Diabetes Care Quality Improvement: A Resource Guide for State Action

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Foreword

Diabetes Care Quality Improvement: A Resource Guide for State Action and its accompanying *Workbook* were developed by the Agency for Healthcare Research and Quality (AHRQ) as learning tools for all State officials who want to improve the quality of health care. Using State-level data on diabetes care from the 2003 *National Healthcare Quality Report*, this *Resource Guide* is designed to help States assess the quality of care in their States and fashion quality improvement strategies suited to State conditions. The States mentioned in this *Resource Guide* gave permission to use their data for illustrative and comparative purposes so that others could learn by their examples.

Many people for whom these learning tools were intended—State elected and appointed leaders as well as officials in State health departments, Diabetes Prevention and Control Programs, Medicaid offices, and elsewhere—provided comments and feedback throughout the development and finalization process. From this process, we learned that they intend to use the *Resource Guide* and *Workbook* in many different ways: to assess their current structure and status, to create new quality improvement programs, to build upon existing programs, as an orientation for new staff, and to share with their partners such as the American Diabetes Association.

The *Resource Guide* and *Workbook* can serve as a meeting place, where the creative minds of those who struggle with quality improvement can share their expertise, ideas, knowledge, and solutions. The various modules are intended for different users. Senior leaders are responsible for making the case for diabetes quality improvement and taking action (Modules 1, 4, and 6) while program staff would need to provide the information necessary to develop and implement a quality improvement strategy (Modules 2, 3, and 5). The goal, of course, is that all groups of people work on these modules as a team. It is within those discussions and sharing and working together that we hope to achieve what we set out to do—help States improve the quality of diabetes care.

If you have any comments or questions on the *Resource Guide* or *Workbook*, please contact AHRQ's Center for Quality Improvement and Patient Safety, 540 Gaither Road, Suite 3000, Rockville, MD 20850.

Contents

Executive Summary….. v
Introduction: How and Why To Use This Resource Guide…. 1
Purpose of the Resource Guide …. 2
Audiences for the Resource Guide …. 3
Structure and Organization of the Resource Guide …. 3
Module 1: Background – Making the Case for Diabetes Care Quality Improvement 7
The Importance of Diabetes …. 8
The NHQR and NHDR as Resources for State Leaders…. 15
The Quality Improvement Opportunity…. 18
Module 2: Data – Understanding the Foundation of Quality Improvement…. 21
Quality Measurement…. 22
Sources of NHQR Data on Diabetes Care…. 25
Module 3: Information – Interpreting State Estimates of Diabetes Quality… 41
Deriving Information From Data…. 42
Step 1: Identifying Appropriate Metrics and Comparisons… 43
Step 2: Interpreting the Data: What Does It Mean?…. 54
Module 4: Action – Learning From Activities Currently Underway…. 61
Selected Public/Private Quality Improvement Initiatives…. 62
Selected Federal Programs and Resources for Diabetes Care Quality Improvement…. 65
State Approaches to Diabetes Care Quality Improvement … 69
Selected Local Quality Improvement Efforts… 82
Module 5: Improvement – Developing a Strategy for Diabetes Quality Improvement…. 85
A Model for Quality Improvement…. 86
Developing a State Strategy For Improving Diabetes Care Quality…. 90
Integrating Quality Improvement Activities Across Conditions… 92
The Importance of Evaluation… 93
Module 6: The Way Forward – Promoting Quality Improvement in the States 99
What Can State Leaders Contribute to Quality Improvement?... 99
References…. 102
Appendixes:
A. Acronyms Used in This Resource Guide…. 109
B. List of NHQR Data Sources, Including Those Supporting State Estimates… 111
C. Additional Data Resources Related to Diabetes Care Quality 112
D. Benchmarks From the NHQR…. 127
E. Information on Statistical Significance… 131
F. NHQR Quality Measures for All Conditions by State… 134
G. Index of Diabetes Quality Improvement Initiatives…. 148
H. CDC Funding for States' Diabetes Programs, 2003-2004…. 152

Executive Summary

> *"As rates of diabetes increase across the country, roughly tracking with increases in obesity rates, States are quickly approaching a time when budgets will not be able to withstand the pressure of treating the flood of obesity-related diseases. Consequently, while we search for better and more efficient ways of treating diabetes and helping people manage the disease so that costly procedures can be prevented, we must find more ways to create incentives for people to make healthy lifestyle choices. The State that figures out how to do this, while respecting and protecting individual liberties, will be the model for the Nation."*
>
> — An Interview with Governor Mike Huckabee, Arkansas

Health care analysts and researchers have documented extensive gaps between the care that patients receive and what the medical community has determined to be the most effective care. Despite unrivaled technological innovation in American health care, too much of the care that is delivered to patients does not meet the accepted standards of quality. More alarming, abundant research has demonstrated that these gaps in quality are responsible for wasteful, ineffective care, preventable medical complications, avoidable hospitalizations, decreased quality of life, disability, and premature death.

In an era of rising alarm over the cost of health care, it is bewildering that so much of the health care that Americans pay for does not meet accepted standards of quality. When considered in light of the number of preventable deaths and greater disability due to poor quality care, it is intolerable. A growing number of health care analysts and leaders argue that the Nation simply cannot afford to ignore the widespread quality problems that exist in U.S. health care system.

As the lead Federal agency supporting research into the quality, cost effectiveness, and safety of health care, the Agency for Healthcare Research and Quality (AHRQ) is at the forefront of equipping health care professionals, policymakers and leaders with the information they need to address the health care quality gap. The *National Healthcare Quality Report* (NHQR), the *National Healthcare Disparities Report* (NHDR), and this *Diabetes Care Quality Improvement:* A *Resource Guide for State Action* are new tools to meet the challenge of improving the quality of care in America.

The *National Healthcare Quality Report* & *National Healthcare Disparities Report*

In 2003, AHRQ released the first ever *National Healthcare Quality Report* and *National Healthcare Disparities Report*. These reports, mandated by Congress, collected and analyzed national and State-level data from a variety of reliable sources to measure the state of health care quality and health disparities in the Nation.

The data in the NHQR and NHDR demonstrate that the gap between health care research and practice is not just an occasional occurrence but is pervasive throughout health care. It affects all patient groups, even those with the most common medical conditions, and every State. The NHQR and NHDR provide further confirmation that, while in some areas care is improving, the health care system in America has a long way to go before it delivers care that is consistent with accepted guidelines and does not vary significantly by geography, race, ethnicity or socioeconomic status.

Both reports also called for health policy leaders and health care professionals to consider ways to improve the quality of care in the United States and take action to deal with the persistent and costly gaps in health care quality. Ultimately, quality improvement occurs at the front lines of health care – health care professionals and clients enhancing their understanding and changing their actions to align with what evidence has revealed as effective care. State leaders can be catalysts for this change.

States as Key Contributors to Quality Improvement

A number of sources have pointed to States as key contributors to improving the quality of care in America. In two reports, *Crossing the Quality Chasm: A New Health Care System for the 21st Century* and *Fostering Rapid Advances in Health Care: Learning from System Demonstrations*, the Institute of Medicine (IOM, 2001a and 2002) outlined a variety of strategies to advance public policy around quality improvement, including attention to care for chronic diseases. The reports emphasized the role of States along with the Federal Government in quality improvement. Secretary of Health and Human Services Tommy G. Thompson has stated that State-level demonstrations are needed to test a variety of quality improvement approaches, evaluate the effectiveness of different models, and inform national efforts (IOM, 2003a).

There is a great deal that State leaders can do to support and encourage quality improvement, and thereby, to improve health outcomes, reduce the burden of disease, and increase the efficiency of the health care system. As large health care purchasers, guardians of public health and health care innovators, States can champion quality improvement and institute best practices that can transform health care systems. A number of States have already undertaken ambitious quality improvement plans, collecting their own data, and developing and implementing clinical guidelines to help improve quality. The scarcity of reliable data and quality improvement tools suited to the State context have made quality improvement in some cases a complex undertaking for pioneering States.

The Role of This *Resource Guide*

AHRQ has published this *Resource Guide* to assist States with quality improvement efforts. As the NHQR and the IOM reports make clear, chronic diseases present unique quality challenges but also have potential for great improvements in care. Thus, this *Resource Guide* focuses on diabetes, one of the conditions highlighted in the NHQR. Using State-level data on diabetes care from the NHQR, this *Resource Guide* is designed to help States assess the quality of care in their States and fashion quality improvement strategies suited to State conditions. AHRQ hopes to catalyze and equip State health care leaders—governors, State legislators, agency officials, and staff, as well as nongovernmental leaders at the State level such as professional associations, business groups, community organizations and others—to take action to improve the quality of health care in America.

