NHDR includes a chapter focusing on efficiency measures. These measures capture information on overuse, underuse, and misuse of health care among population subgroups. Efficiency measures reported in the 2010 NHDR are:
 - Rates of potentially avoidable hospitalizations.
 - Hospitalizations for conditions covered in AHRQ's Prevention Quality Indicators (PQIs).
 - Potentially avoidable hospitalizations among home health and nursing home patients.
 - Unnecessary services and costs, as measured by the percentage of males over age 75 who had a prostate-specific antigen test or a digital rectal exam within the previous year.
 - **Chapter 8: Health Systems Infrastructure**, which explores the capacity of health care systems to support high-quality care, is new to both reports. The IOM recommended including health system infrastructure as a priority area because measuring performance in terms of health care infrastructure capacity can “[i]mprove the foundation of health care systems (including infrastructure for data and quality improvement; communication across settings for coordination of care; and workforce capacity and distribution...to support high-quality care.”

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Unlike most measures, health system capabilities were not assessed at the person level but according to region and provider characteristics. Infrastructure measures, which are primarily structural measures of quality, include:

- Distribution of U.S. pharmacy professionals.
 - Adoption of office-based computerized systems.
 - Hospital use of fully implemented computerized systems, by key functions.
 - Presence of hospital patient safety culture components (e.g., teamwork within units).
- **Chapter 9: Access** includes measures that focus on barriers to care, such as the U.S. population that is uninsured, financial barriers to care experienced by the population with health insurance, and people with a usual source of care. The NHDR has traditionally included a chapter on access to care, identifying facilitators and barriers to care and health care utilization of subgroups defined by race and ethnicity, income, education, and type of health insurance. Pursuant to the IOM's recommendations, a chapter on access to care, which has not been specifically tracked in the NHQR, has been added to the 2010 NHQR. Access is measured based on the following:
- Availability of health insurance.
 - Availability of a usual source of care.
 - Patient assessment of how easy it is to gain access to health care.
 - Successful receipt of needed services.

Appendixes are available online for both the NHQR and NHDR at www.ahrq.gov/qual/qrdr10.htm. These appendixes include:

- **Data Sources**, which provides information about each database analyzed for the reports, including data type, sample design, and primary content.
- **Measure Specifications**, which provides information about how measures are generated and analyzed for the reports. Measures highlighted in the report are described, as well as other measures that were examined but not included in the text of the report.
- **Detailed Methods**, which provides detailed methodological and statistical information about selected databases analyzed for the reports.
- **Data Tables**, which contains detailed data tables for most measures analyzed for the reports, including measures highlighted in the report text and measures examined but not included in the text. A few measures cannot support detailed tables and are not included in the appendix.

Theme of 2010 Reports

This year's focus on health care performance in rural and inner-city areas required the identification of a standardized approach to identifying communities by level of urbanization. With input from the Interagency Work Group, AHRQ selected the National Center for Health Statistics (NCHS) Urban-Rural Classification Scheme to guide analyses involving geographic location. The 2006 NCHS classification system is derived from data gathered from three sources: the OMB metropolitan and nonmetropolitan designations, the Rural-Urban Continuum and Urban Influence coding systems, and the U.S. Census. NCHS includes six urbanization categories, including four metropolitan and two nonmetropolitan county designations. Definitions of metropolitan and nonmetropolitan designations are shown in Table 1.1.

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Although an effort was made to standardize reporting of data according to the NCHS classification system, a number of data sources collected this information using alternative classification models. For example, data in the National Survey on Drug Use and Health (NSDUH) were organized according to the classification system shown in Table 1.2. To the extent feasible, this classification system was modified to correspond to the 2006 NCHS classification scheme. Because correspondence between the NSDUH's nonmetropolitan subgroups and that of the NCHS classification system was poor, for purposes of analysis, nonmetropolitan regions were not subset. Thus, NSDUH performance measures are reported for three metropolitan subgroups and for nonmetropolitan regions as a whole. In other cases, where source data did not provide sufficient detail to adapt to the NCHS model, analyses of performance used aggregated categories (e.g., metropolitan versus nonmetropolitan.)