The purpose of this *Resource Guide* on diabetes quality improvement is to:

- Provide an overview of the factors that affect the quality of care for diabetes.
- Present the core elements of health care quality improvement.
- Assist State policymakers and health care leaders in using the data from the NHQR for planning State-level quality improvement initiatives.
- Provide a variety of best practices and policy approaches that national organizations, the Federal Government, and States have implemented related to diabetes quality improvement.

AHRQ, other Federal agencies, national organizations, States, and others have developed a variety of resources that can assist State leaders in enhancing their quality improvement efforts. These resources include clinical research and guidelines for care, measures and data to assess care quality and document improvements over time, and proven policy strategies to improve health care quality. Diabetes is an especially important target for quality improvement efforts because of the current high cost and rate of preventable complications from diabetes, the widely accepted guidelines for care and data measures for tracking improvements in diabetes care, and the variety of promising quality improvement approaches from State diabetes prevention and control programs and other diabetes initiatives.

Diabetes Facts

Description: Diabetes is a group of diseases characterized by the presence of too much glucose in the blood. In type 1 diabetes, the body does not produce enough insulin. In type 2 diabetes, the body may not produce enough insulin or not use insulin properly. Insulin is a hormone produced by the pancreas to move glucose from the blood into the cells. Glucose (also known more commonly as blood sugar) provides energy for cells (CDC, 2003b; American Diabetes Association, 2003)

Prevalence: 18.2 million people, 6.3% of the U.S. population, are estimated to have diabetes.
13 million people are diagnosed; 5.2 million people do not know they have diabetes. (CDC, 2003b)

Cost: $132 billion total cost in 2002, making it the 6th most costly medical condition.
$92 billion in direct medical costs, $40 billion in indirect costs due to lost productivity and death
$13,000 per year in average medical costs for individuals with diabetes.
$2,500 per year for the average patient without diabetes (Hogan, Dall, Nikolov, 2003).

Deaths: 213,062 estimated deaths, making it the Nation's 6th leading killer, although many experts believe the death rate from diabetes is significantly underreported (CDC, 2003c).

Possible Complications:

- Heart disease, hypertension, heart attacks and stroke
- Digestive problems
- Leg and foot ulcers and lower-limb amputation
- Eye problems and blindness
- Kidney disease and kidney failure
- Coma and death
- Other complications—susceptibility to infection; dental disease; skin problems; sexual dysfunction; and increased risk for birth defects if pregnant (CDC, 2003c)

Resource Guide Overview

This *Resource Guide* provides a wealth of information and points to excellent resources to help States develop quality improvement strategies. The *Resource Guide* is divided into six modules. Each deals with a particular component of the quality improvement process. Because officials in different parts of State government have different roles in quality improvement, this guide is designed to meet the unique information needs of a variety of State leaders. Knowing how it is organized, State leaders can review and use the sections that are most relevant and appropriate for them.

- **Module 1: Background – Making the Case for Diabetes Care Quality Improvement** provides an overview of diabetes and quality improvement. It helps to answer the question of why States should care about these issues. State leaders should care because of the following:
    - Increasing prevalence of diabetes and its link to obesity.
    - Seriousness of diabetes complications and their effect on quality of life and productivity.
    - High health care cost of diabetes complications.

- Problems with health care disparities for different groups.
- Proven effectiveness of interventions to prevent type 2 diabetes and delay complications for all types of diabetes.
- Potential for a significant return from investments in improving diabetes quality of care.
- Significant gaps in quality that exist for diabetes care.
- Opportunity for States to develop quality improvement strategies and document improvements in diabetes care through use of data from the NHQR and this guide.

- **Module 2: Data – Understanding the Foundation of Quality Improvement** looks at the importance of data collection in assessing quality and the role of quality measurement. This module will assist State officials by providing:
  - A listing and explanation of a variety of quality measures from the NHQR and NHDR on diabetes care.
  - Data tables and maps that State leaders can use to assess the quality of care in their States
  - Guidance on selecting reliable measures, collecting good data, and the inherent limitations of data sources.
  - Estimates for all 50 States on the direct and indirect costs of diabetes and on the medical care costs related to diabetes for Medicaid.

- **Module 3: Information – Interpreting State Estimates of Diabetes Quality** takes the next step in the quality improvement process by showing State leaders how to turn data into information to answer key questions that should be understood before action is taken. This module examines:
  - Different benchmarks that States can use to assess their States' performance in providing quality diabetes care.
  - NHQR data from different States—Georgia, Massachusetts, Michigan and Washington—that provide State leaders with concrete examples of how one can draw conclusions from the data.
  - Various factors that affect health care outcomes and the delivery of quality care—including socioeconomic factors, biological and behavioral differences, and health system characteristics—and the role these factors play in assessments of health care quality in the States.

- **Module 4: Action – Learning From Activities Currently Underway** provides State leaders with a variety of national, public-private, Federal, State and local resources and best practices in diabetes quality improvement that can inform State efforts. The module provides:
  - Overviews of programs on national diabetes measures, chronic care improvement, and disease and self-management.
  - Overviews of the Federal programs that partner and provide funding for diabetes quality improvement efforts in the States.

- A catalog of State diabetes quality improvement approaches in partnership/planning activities, program development, and dissemination, with examples from a variety of States.

- More extensive profiles of diabetes quality improvement approaches in California, Michigan, Missouri, and North Carolina.

- A worksheet for analyzing current diabetes quality improvement activity in a State.

Diabetes-Related Quality Measures in the NHQR

The NHQR uses two kinds of data measures for diabetes care quality: process and outcome measures. These measures are discussed in Module 2: Data and Appendix C.

Process Measures – based on guidelines for care for a specific condition**.** The NHQR uses five diabetes process measures:

- *HbA1c test*: Percent of adults with diabetes who had a hemoglobin A1c measurement (HbA1c) at least once in the past year
- *Lipid profile*: Percent of patients with diabetes who had a lipid profile in the past two years
- *Eye exam*: Percent of adults with diabetes who had a retinal eye examination in the past year
- *Foot exam*: Percent of adults with diabetes who had a foot examination in the past year
- *Flu vaccination***:** Percent of adults with diabetes who had an influenza immunization in the past year

Outcome Measures – based on patient health status. The NHQR uses two types of outcome measures for diabetes—test results and avoidable hospitalizations—as follows:

- **Test Results:**
  - *HbA1c levels***:** Percent of adults with diagnosed diabetes with HbA1c levels > 9.5 percent (poor control); < 9.0 percent (needs improvement); and < 7.0 percent (optimal control)
  - *Cholesterol levels***:** Percent of adults with diagnosed diabetes with most recent LDL-C level < 130 mg/dL (needs improvement); <100 (optimal)
  - *Blood pressure***:** Percent of adults with diagnosed diabetes with most recent blood pressure <140/90 mm/Hg
- **Avoidable Hospitalizations:**
  - Hospital admissions for adults with *uncomplicated, uncontrolled diabetes* per 100,000 population
  - Hospital admissions for adults with *short-term complications* of diabetes per 100,000 population
  - Hospital admissions for adults with *long-term complications* of diabetes per 100,000 population
  - Hospital admissions for *lower extremity amputations* for patients of all ages with diabetes per 1,000 population

- **Module 5: Improvement – Developing a Strategy for Diabetes Quality Improvement** provides models and tools for State leaders to use in crafting a quality improvement strategy for a given State. The module examines the Plan-Do-Study-Act (PDSA) model, which is used frequently in quality improvement in clinical settings, and adapts that model to State policymaking. Some of the tools and issues covered in this module include:

  - The application of the PDSA model to one State program—the Wisconsin Collaborative Diabetes Quality Improvement Project.

  - A worksheet for assembling and analyzing State-specific data about diabetes and health care quality.

- A PDSA model checklist of steps for designing a State quality improvement strategy that fits with and builds upon current State activities.

- Discussion of the appropriate scope of State quality improvement efforts, either focused on diabetes alone or on diabetes in connection with other health care conditions.

- An overview of the importance of evaluation.

- **Module 6: The Way Forward – Promoting Quality Improvement in the States** concludes the *Resource Guide* and examines the opportunities for States to contribute to improving diabetes care quality, including:

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- Providing leadership and shared vision to inspire others to become involved in improving health care quality.