Table 1.1. 2006 NCHS Urban-Rural Classification System

Metropolitan	
Large central metropolitan	Counties in a metropolitan statistical area of 1 million or more population: <ol style="list-style-type: none"> 1. That contain the entire population of the largest principal city of the metropolitan statistical area, or 2. Whose entire population resides in the largest principal city of the metropolitan statistical area, or 3. That contain at least 250,000 of the population of any principal city in the metropolitan statistical area
Large fringe metropolitan	Counties in a metropolitan statistical area of 1 million or more population that do not qualify as large central
Medium metropolitan	Counties in a metropolitan statistical area of 250,000 to 999,999 population
Small metropolitan	Counties in a metropolitan statistical area of 50,000 to 249,999 population
Nonmetropolitan	
Micropolitan	Counties with urban population of 20,000 to 49,999, adjacent to metro area
Noncore	Counties that are neither metropolitan nor micropolitan

Source: Ingram D, Franco S. 2006 Rural-Urban Classification Scheme for Counties. Centers for Disease Control and Prevention, NCHS, 2006. Available at www.cdc.gov/nchs/data_access/urban_rural.htm.

Table 1.2. NSDUH data classification and modified classification for metropolitan and nonmetropolitan communities

NSDUH Rural/Urban Classification	Modified NSDUH Classification for NHQR and NHDR
Metropolitan	
Large metropolitan	Large central and fringe metropolitan
Small metropolitan 250K-1,000,000	Medium metropolitan
Small metropolitan <250K	Small metropolitan
Nonmetropolitan	
Urbanized = 20,000 or more	Excluded from analyses
Less urbanized = 2,500-20,000	Excluded from analyses
Completely rural = 2,500 or less	Excluded from analyses

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Measure Set for the 2010 NHQR and NHDR

Retired Measures

Previous reports have demonstrated that some measures of health care quality have improved. Since the first NHQR and NHDR, significant improvements in a number of measures of quality of care have occurred, with U.S. health care providers achieving overall performance levels exceeding 95%. The success of these measures limits their utility for tracking improvement over time. Because these measures cannot improve further to a significant degree, including them in the measure set creates a ceiling effect that may distort quantification of rate of change over time. Data on retired measures will continue to be collected and these measures will be added back to the reports if their performance falls below 95%. For the 2010 report, no measures have been retired or added back.

The measures that were retired in 2009 and therefore not presented in the 2010 report are:

- Adults with diabetes who had their blood cholesterol checked.
- Hospital patients with heart attack who received aspirin within 24 hours of admission.
- Hospital patients with heart attack who were prescribed aspirin at discharge.
- Hospital patients with heart attack who were prescribed a beta blocker at discharge.
- Smokers with heart attack who received smoking cessation counseling while hospitalized.

Core Measures

The NHQR and NHDR track a broad array of health care measures and have added measures each year. The 2010 reports continue to focus on a consistent subset of measures, the “core” measures, which includes the most important and scientifically supported measures in the full measure set. In 2005, the Interagency Work Group selected the core measures from the full measure set. For most core measures, findings are presented each year. A subset of the core measure group is presented on an alternating basis, typically rotating across odd or even years of the report. All alternating core measures are included in trend analyses. “Noncore” measures are included in summary statistics and may be presented to complement core measures in key areas.

Examples of alternating measures include the set of measures focusing on breast cancer and colorectal cancer. While measures are annually tracked, breast cancer measures are presented in odd calendar years; these measures were contained in the 2009 reports. Colorectal cancer measures are also tracked annually, but results are presented in even calendar years, such as in the 2010 quality and disparities reports.

Composite Measures

Policymakers and others have voiced their support for composite measures of quality because they can be used to facilitate understanding of information from many different measures. A composite measure summarizes care that is represented by individual measures that are often related in some way, such as components of care for a particular disease or illness. Composite measures are composed of two or more process^{vi} or outcome^{vii} measures that have been recommended or identified as a “best practice” in the

^{vi} “Receipt of three recommended diabetes services” is one example of a composite process measure. This composite was formed by combining information on adults with diabetes who received the following clinical preventive services: hemoglobin A1c measurement, a dilated eye exam, and a foot exam.

^{vii} “Adults with ambulatory visits who reported poor communication with health providers” is an example of a composite outcome measure. This composite was formed by combining information on patient perceptions of their providers, including the extent to which the provider listened to the patient, respect shown by the provider, time spent with the patient, and explanations offered by providers.

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treatment or prevention of complications associated with specific conditions, such as diabetes. Since measures used to construct composites represent various dimensions or processes of care, they provide a more complete understanding of the quality of the U.S. health care system. To ensure that actionable information is available, estimates of performance on the individual measures that make up a composite measure are available in an appendix to these reports.

Decisions concerning the appropriateness of pooling data to generate a composite measure were discussed with data sources. Several of the composite measures included in the reports were developed, tested, and estimated by the data source or other public or private organizations for use in quality assessment, monitoring, and improvement activities.

Composite measures in the NHQR and NHDR are created in a variety of different ways. The appropriateness model is sometimes referred to as the “all-or-none” approach because it is calculated based on the number of patients who received all of the services they needed. One example of this model is the diabetes composite, in which a patient who receives only one or two of the three recommended services would not be counted as having received all recommended care.

The opportunities model assumes that each patient needs and has the opportunity to receive one or more processes of care, but not all patients need the same care. Composite measures that use this model summarize the proportion of appropriate care that is delivered. The denominator for an opportunities model composite is the sum of opportunities to receive appropriate care across a panel of process measures. The numerator is the sum of the components of appropriate care that are actually delivered.

The composite measure of recommended hospital care for heart failure is an example of the use of the opportunities model. The total number of patients who receive treatments represented by individual components of the composite measure (e.g., evaluation of left ventricular ejection fraction and use of angiotensin-converting enzyme (ACE) inhibitor or angiotensin receptor blocker (ARB) among patients with left ventricular systolic dysfunction) is divided by the sum of all of the opportunities to receive appropriate care.

The CAHPS® (Consumer Assessment of Healthcare Providers and Systems) surveys have their own method for computing composite measures that has been in use for many years. These composite measures average individual components of patient experiences of care and are presented as the proportion of respondents who indicate that providers sometimes or never, usually, or always performed well.

Composite measures that relate to rates of complications of hospital care are postoperative complications and complications of central venous catheters. For these complication rate composites, an additive model is used that sums individual complication rates. Thus, for these composites, the numerator is the sum of individual complications and the denominator is the number of patients at risk for these complications. The composite rates are presented as the overall rate of complications. The postoperative complications composite is a good example of this type of composite measure: if 50 patients had a total of 15 complications among them (regardless of their distribution), the composite score would be 30%.

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Other Measure Characteristics

Core and noncore measures may be characterized as “process” or “outcome” measures. Process measures track receipt of medical services and whether providers rendered care according to accepted standards. Outcome measures are indicative of the result or impact of medical care. Many factors other than the care received affect health outcomes; these include lifestyle, social and physical environment, and genetic predisposition to disease. Therefore, outcome measures are typically adjusted for risk or patient characteristics that may influence outcomes.

Both process and outcome measures are included in the 2010 NHQR and NHDR; both types of measures are not reported for all conditions due to data limitations. For example, data on HIV care are suboptimal, so no HIV process measures are included as core measures. In addition, not all core measures are included in trending analysis, because 3 or more years of data are not always available. Ideally, process measures and related outcome measures would be tracked in tandem. In reality, data are typically unavailable to examine the relationship between structural, process, and outcome measures.

Process measures reported in the NHQR and NHDR, particularly in the chapter on effectiveness, are grouped into categories related to the type of care: prevention, acute treatment, and chronic disease management. There is a sizable overlap among the care types and some measures may be considered to belong in more than one type of care category.