- Fostering partnerships and collaborations between key parties, such as health care professionals, providers, patients, purchasers, as well as elected and appointed State government leaders and State government experts on diabetes..

- Fostering planning and setting goals that includes specific steps and deliverables so that partners move together.

- Enhancing measurement and reporting to identify the most troublesome areas and prioritize resources and attention to those areas that most need improvement. .

- Improving the infrastructure of health care quality through attention to professional education, data systems, financing and delivery systems, research, and patient education resources, among others.

- Including evaluation and accountability to track how well or poorly a quality improvement intervention is working and the health care system is performing.

- Creating incentives to reward the delivery of high quality care.

This *Resource Guide* is designed to demonstrate for State leaders the need for quality improvement in diabetes. It also provides data, information, best practices and quality improvement tools that can assist State leaders in crafting diabetes quality improvement strategies.

Much has already been done by States, but data from the NHQR show us that much remains to be done to achieve quality care for all people with diabetes. By reviewing and analyzing this *Resource Guide*, assessing the local context, and designing a diabetes quality improvement strategy, State leaders can identify opportunities to make a difference in the quality of care their constituents receive. The experiences of States that have implemented quality improvement for diabetes care provide valuable insights into what can be accomplished through innovative, visionary efforts by State leaders.

Introduction: How and Why To Use This *Resource Guide*

Three and one-half years ago while waiting in an examining room during a routine doctor's visit, Representative Dan Bosley of Massachusetts was reading a poster on the wall of the doctor's office. As he read the poster, a strange thing occurred. He recognized some remarkable similarities between the disease described in the poster and some symptoms he was experiencing. When his doctor came in to do the exam, Rep. Bosley mentioned that he had the symptoms described in the poster. His doctor laughed and said that those symptoms could be warning signs for a lot of things. Fortunately, the doctor performed a blood test. That is how Rep. Bosley found out he had type 2 diabetes. At the time of his diagnosis, Rep. Bosley's blood sugar or glucose level was 250, significantly above normal.

Rep. Bosley has had to make adjustments to his life to deal with his diabetes. He takes medication, checks his blood glucose, and monitors his eating every day. He has to be cautious about taking other medications that may interact with either his diabetes medication or affect his blood glucose adversely. Having diabetes also means he has to be careful about cuts that do not heal and make sure that his eyes, feet and hemoglobin A1c levels, the average blood glucose level over the previous 2-3 months, are checked yearly. He also must worry about his blood pressure and cholesterol.

Rep. Bosley has learned how diabetes affects his life on a daily basis. He states, "Although my lifestyle as a legislator makes it difficult at times, through changes in my daily routine, an exercise regimen, and a better diet, I find that I can control my blood levels to the point where I lead a pretty normal life."

— An Interview with Representative Daniel Bosley of Massachusetts

For many years, leading health care analysts and researchers have recognized that the quality of health care delivered by the American health care system is varied. While producing unrivaled innovation and new medical treatments, in other ways the U.S. health care system has difficulty routinely and consistently translating research into practice, adhering to guidelines for proper care, and improving health care outcomes. This is particularly true of diabetes care and care for other chronic diseases (McGlynn, Asch, Adams, et al., 2003).

As the lead Federal agency charged with providing research on health care quality, outcomes, and efficiency, the Agency for Healthcare Research and Quality (AHRQ) recently released the first annual *National Healthcare Quality Report* (NHQR) and the first annual *National Healthcare Disparities Report* (NHDR). Commissioned by Congress, these reports provide extensive data on the state of health care quality in the United States. The NHQR highlighted both important gains and continuing challenges to health care quality in America. In particular, the NHQR found strong evidence of wide variation in the quality of care for many diseases and conditions, including diabetes. The report makes clear that there is a sizable gap between what experts recognize as the central elements of quality care and the care that patients actually receive. The NHDR also found that differences in health care quality exist across racial, ethnic, geographic, and socioeconomic groups.

The NHQR and NHDR were not the first reports to document significant gaps in quality in the U.S. health care system. In the groundbreaking report, *Crossing the Quality Chasm: A New Health Care System for the 21st Century*, the Institute of Medicine (IOM) issued a call to action to every actor in health care to address this chasm. The IOM specifically called on AHRQ to identify and foster research on the 15 most expensive medical conditions in order to focus quality improvement efforts.

To stimulate efforts to improve the quality of care, AHRQ has published this *Resource Guide* on diabetes quality improvement aimed at a variety of State and local health care policymakers and leaders. State leaders in particular can play a key role in championing and fostering health care quality improvement. This Resource Guide also focuses on diabetes as a natural target for quality improvement. The high cost of diabetes complications—their long term effect on individual quality of life, the high treatment costs, the fact that they are largely preventable, and the possibility for a sizable return on investment—provide inherent incentives for State leaders to assess the diabetes care in their State and identify opportunities for quality improvement.

Purpose of the *Resource Guide*

The purpose of this Resource Guide is to:

- Provide an overview of the factors that affect the quality of care for diabetes.
- Present the core elements of health care quality improvement.
- Provide data from the NHQR on diabetes to inform State decisionmaking.
- Offer a variety of best practices and policy approaches to diabetes quality improvement
- Assist policymakers and others in planning State-level quality improvement initiatives.

AHRQ's *National Healthcare Quality Report* and *National Healthcare Disparities Report*

The NHQR, released in December 2003, is a call for all health care professionals to consider ways to improve the quality of care in the United States. The report offers the first national consensus measures for quality and the Federal Government's baseline for those measures. The NHQR chronicles the gap between actual medical practice and evidence-based practice guidelines. It addresses:

- Objectives of high quality health care: effectiveness, safety, timeliness, and patient centeredness (IOM, 1999).
- The life-cycle spectrum of health care requirements: staying healthy, getting better, living with illness or disability, and end-of-life care (IOM, 1999).
- Nine major priority areas: cancer, end stage renal disease, diabetes, heart disease, HIV and AIDS, maternal and child health, mental health, respiratory diseases, and nursing home and home health care.
- A total of 147 measures of specific "good practice" processes and outcomes of care.

The NHDR, also released in 2003, uses the same framework and measures to report on health care quality by racial/ethnic and socioeconomic groups. It also measures access to health care for these subgroups. Although the NHDR does not report by State, it provides national baselines of quality and access measures for these vulnerable subgroups. These are valuable comparisons for how diverse populations are treated in a State.

The NHQR can be found at: http://www.qualitytools.ahrq.gov/qualityreport/download_report.aspx.

The NHDR can be found at: http://www.qualitytools.ahrq.gov/disparitiesreport/download_report.aspx.

State leaders may lack State-specific data and research evidence that can be easily synthesized and presented appropriately to inform decisionmaking. The NHQR, the NHDR and AHRQ are rich resources for providing both national and State data on health care quality. Using data collected from the NHQR and the NHDR, this *Resource Guide* will help State leaders understand the issues surrounding diabetes quality improvement, evaluate the quality of diabetes care, and construct quality improvement plans that are suited to each State's context. AHRQ has developed this guide to provide States with the resource information, framework, and guidance to help them understand the issues involved in implementing a quality improvement program.

Audiences for the *Resource Guide*

The delivery of high quality care happens in the clinical setting. Thus, quality improvement efforts ultimately need to affect what happens in a doctor's office, hospital, or other health care setting. Even so, State leaders and policymakers can have an enormous impact on health care. They can create a vision that inspires action and change. They can involve strategic partners and champions who can reach the front lines of health care. They can assemble information that grabs the attention of health care providers at the local level, just as the NHQR does at the national and State level. As purchasers and regulators, States can supply incentives for providers to make the changes necessary to improve the quality of health care. Through State leadership, health care improvement strategies can be fashioned more meaningfully for State and local health care markets.

Thus, the audiences for this *Resource Guide* include:

- **State elected leaders**—Governors, legislators and their staff who provide leadership on health policy.

- **State executive branch officials**—Executive office appointees and career staff charged with taking action on important health issues, such as State health department, Diabetes Prevention and Control Program (DPCP), and State Medicaid officials.