- **Prevention.** Caring for healthy people is an important component of health care. Educating people about healthy behaviors and lifestyle modification can help to postpone and avoid illness and disease. In addition, detecting health problems at an early stage increases the chances of effectively treating them, often reducing suffering and costs. Many of the preventive measures tracked in the reports come from the U.S. Preventive Services Task Force and the Centers for Disease Control and Prevention Advisory Committee on Immunization Practices.
- **Treatment.** Even when preventive care is ideally implemented, it cannot entirely avert the need for acute care. Delivering optimal treatment for acute illness can help reduce the effects of illness and promote the best recovery possible.
- **Management.** Some diseases, such as diabetes and ESRD, are chronic, which means they cannot simply be treated once; they must be managed across a lifetime. Management of chronic disease often involves lifestyle changes and regular contact with a provider to monitor the status of the disease. For patients, effective management of chronic disease can mean the difference between healthy living and frequent medical problems.

A list of core measures included in the 2010 NHQR and NHDR is shown in Table 1.3 at the end of this chapter. Measures are identified according to the priorities addressed, dimension or type of care, and focus on structure (access), process (prevention, acute care, chronic care), or outcome of care. The table also notes whether a measure is a composite measure.

Analyses

In the NHQR, measures are tracked for different groups, such as age, gender, and geographic location. In the NHDR, comparisons are made across groups defined by race, ethnicity, income, education, activity limitations, and geographic location. In general, either the largest subgroup or the best performing subgroup

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is used as the reference; unless specified, this would typically be individuals ages 18-44 for age contrasts, individuals with private health insurance for insurance contrasts, and non-Hispanic Whites for racial contrasts.

Two criteria are applied to determine whether the difference between two groups is meaningful:

1. First, the difference between the two groups must be statistically significant with $p \leq 0.05$ on a two-tailed test.
2. Second, the relative difference between the comparison group and the reference group must be at least 10% when the measure is framed positively as a favorable outcome or negatively as an adverse outcome.

To further address the interrelationships among measures, group demographic characteristics, and socioeconomic factors, multivariate regression analyses were conducted for a small number of measures that had data available to examine the relationship between the measure, race/ethnicity, and socioeconomic factors. These analyses, which are shown for selected measures in the NHDR chapter on priority populations, generated adjusted percentages that quantify the magnitude of disparities after controlling for a number of confounding factors. For example, results of multivariate analyses are shown for an effectiveness measure—the percentage of people with diabetes who received recommended care for diabetes. Values of these measures are compared for different racial and ethnic groups after adjusting for differences in the distributions of income, education, insurance, age, gender, and geographic location.

Annual Rates of Change and Trend Analyses

For all measures for which reliable trend data are available, analyses are conducted to assess the annual rate of change. The 2010 reports use regression analysis to estimate average annual rate of change. Regression models were specified as follows:

$$\ln(M) = \beta_0 + \beta_1(Y), \text{ where}$$

$\ln(M)$ = natural logarithm of the measure value (M)
 β_0 = intercept or constant
 $\beta_1(Y)$ = coefficient corresponding to year (Y)

Using regression results, the average annual rate of change was calculated as $100 \times (\exp(\beta_1) - 1)$.

Data in the NHQR/NHDR are unavailable at the person level and aggregated estimates are used throughout analyses. The regression-estimated annual rate of change was reported only when at least three data points—or 3 years of aggregated data—were available for a measure.

For inclusion as either improving or getting worse, the average annual rate of change must be at least 1% per year when the measure is framed positively as a favorable outcome or negatively as an adverse outcome.

Progress on individual measures is reported as follows:

- Progress on a measure is deemed to be improving or getting better if the annual rate of change is 1% or greater, in the desirable direction.
- Progress on a measure is deemed to be getting worse when the annual rate of change is 1% or greater, in the undesirable direction.
- Progress has remained the same if the annual rate of change is $\leq 1\%$ in either the desirable or undesirable direction.

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Across subpopulation groups, average annual change was estimated to ascertain the extent to which disparities in quality and access measures were increasing, decreasing, or remaining the same over time. Calculation of change in disparities was conducted in a manner similar to that described above, with the exception that a linear regression (as opposed to a log-linear regression) was used to estimate annual change for population subgroups. Change in disparities was estimated as the difference in the average annual change between the comparison and reference groups. Measures for which the difference between groups was >1 indicate that the disparity is getting larger whereas differences < -1 indicate that the size of the disparity is getting smaller. Values between -1 and 1 suggest that group differences have not changed over time. Due to methodological changes over time, changes in data used to construct measures across years, and changes to the measure set, it is not appropriate to compare the annual change or rates of change for measure groups discussed in this year's report with those from prior years.

Summary Measures in the Highlights

The Highlights chapter reports findings across broad panels of measures. Contained in the highlights are summary data detailing:

- Measures or groups of measures for which selected population groups (e.g., race/ethnicity, income, metropolitan and nonmetropolitan groups) performed better, worse, or the same as the reference group;
- Distribution of change over time in quality and access measures for population subgroups; and
- Change in quality and access over time, by type of service (preventive care, acute care, chronic disease management) and outcomes.

This process is more complicated because data on all measures are not collected each year. In the summary trend analyses, we obtain all available data points between the year 2000 and the current data year for each measure. For most measures, trends include data points from 2001/2002 to 2007/2008. Composite measures are included in the core measure category. To avoid duplication of estimates within the other categories, composite measures are not included in other categories where estimates from their component measures are used. For example, the diabetes composite measure (which includes hemoglobin A1c measurement, eye exam, and foot exam) contributes to the overall rate for the core measures group but not to the diabetes group rate, which uses the estimates from the three noncore component measures.

Using the analytic approach previously described, we calculated the sum of measures that were identified as better, worse, or the same (when considering subgroup differences) or that were improving, worsening, or remaining the same over time (when considering trend data). The distribution of measures by subpopulation, type of service, or type of measure (i.e., quality or access) are presented as a way to summarize the status of health care quality and disparities in the United States.

Standardization of language to describe differences in the value of a measure across time and subgroups is part of the effort by HHS and AHRQ to provide information on where the Nation is—and is not—making progress in reducing disparities in health care. Furthermore, as detailed below, the use of benchmarks, or “best known level of attained performance,” provides an additional way to monitor progress. It also offers an approach to measuring disparities by projecting the amount of time that would be needed for selected groups to achieve the benchmarks.

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Benchmarks

Pursuant to the IOM's recommendations, when data were available, the 2010 NHQR and NHDR include measure-specific benchmarks that reflect the highest level of performance documented for individual measures. Benchmarks enable readers to assess national and State performance relative to that of the highest performing States, organizations, and other entities. They also aid in establishing reasonable performance improvement goals. From an equity perspective, standards of performance should not differ across population groups. As such, benchmarks corresponding to measures included in both the NHQR and NHDR were identical.

For measures for which they are reported, benchmarks were estimated as the measure average for the 10% of States that had the best performance on the measure of interest. For benchmarking purposes, the District of Columbia is treated as a State. Benchmarks were estimated only if data were available for a minimum of 30 States. Before settling on the approaches used, we considered alternative methods for designating benchmarks. One method would have limited "best attained performance" to the one State with the highest performance on a measure. This approach was rejected because of concerns about the reliability of data from one State, especially if the State is unique in terms of the characteristics of the population, health care infrastructure, or practice patterns. The top-performing State may simply be an outlier.

State-level estimates used in constructing benchmarks were primarily calculated from the same data source as the measure. In some cases, such as when the number of individuals sampled from a specific State was too small, data did not support estimation at a subnational level and benchmarks were not identified. We made exceptions for three measures derived from the Medical Expenditure Panel Survey (MEPS) and the National Health Interview Survey (NHIS). For these measures of colorectal cancer screening, diabetes care, and pneumococcal vaccination, almost identical data were available from Behavioral Risk Factor Surveillance Survey (BRFSS) State data. However, BRFSS sampling and mode of administration differ from MEPS and NHIS. Hence, to calculate a benchmark for these measures, we first calculated the ratio of the top 10% achievable benchmark to the overall national estimate from BRFSS. We then applied this ratio to the overall national estimates from MEPS or NHIS. For example, if the BRFSS benchmark to national estimate for a measure was 1.5, we would multiply the national estimate for that measure from MEPS by 1.5 to obtain a corresponding benchmark.