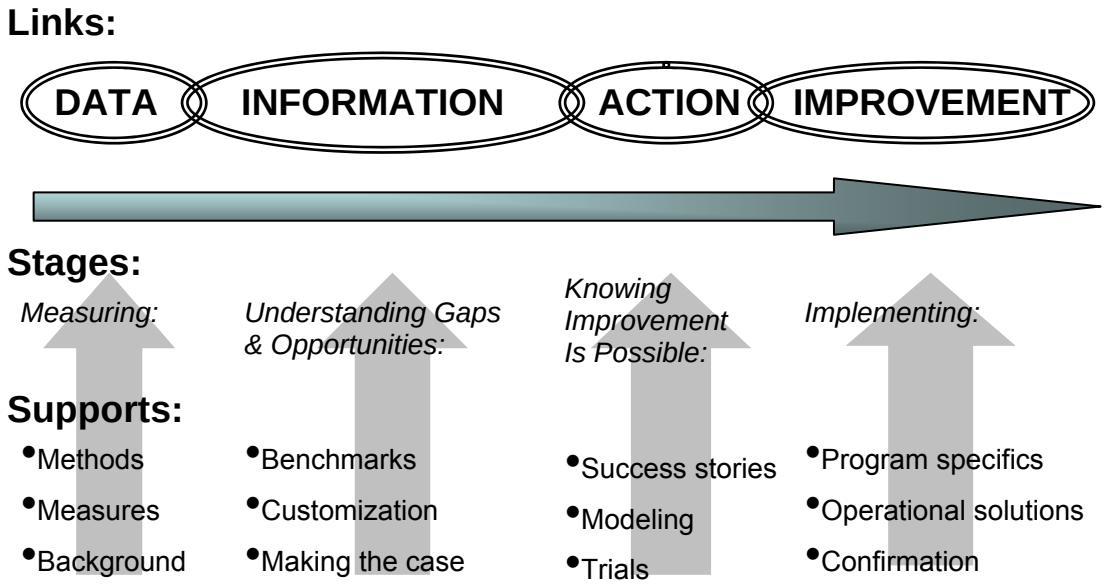
- **Other nongovernmental State and local health care leaders**— Members of professional societies, provider associations, quality improvement organizations, voluntary health organizations, health plans, business coalitions, community organizations, consumer groups, and others who want to stimulate action on health care quality improvement at the State level.

Structure and Organization of the *Resource Guide*

Figure I.1 provides a macro-level view of the major components that State policymakers need to effect quality improvement (McNeill and Kelley, 2004). The model begins with gathering data and moves through generating information from those data for specific audiences, then into appropriate action to effect change, and finally to the intended outcome—improvement. This conceptual framework shows the links or stages in the quality improvement process that health system professionals must navigate to accomplish real change. The *Resource Guide* is divided into separate modules that tackle each of these stages in the quality improvement continuum. Each module provides an explanation of the stages as well as tools that State leaders can use to move to the next stage in the quality improvement process.

To assist State leaders with finding the information they need in this guide, the beginning of each module has an outline of the contents and key ideas. Each module ends with a summary and synthesis to demonstrate how to use the module to move to the next step. Also, a resource list for further reading and a discussion of associated appendixes are included where applicable.

Figure I.1
The Quality Improvement Process:
Links, Stages of Change, and Information Supports



Source: McNeill and Kelley, 2004.

State leaders in different parts of State government have different roles in quality improvement. This *Resource Guide* attempts to reach a variety of State leaders who have key and different contributions to make to the quality improvement process. Once users know *how* the guide is organized, they can skip to the sections that are most relevant and appropriate for them. For instance, the first module provides an overview of the issues and is designed specifically for senior level elected and appointed officials. Subsequent modules, by contrast, provide more in-depth information for specialists and technical staff such as Diabetes Prevention and Control Program staff, legislative and policy analysts, quality improvement specialists, and health data officials.

The modules are organized as follows:

- **Module 1: Background** helps to answer the following questions: What is diabetes? What is quality improvement? Why should States care about these issues? How can States be involved in diabetes quality improvement?

- **Module 2: Data** looks at the importance of data collection in assessing quality and the role of quality measurement and examines a variety of data sources on diabetes care quality that State leaders can use to assess the quality of care in their States. It specifically provides process and outcome measures and estimates from the NHQR and NHDR on diabetes care. Module 2 also provides guidance on selecting reliable measures and collecting good data and discusses the inherent limitations of particular data sources. Finally, the module presents data estimates on the direct and indirect costs of diabetes, including the cost to Medicaid, for each State.

- **Module 3: Information** takes the next step in the quality improvement chain by showing State leaders how to turn data into information to answer key questions that should be understood

before action is taken. This module examines the different benchmarks that States can use to assess their States' performance in providing quality diabetes care. An analysis using NHQR data from four States—Georgia, Massachusetts, Michigan, and Washington—provides State leaders with concrete examples of how one can draw conclusions from the data that can motivate local action. The module also analyzes various factors that affect health care outcomes and the delivery of quality care, including socioeconomic factors, biological and behavioral differences, and health system characteristics, and the role these factors play in assessments of health care quality in the States.

- **Module 4: Action** provides State leaders with a variety of tools and examples from diabetes care quality initiatives that can inform State efforts. The module will provide an overview of a variety of national, public-private, Federal, State, and local diabetes quality improvement initiatives. Analyzing State action on diabetes quality improvement, the module provides a catalog of State approaches with brief examples from a variety of States, followed by profiles of diabetes quality improvement approaches in California, Michigan, Missouri, and North Carolina.

- **Module 5: Improvement** provides models, tools and checklists for State leaders to use in crafting a quality improvement strategy for a given State. The module examines the Plan-Do-Study-Act model, which is used frequently in quality improvement in clinical settings, and adapts that model to State policymaking.

- **Module 6: The Way Forward** concludes the *Resource Guide* and examines the opportunities for States to contribute to improving diabetes care quality.

In general, as State leaders begin the process of quality improvement, they must make several key decisions. This *Resource Guide* provides guidance related to each of the following decision points:

1. **Make quality improvement a priority.** Module 1: Background provides evidence to use in making the case for diabetes care quality improvement.
2. **Decide on a general topic areas for analysis.** This is discussed in Module 2: Data.
3. **Identify measures that address the topic.** Module 2: Data describes the NHQR measures that address diabetes care quality.
4. **Develop an inventory of data sources for the State or locality.** This is pointed out in Module 2: Data.
5. **Determine benchmarks for the measures selected.** Module 3: Information explains and identifies benchmarks from the NHQR.
6. **Conduct or commission analyses to create information that addresses the questions raised.** Module 3: Information discusses creation of information from data.
7. **Utilize an existing—or develop a new—advisory group, committee, or workgroup focused on quality improvement.** This is reviewed in Module 4: Action. An advisory group with internal and external members can help refine the topic, design the program, identify data and information needs, recommend action, and champion the cause.
8. **Find resources to develop and support the initiative.** Ideas for how to find financial support for diabetes quality improvement are discussed in Module 4: Action. Sources for information resources are noted throughout the guide.
9. **Design and take action aimed to improve quality.** Module 4: Action recounts a wide array of activities that have been undertaken by State governments in the area of diabetes care quality.

10. **Evaluate the result.** Module 5: Improvement discusses evaluation activities needed to assess the successes and challenges of quality improvement efforts.

Module 6: The Way Forward concludes this *Resource Guide* by summarizing the key elements necessary in State efforts to promote diabetes care quality improvement.

Module 1: Background – Making the Case for Diabetes Care Quality Improvement

About three years ago, New Hampshire State Representative Fran Wendelboe discovered that she had pre-diabetes. She tried controlling her diet, losing weight and monitoring her blood glucose on her own, but her hectic schedule as an elected official and times of stress made this difficult. One morning she experienced trouble seeing and knew that she needed to see her doctor.

"It was time for me to stop avoiding an official diagnosis and get serious, actually past time," stated Representative Wendelboe. "I am now on medication twice a day, but I am still struggling with my crazy schedule and regular meal times. This is not simple, even knowing that the stakes are high."

– An Interview with Representative Fran Wendelboe of New Hampshire

Module Overview:

1) The Importance of Diabetes – Why should State leaders prioritize diabetes?
    a. Rising prevalence
    b. Long-term complications
    c. High costs
    d. Disparities in care
    e. Effectiveness of interventions
    f. Potential for return on investment
2) The NHQR and NHDR as Resources for State Leaders
    a. Gaps between recommended care and care received
    b. Variation in care across States
    c. Variation in care across population groups
3) The Quality Improvement Opportunity
4) Summary and Synthesis
5) Resources for Further Reading
6) List of Associated Appendixes for Use With This Module

Key Ideas in Module 1:

- States have an established role and interest in preventing and improving care for diabetes due to the complications associated with diabetes as well as its costs, increasing prevalence, and problems with disparities in care.
- Increasingly, research evidence points to the potential for cost savings and improved quality of life from investments in improved diabetes care quality.
- The *National Healthcare Quality Report* and *National Healthcare Disparities Report* are new resources that State leaders can use to assess diabetes care quality in their States and devise quality improvement plans.