Time To Achieve Benchmark

Also new to the 2010 reports are projections of the time expected for population subgroups to achieve the designated benchmark, based on past performance. Using standard linear regression of the actual values over time and extrapolating to future years, we calculated the time required for the population, or population subgroup, to perform at the level of the top-performing States. Since projections of future performance were based on past performance data, it was necessary to ensure reliability by limiting estimates to those cases in which at least three data points were available.

An important caveat to consider in using information on time to achieve benchmarks is that the linear estimation approach used to derive these estimates assumes that characteristics of the population, technology, and health care infrastructure remain constant. Changes in the characteristics of the population or health care system may be expected to alter achievement of benchmarks. Advancements in medical science, changes in the organization of health services, or reductions in the uninsured population following implementation of the Patient Protection and Affordable Care Act (P.L. 11-148) would be expected to alter the performance trajectory. In some cases, the time to achieve the benchmark will drop, while in other cases it may increase.

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Time to achieve the benchmark was not estimated for all measures in the NHQR and NHDR. Time to benchmark is not reported if:

- The average annual rate of change in a measure is less than 1%.
- The time to benchmark is estimated at 25 or more years.
- Trends over time show movement away from the benchmark (these occurrences are mentioned in the reports).
- The direction or trend changes over time; operationally, these were identified as cases in which there are at least 4 years of data showing “upward” movement and at least 4 years of data showing “downward” movement.

Quantifying Disparities

In the Highlights and Priority Populations chapters of the NHDR, the extent of disparities across the core measures is summarized for Black, Hispanic, Asian, Native Hawaiian and Other Pacific Islander (NHOPI), American Indian and Alaska Native (AI/AN), and poor populations. Racial, ethnic, and socioeconomic groups are compared with a designated reference group for each core measure. Each group could receive care that is worse than, about the same as, or better than the reference group. For each group, the percentages of measures for which the group received worse care, similar care, or better care were calculated.

In the Priority Populations chapter of the NHDR, which presents information on each population separately, all core measures with available data are used when summarizing trends in disparities across groups. For example, much less information is available for income groups than for racial and ethnic groups. Rates relative to standard reference groups are used to quantify the magnitude of disparities and to identify the largest disparities specific groups face. For each group, the group rate was divided by the reference group rate to calculate the relative rate for each core measure, with each core measure framed negatively (e.g., for immunization, the likelihood of not receiving the vaccine). Relative rates of selected core measures are presented in the Highlights chapter of the reports.

Presentation of Reports

As in past reports, the NHQR and its companion NHDR continue to be formatted as chartbooks. Each chapter begins with a description of the importance of the topic. After introductory text, charts and accompanying findings highlight a small number of measures relevant to the topic. Where applicable, key findings from the NHDR are included in the NHQR, and NHQR findings are reported in the text of the NHDR. Readers should refer to the report from which results have been drawn to gather additional details on the data presented.

Unless otherwise stated, only those findings that meet the “meaningfulness criteria,” as previously described, are presented in the bullets that accompany each figure. When these data are available and relevant, the NHQR charts show contrasts by:

- Age.^{viii}
- Gender.
- Insurance status.
- Geographic location (rural versus urban).

^{viii} Unless otherwise specified, the NHQR and NHDR define children as individuals under the age of 18; adults include people age 18 and over.

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To the extent that data are available, charts in the NHDR typically show contrasts by:

- Race: Whites, Blacks, Asians,^{ix} NHOPIs, AI/ANs, and people of more than one race.
- Ethnicity: Hispanics and non-Hispanics.^x
- Income: Poor, near poor, middle income, and high income.^{xi}
- Education: People with less than a high school education, high school graduates, and people with at least some college education.

When data support stratified analyses, a figure showing racial and ethnic differences stratified by socioeconomic factors is included. These data are summarized in bullet format. Figures include a note about the reference group for population-based measures and the unit of analysis for measures based on services or events.