The Importance of Diabetes

Diabetes is a serious chronic illness that affects a growing number of people in the United States every year. More than 18 million people have diabetes. One of the Nation's leading killers, diabetes is a costly, chronic disease that, if not diagnosed and treated properly, over the course of time can lead to serious complications such as heart disease, stroke, blindness, lower-limb amputation, kidney failure, disability, and premature death.

For many patients, it is years before they notice the warning signs of diabetes and are diagnosed. Still others who are diagnosed lack adequate treatment and do not know how to manage their disease well over time. Furthermore, the separate care environments that people with diabetes must navigate due to the nature of their disease – eye, foot, heart, and various internal medicine specialists, just to name a few – mean that it is difficult for them to consistently receive the most effective care over time.

What is diabetes?

Diabetes is a group of diseases characterized by the presence of too much glucose in the blood. In type 1 diabetes, the body does not produce enough insulin. In type 2 diabetes, the body may not produce enough insulin or not use insulin properly. Insulin is a hormone produced by the pancreas to move glucose from the blood into the cells. Glucose (also known more commonly as blood sugar) provides energy for cells.

Type 1 diabetes usually begins in childhood and occurs when the cells that produce insulin are destroyed; this type of diabetes accounts for 5 percent to 10 percent of all diagnosed cases.

Type 2 diabetes occurs as the body develops insulin resistance or the pancreas loses the ability to produce insulin. Type 2 diabetes is associated with both genetic and behavioral factors including age, obesity, physical inactivity, family history of diabetes, among other factors. Certain racial and ethnic groups are particularly at risk for diabetes, including African American, Latino, American Indian, and Native Hawaiian populations. Normally seen in adults, type 2 diabetes is on the rise in children and young adults. This type of diabetes accounts for 90 percent to 95 percent of all diagnosed cases of diabetes.

Gestational diabetes is caused by glucose intolerance that develops in some women during pregnancy. Women with gestational diabetes are at increased risk of developing type 2 diabetes after pregnancy.

People with the condition known as **prediabetes** have an increased risk of developing diabetes. Those with prediabetes have impaired fasting glucose and/or impaired glucose tolerance. The CDC estimates that as many as 41 million adults had prediabetes in 2000. Studies indicate that the progression from prediabetes to diabetes is not inevitable. People with prediabetes can prevent or delay the onset of type 2 diabetes with weight loss and increased physical activity.

Once a person develops diabetes, there is currently no cure. Diabetes must be managed through proper treatment in order to avoid complications.

Source: CDC National Diabetes Fact Sheet (CDC, 2003b).

Why Should State Leaders Prioritize Diabetes?

As protectors of the public's health, State governments play a vital role in preventing and controlling this disease. Every State has public resources invested in a Diabetes Prevention and Control Program that is working to improve care for diabetes, although the level of investment varies from State to State. As health care purchasers, States are responsible for ensuring that the health care they pay for on behalf of State employees, Medicaid clients, and other recipients meets appropriate standards of quality.

State leaders are called to pay attention to many important issues during the course of their work. Making critical determinations of the relative resources and attention that each issue should receive is vitally important for State leaders. There are a number of reasons why States may want to take a closer look at diabetes, including:

- The rising prevalence of the disease (graphically represented in Figure 1.1), including increases among children and adolescents, driven by an aging and increasingly obese population.

- The long-term complications that can be prevented if diabetes is diagnosed early and treated appropriately over time.

- The high health care cost of diabetes, primarily its complications and the loss of economic productivity when disability or premature death occurs.

- The disparities between various racial and ethnic groups in quality of diabetes care.

- Interventions and treatment that can prevent type 2 diabetes and control the development of complications for type 1 and type 2 diabetes.

- The potential for return on investment for purchasers and the health care system as a whole through diabetes quality improvement.

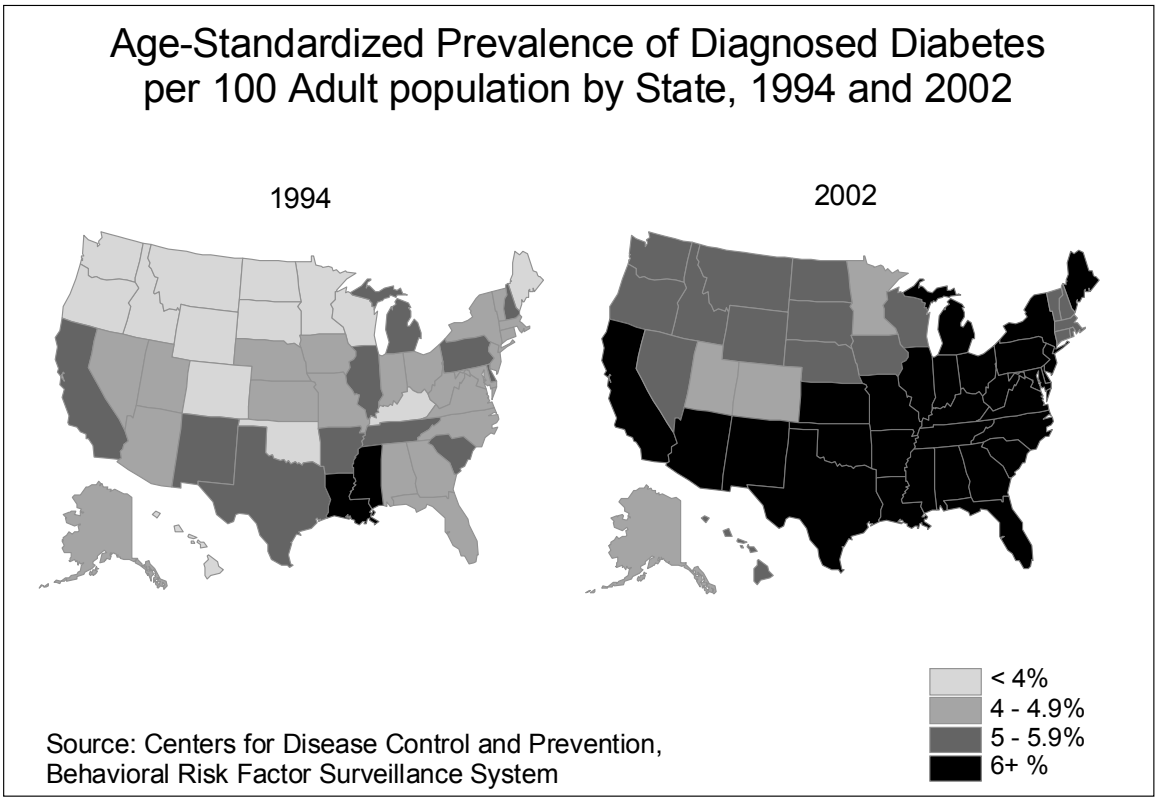
Rising Prevalence

According to the Centers for Disease Control and Prevention (CDC), diabetes currently affects over 18 million people, or 6.3 percent of the total population (CDC, 2003c). Of those estimated to have the disease, more than 5 million people do not know they have it (CDC, 2003c). Another 41 million people are estimated to have prediabetes, a term used to describe the condition of having an increased risk of developing type 2 diabetes (CDC, 2003b).

Trend data indicate that diabetes is rising at a rate faster than population growth would alone indicate (CDC, 2003a; Mokdad, Ford, Bowman, et al., 2000). The development of diabetes has been strongly linked with obesity, aging, and the increasing racial and ethnic diversification of the population (Ford, Williamson, Liu, 1997; Resnick, Valsania, Halter, et al., 2000). Diabetes affects older persons more frequently than younger populations. Of those over 65 years of age, 16 percent have diabetes, whereas diabetes affects 2 percent of people between 20 and 44 years of age (Freid, Prager, MacKay, Zia, 2003). The prevalence of diabetes is also higher among certain racial and ethnic groups, including blacks and Hispanics (AHRQ, 2003b). Without intervention now to prevent and control the onset of diabetes, rates could increase significantly as the large number of baby boomers move into retirement and live longer.

In addition to the aging of the population, the dramatic rise of obesity in the U.S. population is also increasing the incidence of diabetes, especially among children (Mokdad, Ford, Bowman, et al., 2003). Since 1991, obesity rates have grown by 74 percent and diabetes rates have grown by 61 percent (CDC, 2003). Type 2 diabetes used to be called adult onset diabetes because it almost never occurred in children and young people. As childhood obesity has increased, the incidence of type 2 diabetes in children and young people has increased as well. A CDC study estimates that as many as one in every three children born in 2000 will develop diabetes, if serious changes do not occur in diet, weight and exercise in the American population (Narayan, Boyle, Thompson, et al., 2003). The earlier that diabetes develops the more likely that a patient will develop complications and die prematurely.

Figure 1.1



Long-Term Complications

Diabetes ranks as the Nation's sixth leading cause of death, at a cost of 200,000 lives a year (CDC, 2004). Experts believe that this death rate is underreported because of the number of significant comorbidities associated with diabetes, such as heart disease, stroke, and kidney disease that may be coded as the cause of death instead of the diabetes (CDC, 2003c).
The presence of too much glucose in the blood causes damage to blood vessels and, subsequently, to nerves, organs, and tissues; over time this results in various long-term complications, including:

- **Heart disease, hypertension, heart attacks, and stroke** – People with diabetes are at increased risk for high blood pressure and harmful levels of cholesterol. As a result, they also face increased risk of having a heart attack or stroke. Adults with diabetes have death rates from heart disease that are 2 to 4 times greater than those without diabetes (CDC, 2003c). A person with diabetes has the same high risk for a heart attack as a person who has had a previous heart attack (Haffner, Lehto, Ronnemaa, et al., 1998).
- **Nerve damage** – Nerve damage can lead to loss of feeling in the feet and legs, stomach and digestion problems, sexual dysfunction, carpal tunnel syndrome, and other nerve problems. As many as 70 percent of people with diabetes have some form of nerve damage (CDC, 2003c).
- **Ulcers and lower limb amputation** – Nerve damage and circulation problems in the feet and legs can contribute to sores and ulcers developing in these areas. Diabetic wounds often have trouble healing. Uncontrolled infections in the lower limbs can result in the need to amputate toes, a foot, or a leg. More than 60 percent of the amputations unrelated to trauma occur in people with diabetes, making it the leading cause of nontraumatic amputation (CDC, 2003c).

- **Eye problems and blindness –** The small blood vessels in the eye can become damaged, leading to blurred vision, increased risk for glaucoma and cataracts, damage to the retina and blindness. Diabetes is the leading cause of new cases of blindness among adults between 20 and 74 years of age (CDC, 2003c).
- **Kidney disease and kidney failure –** Damage to the fine blood vessels that are responsible for filtering wastes from the body can harm the kidneys. If enough damage occurs, the kidneys fail. This failure, called end stage renal disease (ESRD), means that individuals must undergo dialysis or a kidney transplant to survive. Diabetes is responsible for 44 percent of new cases of ESRD, making it the leading cause of this disease (CDC, 2003c).
- **High and low blood glucose levels** – Glucose levels in the blood that are too high or too low can cause people with diabetes to experience a number of sudden problems, including shakiness, blurred vision, nausea, and vomiting. In serious cases, these imbalances can result in coma and death.
- **Other complications** – Diabetes also increases the incidence of dental disease and skin problems, increases the risk of infection, and poses an increased risk for birth defects if pregnant (CDC, 2003c; CDC, 2004).

None of the complications listed above is an inevitable outcome of having diabetes. With quality care and proper self-management, individuals with diabetes can prevent or delay the onset of these complications (CDC, 2004).

High Cost of Diabetes

In 2002, diabetes cost the United States $132 billion. Of this, $92 billion was spent directly on medical care, while $40 billion was the indirect cost associated with disability, diminished productivity and premature mortality. Almost 20 percent of health care spending goes to treat people with diabetes (Hogan, Dall, Nikolov, 2003).

Diabetes is the sixth most expensive condition nationally (Cohen and Krauss, 2003). On average, medical expenditure for a person with diabetes in 2002 cost more than $13,000 per year versus just $2,500 for the average person without diabetes (Hogan, Dall, Nikolov, 2003). About half of the lifetime health care costs for patients with diabetes are related to potentially preventable complications (Herman and Eastman, 1998).

Low-income populations for which States provide health care assistance are very vulnerable to the complications of diabetes. Medicaid pays 10.3 percent of the costs for treating diabetes, compared with 6.4 percent for heart disease and 4.6 percent for cancer, the two most expensive medical conditions (Cohen and Krauss, 2003). To control Medicaid spending, States have a financial stake in encouraging providers to give high quality care to Medicaid recipients with diabetes (Faulkner, 2003). Recognizing this reality, more than 20 State Medicaid programs are using disease management as a means to control costs while improving quality (Brown and Matthews, 2003). Module 2: Data presents two data tables with estimates of the total costs of diabetes for all 50 States and also costs just for Medicaid populations in all 50 States. These estimates are derived from the size of the population and estimates of diabetes prevalence and costs per person with diabetes based on judgments from published research.

In addition to Medicaid, private health plans and employers across the Nation are increasingly looking to wellness programs, disease management, and case management for diabetes as strategies to control health care costs. State governments, too, have struggled with rising health insurance costs for State employees. States, as employers, have financial incentives to help employees, dependents, and retirees also avoid the consequences of complications of diabetes. Moreover, for people with diabetes who are uninsured or who

lack drug coverage, the costs of treating this disease can be a crushing financial burden. As a result, patients may forgo needed medications or other care, thus increasing their chances for costly complications later (IOM, 2001c).

Disparities in Health Care

Significant differences exist between racial, ethnic, and socioeconomic groups in health outcomes for diabetes (AHRQ, 2003b; IOM, 2003b). For instance, the NHDR found that blacks, American Indians, and Hispanics have higher death rates for diabetes than whites. Poor glycemic (or blood sugar) control, serious complications from diabetes, and hospitalization for complications were also more common in blacks than other racial and ethnic groups. People with diabetes who had lower socioeconomic status were also less likely to receive recommended care, such as eye exams, and were more likely to be hospitalized for diabetes complications (AHRQ, 2003b). Such disparities may be due to barriers to health care access, generally. Overcoming these barriers, such as lack of insurance coverage or ineligibility for public health programs, is a substantial challenge for many individuals with diabetes.

States and the Federal Government have actively sought to address health care disparities as an issue of equity in the health care system. Disparities also raise questions regarding the effective use of resources. Care for low-income individuals who are hospitalized due to diabetes complications is often financed by public sources such as Medicaid and uncompensated care funds. Ensuring effective care can help people with diabetes to remain healthy and productive, prevent complications, and reduce health care costs.

Effectiveness of Interventions

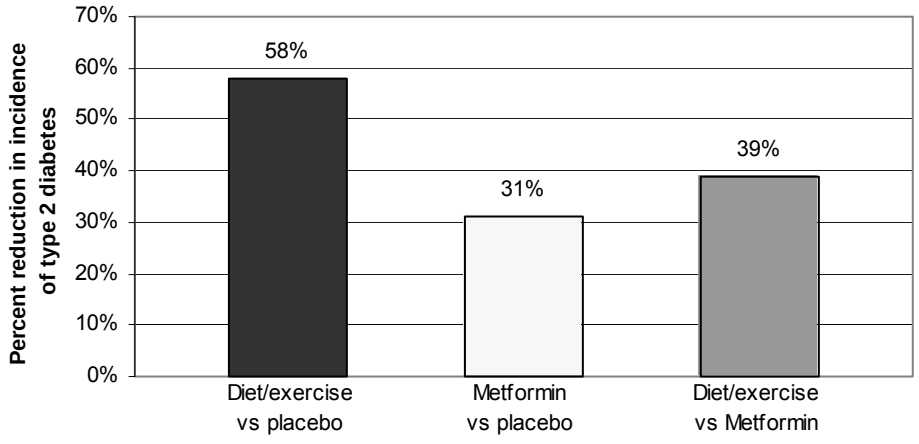
Diabetes has tremendous impact on both public and private health care spending and on the quality of life for those diagnosed with the disease. Yet type 2 diabetes, the most common form of diabetes, can be prevented and controlled. It is not inevitable that more Americans develop diabetes as they age, nor is it inevitable that people with diabetes experience the long-term complications such as lower limb amputations, kidney failure, and premature death.