Many of the core and composite measures have multiple years of data, so figures typically illustrate trends over time. Figures include a notation about the denominator, which is either the reference population for population-based measures or the unit of analysis for measures based on services or events from provider- or establishment-based data collection efforts.

To systematically identify the relationship between geographic location and quality of care, when possible, findings in the NHQR and NHDR show measures of quality of care for individuals residing along the urban-rural continuum described above.

Defining Individuals With Disabilities

For the purpose of the NHDR, people with disabilities are those with physical, sensory, and/or mental health conditions who also have an associated decrease in functioning in such day-to-day activities as bathing, walking, doing everyday chores, and/or engaging in work or social activities. This is consistent with the Americans With Disabilities Act (ADA) of 1990,^{xii} which defines disability to include “a physical or mental impairment that substantially limits one or more major life activities of such individual” as well as with Federal program definitions based on the ADA.

In displaying the data on disability, paired measures are shown to preserve the qualitative aspects of the data:

- Limitations in basic activities represent problems with mobility and other basic functioning at the person level.
- Limitations in complex activities represent constraints encountered when people, in interaction with their environment, attempt to participate in community life.

^{ix} Asian includes the former category of Asian or Pacific Islander prior to Office of Management and Budget guidelines, when information was not collected separately by group.

^x Not all data sources used in the NHDR collect information by race and ethnicity separately. In such cases, comparisons are made by combining racial/ethnic group categories (e.g., comparing non-Hispanic Blacks and Hispanics with non-Hispanic Whites.)

^{xi} Unless otherwise indicated, throughout this report, poor is defined as having family income less than 100% of the Federal poverty level (FPL); near poor refers to incomes between 100% and 200% of the FPL; middle income refers to incomes between 200% and 400% of the FPL, and high income includes incomes 400% or more of the FPL. These are based on U.S. Census poverty thresholds for each data year, which are used for statistical purposes.

^{xii} 42 U.S.C. 12102.

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The use of paired measures of basic and complex activity limitations is conceptually similar to the way others have defined “disability.” It is also consistent with the International Classification of Functioning, Disability, and Health separation of activities and participation domains. These two categories are not mutually exclusive; people may have limitations both in basic activities and complex activities. Further information can be found in the Individuals With Disabilities or Special Health Care Needs section of the NHDR, in the chapter on Priority Populations.

Table 1.3. Core measures included in the 2010 NHQR and NHDR, by measure characteristic

Measure	Dimension or Type of Care					Composite Measure
	Access	Prevention	Acute Care	Chronic Care	Outcome	
Effectiveness						
Cancer (alternating measures)^{xiii}						
Adults age 50 and over who ever received colorectal cancer screening (colonoscopy, sigmoidoscopy, or proctoscopy)		✓				✓
Rate of advanced stage colorectal cancer per 100,000 adults age 50 and over		✓			✓	
Diabetes						
Hospital admissions for lower extremity amputations per 1,000 adult patients with diagnosed diabetes					✓	
Adults age 40 and over with diagnosed diabetes who received all three recommended services for diabetes in the calendar year (hemoglobin A1c measurement, dilated eye examination, and foot examination)				✓		✓
End Stage Renal Disease						
Adult hemodialysis patients with adequate dialysis (urea reduction ratio 65% or greater)				✓	✓	
Dialysis patients under age 70 who were registered on a waiting list for transplantation				✓		

^{xiii} Cancer measures alternate by year. Data on colorectal cancer are presented in “even year” reports, and data on breast cancer are presented in “odd year” reports.

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Table 1.3. Core measures included in the 2010 NHQR and NHDR, by measure characteristic