Research indicates that diabetes prevention works. Weight control and regular exercise can prevent or delay the onset of type 2 diabetes. The Diabetes Prevention Program was a randomized clinical trial comparing diet, exercise and treatment with metformin, a drug used to control blood glucose levels, in 3,234 patients (Knowler, Barrett, Connor, et al., 2002; Diabetes Prevention Program Group, 2003). Conducted by the National Institute of Diabetes and Digestive and Kidney Diseases, the trial demonstrated that changes to diet and a moderate increase in physical activity reduced the development of diabetes by 58 percent over 3 years; diet and exercise were more effective than drug treatment in reducing diabetes (Figure 1.2). Similar studies performed in China and Finland have also demonstrated substantial reductions in the development of type 2 diabetes through improved diet and exercise among participants at risk for the disease (Pan, Li, Hu, 1997; Tuomilehto, Lindström, Eriksson, et al., 2001).

Other studies have shown that proper health care and patient empowerment can help control and minimize the complications of diabetes for those who already have the disease. The Diabetes Control and Complications Trial (DCCT) Research Group studied individuals with type 1 diabetes and found that intensive treatment for diabetes reduced eye disease by 76 percent, nerve disease by 60 percent, and two forms of kidney problems by 39 and 54 percent (DCCT, 1993). Another large, longitudinal study performed in the United Kingdom found that aggressive treatment to lower blood glucose in patients with type 2 diabetes resulted in the reduction of eye disease and kidney disease by 25 percent. The same study showed that reductions in HbA1c levels was associated with a 35 percent reduction in damage to eyes, kidneys, and nerves and a 25 percent reduction in the risk of premature death from diabetes (UK Prospective Diabetes Study Group, 1998).

Patient self-management is particularly important for managing diabetes and preventing complications. Studies have demonstrated that patient self-management programs are effective tools for improving patient outcomes. One Stanford University study funded by AHRQ found that over a 2-year period participants in a chronic disease self-management program showed reductions in health distress, made fewer visits to the doctor's office and emergency room, had not experienced any further increases in disability and had increased self-efficacy (Lorig, Ritter, Stewart, et al., 2001). Systematic reviews of the literature on self-management programs for diabetes found positive effects on patients' knowledge, self-monitoring of blood glucose, diet, and glycemic control (Norris, Nichols, Caspersen, et al., 2002; Norris, Engelgau, Narayan, 2001).

Figure 1.2. Results of the Diabetes Prevention Program Study



Source: Knowler et al., 2002. Randomized clinical trial with average 2.8-year follow-up period.

State Diabetes Prevention and Control Programs, funded partially by CDC, have been associated with noticeable improvements in diabetes prevention and treatment; State DPCPs raise awareness of diabetes, primary and secondary prevention, and quality improvement. North Carolina's Project DIRECT in its first year of operation helped increase diabetes patient counseling for foot care from 20 to 50 percent. Medical chart reviews showed improvement in monitoring of blood glucose, recommended screenings, and diabetes education. In New York State, work with community and university partners helped to reduce hospitalization rates for diabetes by 35 percent and lower-extremity amputation by 39 percent (CDC, 2003d). From 1996 to 2001, Michigan's diabetes program increased significantly the number of recommended tests and screenings that people diagnosed with diabetes received. Hemoglobin A1c (HbA1c) tests increased from 14 to 78 percent, and foot exams increased from 58 to 77 percent. In addition, patients reported improved exercise and dietary planning (CDC, 2003e).

Ample research and experience from State DPCPs demonstrate that there are successful tools for delaying and potentially preventing the development of type 2 diabetes, managing both type 1 and type 2 diabetes effectively and preventing the long-term complications that are responsible for high treatment costs and diminished quality of life for people with diabetes.

Potential for Return on Investment

Because diabetes can result in expensive long-term complications, public health experts argue that investing in diabetes prevention and control initiatives today can improve health outcomes and reduce

health care costs. Although the business case for diabetes prevention and quality improvement is still being developed, a number of studies and the experience of both public and private payers show promising signs regarding the return on investment.

A comprehensive economic analysis of the literature on 17 common diabetes interventions sought to answer whether research has determined if diabetes prevention and treatment is cost effective for society. The study ranked diabetes interventions based on whether the interventions were clearly cost saving, clearly cost effective, possibly cost effective, not cost effective or unclear. The study determined a number of areas in which the benefits of diabetes prevention and treatment provide a clear return on investment, including eye screening and treatment, prenatal care, kidney disease prevention, and improved control of blood glucose. The study found no diabetes treatments with costs that outweighed the benefits (Klonoff and Schwartz, 2000).

Other convincing evidence that quality improvement for diabetes pays off comes from studies of more intensive and comprehensive treatment. Two studies analyzed the treatment costs of more intensive versus conventional care for diabetes, one for type 1 and the other for type 2. Both studies were based on the Diabetes Control and Complications Trial, a randomly controlled clinical trial of intensive therapy for type 1 diabetes, compared to traditional, less frequent treatment and contacts. The trial found that intensive therapy averted complications of the disease (DCCT Research Group, 1990). The two derivative studies simulated the lifetime costs of diabetes—one for type 1 (DCCT Research Group, 1996) and the other for type 2 (Herman and Eastman, 1998). The researchers reached similar conclusions. Even at two to three times the expense of conventional therapy, the lifetime costs of improved care were offset by the lifetime costs of blindness, end-stage renal disease, and lower extremity amputations.

A study of comprehensive care for diabetes in a managed care environment demonstrated cost savings in as little as a 3-year period (Sidorov, Shull, Tomcavage, et al., 2002). The program, designed for six chronic diseases, found per member per month paid claims averaged $394.62 per enrollee with diabetes in the comprehensive care program compared to $502.48 per enrollee with diabetes not in the program. That was a total saving for the health plan of $4.3 million in paid claims annually for diabetes care, which compared very favorably with an estimated $1.81 million cost (including capital expenses) of the disease management program attributed to diabetes care. These cost reductions were accompanied by a higher proportion of diabetes patients receiving recommended tests and monitoring.

Another analysis of the business case for diabetes disease management conducted by Harvard University for the Commonwealth Fund found that the two health plans studied were able to cover the costs of their investment in diabetes disease management programs, but did not save a significant amount of money. However, each patient enrolled in the program for 10 years would gain significantly in quality-adjusted life years (Beaulieu, Cutler, Ho, et al., 2003). The results of this study led the authors to conclude:

> …The magnitude of the difference between costs and patient benefits is so great that we believe, at the societal level, the outcomes of these comprehensive [diabetes disease management] programs will always be worth the investment needed (Beaulieu, Cutler, Ho, et al., 2003).

America's Health Insurance Plans, a national trade association, evaluated eight health plan programs in an analysis of cost savings from disease management. This analysis found that diabetes disease management programs reduced hospital inpatient costs, number of days in the hospital, as well as per member costs and total costs. Disease management of multiple chronic conditions, including diabetes, also showed evidence of significant returns. One plan with Medicare, Medicaid, and commercial enrollees found that it saved $2.94 for every dollar invested in disease management for multiple chronic conditions (AAHP/HIAA, 2003).

From 1999 to 2001, the Washington State Diabetes Collaboratives helped reduce blood glucose for patients in participating health centers by 10 percent on average; and for patients with poor blood glucose control, it was reduced from 24 percent to 17 percent, a 7-percentage-point reduction. The estimated annual cost savings from this improvement is roughly $419,000 a year (CDC, 2003a). Other studies have demonstrated that reducing HbA1c levels from 10 to 9 percent in people with diabetes can result in savings of more than $1,200 per patient. The savings can be as much as $4,000 in patients with a combination of diabetes, heart disease, and hypertension, which are common comorbidities of diabetes (White, 2002).

Other evidence from State disease management programs indicates that States expect quality improvement for diabetes to help them reduce health care costs. Washington State hopes to save $900,000 through its Medicaid diabetes disease management program. Oregon expects to save $1.5 million from its Medicaid disease management that targets diabetes, asthma, and congestive heart failure (Brown and Matthews, 2003).

A growing body of research indicates that payers, patients, and society can see a long-term return on investment in diabetes quality improvement. Yet, more research needs to be conducted on the types of interventions and resource investments that may yield savings and under what circumstances. Most studies look at the cost effectiveness of one treatment or another but do not consider the cost effectiveness of all interventions together such as the DCCT study did. The challenge of documenting cost savings from diabetes interventions is that there are so many potential health problems to address for people with diabetes and so many combinations of interventions to assess. Tracking and data management are difficult to do. Cost savings are difficult to calculate accurately because of measuring savings for people who are unaware that they have diabetes and for those diagnosed who are *not* using health care services and are *not* managing their disease. Most importantly, the available evidence points to the fact that the largest savings from diabetes interventions can occur many years into the future—a difficult investment horizon for businesses and legislative budget analysts who may be looking for short-term savings. While more research needs to be done, there is reasonable evidence that diabetes interventions can yield cost savings and little doubt that available interventions can improve the quality of diabetes care and health outcomes over the long term.