Measure	Dimension or Type of Care					Composite Measure
	Access	Prevention	Acute Care	Chronic Care	Outcome	
Heart Disease						
Hospital patients with heart attack and left ventricular systolic dysfunction who received ACE inhibitor or ARB			✓			
Hospital patients with heart failure who received recommended hospital care (evaluation of left ventricular ejection fraction and ACE inhibitor or ARB prescription at discharge, if indicated)			✓			✓
Deaths per 1,000 adult hospital admissions with heart attack					✓	
HIV/AIDS						
New AIDS cases per 100,000 population age 13 and over					✓	
Maternal and Child Health						
Women who completed a pregnancy in the last 12 months who first received prenatal care in the first trimester*		✓				
Children ages 19-35 months who received all recommended vaccines		✓				✓
Children ages 3-6 who ever had their vision checked by a health provider (alternating measure)		✓				
Children ages 2-17 for whom a health provider ever gave advice about the amount and kind of exercise, sports, or physically active hobbies they should have		✓				
Children ages 2-17 for whom a health provider ever gave advice about healthy eating		✓				
Infant deaths per 1,000 live births, birth weight less than 1,500 g*					✓	

*No new data

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Table 1.3. Core measures included in the 2010 NHQR and NHDR, by measure characteristic

Measure	Dimension or Type of Care					Composite Measure
	Access	Prevention	Acute Care	Chronic Care	Outcome	
Mental Health and Substance Abuse						
Adults with a major depressive episode in the last 12 months who received treatment for depression			✓			
People age 12 and over who needed treatment for illicit drug use or an alcohol problem and who received such treatment at a specialty facility in the last 12 months			✓			
Suicide deaths per 100,000 population		✓			✓	
Respiratory Diseases						
Adults age 65 and over who ever received pneumococcal vaccination		✓				
People with current asthma who are now taking preventive medicine daily or almost daily (either oral or inhaler)				✓		
Hospital patients with pneumonia who received recommended hospital care (initial antibiotics within 6 hours of hospital arrival; antibiotics consistent with current recommendations; blood culture before antibiotics are administered; influenza vaccination status assessment/vaccine provision; and pneumococcal vaccination status assessment/vaccine provision)			✓			✓
Patients with tuberculosis who completed a curative course of treatment within 1 year of initiation of treatment			✓		✓	

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Table 1.3. Core measures included in the 2010 NHQR and NHDR, by measure characteristic

Measure	Dimension or Type of Care					Composite Measure
	Access	Prevention	Acute Care	Chronic Care	Outcome	
Lifestyle Modification						
Adult current smokers with a checkup in the last 12 months who received advice to quit smoking		✓				
Adults with obesity who ever received advice from a health provider to exercise more		✓				
Functional Status Preservation and Rehabilitation						
Older women who reported ever being screened for osteoporosis		✓				
Adult home health care patients whose ability to walk or move around improved				✓	✓	
Long-stay nursing home residents whose need for help with daily activities increased				✓	✓	
Supportive and Palliative Care						
Adult home health care patients with shortness of breath				✓	✓	
High-risk long-stay nursing home residents with pressure sores				✓	✓	
Short-stay nursing home residents with pressure sores				✓	✓	
Long-stay nursing home residents with physical restraints				✓		
Patient Safety						
Adult surgery patients who received appropriate timing of antibiotics (prophylactic antibiotics begun at the right time and ended at the right time)			✓			✓
Adults age 65 and over who received potentially inappropriate prescription medications			✓		✓	
Adult surgery patients with postoperative complications					✓	

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Table 1.3. Core measures included in the 2010 NHQR and NHDR, by measure characteristic

Measure	Dimension or Type of Care					Composite Measure
	Access	Prevention	Acute Care	Chronic Care	Outcome	
Bloodstream infections or mechanical adverse events associated with central venous catheter placement					✓	
Deaths per 1,000 discharges potentially resulting from care (failure to rescue)					✓	
Timeliness						
Adults who needed care right away for an illness, injury, or condition in the last 12 months who got care as soon as wanted					✓	
Emergency department visits in which patients left without being seen					✓	
Patient Centeredness						
Children with ambulatory visits whose parents reported poor communication with health providers					✓	✓
Adults with ambulatory visits who reported poor communication with health providers					✓	✓
Access						
People under age 65 with health insurance	✓					
People under age 65 who were uninsured all year	✓					
People with a usual primary care provider	✓					
People without a usual source of care who indicated a financial or insurance reason for not having a source of care	✓					
People with a specific source of ongoing care	✓					
People who were unable to get or delayed in getting needed medical care, dental care, or prescription medicines in the last 12 months	✓					✓