The NHQR and NHDR as Resources for State Leaders

The NHQR and NHDR serve as a snapshot of national health care quality by providing a means to assess where the health care system is doing well and where there are areas for improvement. These first reports offer baseline estimates using current data, and subsequent reports will compare future years of data against these baselines to assess whether the United States is improving the quality of health care.

For State leaders, it is important to understand several key findings from the NHQR. First, on many measures, there is a large gap between what is recommended care for patients and what the patient often receives. Further, there is considerable variation in the care that individuals with the same condition receive from State to State and, for some measures, region to region. The NHDR also found that there is considerable variation in care among population groups and socioeconomic characteristics, such as age, race, ethnicity, education, and income level.

Gaps Between Recommended Care and the Care Received

Clinical guidelines for diabetes care recommend that people with diabetes receive several important tests and a vaccination for influenza annually in order to prevent future complications (American Diabetes Association [ADA], 2004a). There is large variation in how often people with diabetes receive recommended tests and influenza vaccination. The NHQR reports that:

- According to AHRQ's Medical Expenditure Panel Survey (MEPS), a national data source, the vast majority of patients with diabetes—89 percent nationally—receive an HbA1c test within the year.
- According to State data from the CDC's Behavioral Risk Factor Surveillance System (BRFSS), nearly half of all people with diabetes do not receive a vaccination for influenza annually as recommended by diabetes care guidelines. Furthermore, the vaccination rates across the States vary tremendously—from 17 percent to 64 percent.
- According to the same source, nearly one-third of diabetes patients do not have a retinal or foot exam annually. Across States, the rates range from 50 percent to 83 percent for retinal exams and 50 percent to 87 percent for foot exams.
- According to the CDC's National Health and Nutrition Examination Survey (NHANES), only 37 percent of adults diagnosed with diabetes have HbA1c levels in the optimal range. (There are no State estimates for this measure.) (See Module 2: Data and Appendix C for further explanation of these data sources.)

These facts highlight where the Nation is doing well and where there is room for better processes regarding diabetes care. The States with the highest rates on the diabetes measures above—the best-in-class States—also provide examples of quality performance that is achievable.

Variation in Care Across States

As the list above indicates, there is considerable variation in diabetes care from State to State. Yet, diabetes has well-developed national guidelines for the care that people with diabetes should receive. This variation suggests considerable room for improvement for some States in the quality of diabetes care.

Table 1.1 summarizes State-generated estimates for four diabetes care quality measures from the Behavioral Risk Factor Surveillance System (BRFSS), collected by States and coordinated by the CDC. The BRFSS reports that States have a two-fold range of 48 to 89 percent of their residents with diabetes receiving an annual HbA1c test. A similar spread between the States occurs for foot exams; a slightly smaller difference occurs for eye exams. Influenza immunizations, however, have a four-fold difference between the high and low State rates.

Table 1.1 also gives the Healthy People 2010 (HP2010) baselines and goals for objectives similar to the measures used in the NHQR. Comparing the first column, State averages, with the HP2010 measures, it is evident that States have made considerable progress from the 1998 baseline estimates for most of these measures. There is room for improvement on some goals and considerable room for improvement compared to the performance of the best or top-decile States.

Variation in Care Across Population Groups

The NHQR and NHDR also document variation in care across a number of different population characteristics. The NHQR provides information on variations in quality measures by:

- Age
- Sex
- Educational level
- Employment status
- Health insurance status (public/private/uninsured)
- Income level
- Metropolitan/non-metropolitan location
- Health status

Table 1.1. Quality measures for diabetes care: All-State average, top-decile States' average, and State range for 2001, the HP2010 baseline for 1998, and HP2010 goal for 2010

Measure	All-State average	Top-decile States' average	Range of State values	HP2010 baseline (1998)	HP2010 goal (2010)
Process: percent of adults with diabetes who had a hemoglobin A1c measurement at least once in past year	79.4	95.6	64-98.5	NA	NA
Process: percent of adults with diabetes who had a hemoglobin A1c measurement at least twice in past year [a]	61.1	83.0	47.6-89.3	59[b]	TBD[c]
Process: percent of adults with diabetes who had a retinal eye examination in past year	66.7	79.6	50.2-82.5	47	75
Process: percent of adults with diabetes who had a foot examination in past year	64.6	81.3	47.7-87.2	55	75
Process: percent of adults with diabetes who had an influenza immunization in past year	37.4	59	16.5-64.4		

[a] This measure is not a part of the official NHQR measure set. It is the revised HP2010 objective and is commonly used among State DPCPs. The official NHQR measure is the percent of adults with diabetes who had a hemoglobin A1c measurement at least once in the past year and is consistent with the measures endorsed by the National Diabetes Quality Improvement Alliance. This *Resource Guide* reports rates of HbA1c testing for both measures whenever possible.

[b] The baseline estimate for the HP2010 HbA1c objective of tests two or more times per year is provided by the CDC for the year 2000 (not for 1998).

[c] The goal for the HP2010 HbA1c objective has not yet been determined since the change of the measure specification from "at least once" to "at least two times" per year.

Source: Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System and Healthy People 2010.

The NHDR documents the variation in the quality of and access to health care across subgroups of race, ethnicity, income, education, and place of residence.

The data from the NHQR and NHDR, as well as findings from other research, show that a variety of care for diabetes (AHRQ, 2003a and 2003b). African Americans, American Indians, Asian Americans, Hispanics/Latinos, and Pacific Islanders are more likely than non-Hispanic whites to have diabetes (CDC, 2004; AHRQ, 2003b). In addition, across some measures for diabetes, racial and ethnic minorities receive less recommended care than whites do and have higher rates of hospitalization for long-term complications of diabetes (AHRQ, 2003b). However, one study demonstrated that racial and ethnic disparities are moderated when people are involved in a regular system of care (Karter, Ferrara, Liu, et al., 2002).

Also, people with incomes below the poverty level and those with less education are more likely to develop diabetes and its complications. Individuals with lower incomes and those with less than a college education also were lower than the national average across most diabetes quality measures (AHRQ, 2003a and 2003b). All of these findings are important to recognize as States undertake diabetes quality improvement initiatives, because the racial, ethnic, and socioeconomic makeup of a given State influences the underlying factors that affect diabetes care quality.

The variation in quality across the Nation, across States, and among various population groups highlight opportunities for improvement. States with below average rates on a given quality measure have clear guidance on which areas to address related to diabetes care quality. Also, low performers may be able to make small changes with big results. Additionally, States that score highest on a given quality of care measure can provide a benchmark for other States to aim for and indicate what is possible.

The Quality Improvement Opportunity

In recent years, interest in addressing health care quality has increased tremendously. The publication of the Institute of Medicine's (IOM) reports, *To Err is Human* and *Crossing the Quality Chasm,* has helped spur interest in medical errors, patient safety and quality improvement. The releases of the NHQR and NHDR have also provided added attention to health care quality as an issue for Federal and State policymakers.

In its report, *Fostering Rapid Advances in Health Care*, the IOM outlined a variety of strategies to advance public policy around quality improvement, including attention to care for chronic diseases. The report emphasized the role of States along with the Federal government in quality improvement. Secretary of Health and Human Services Tommy G. Thompson has stated that State and local demonstrations are needed to test a variety of quality improvement approaches, evaluate the effectiveness of the different models, and inform national efforts (IOM, 2003a). States already have undertaken disease management pilots and other demonstration projects related to quality improvement using funds from the CDC, Medicaid, and Medicare (see Module 4: Action for more information on the kinds of programs).

States are critical partners in quality improvement with strategic implications for the future of health care. There is commitment at the national level to quality improvement. What is needed now is action.

Both the NHQR and IOM's *Crossing the Quality Chasm* report highlight the importance of improving care for chronic diseases. Diabetes in particular is recognized as one chronic disease for which quality improvement efforts could make great strides. Diabetes has widely respected national guidelines for what constitutes quality care and well-developed national measures of quality. Despite this fact, the gap between evidence-based treatment and actual practice and outcomes continues to be wide. There continues to be a large number of complications from diabetes that research demonstrates could have been prevented with high quality care. States can play a key role in fostering diabetes quality improvement.

Summary and Synthesis

This module has provided background on diabetes as a disease and its associated costs, complications and prevalence. This module has also examined the evidence from both NHQR and NHDR regarding the substantial gaps in care quality for diabetes that exist across the Nation, between States, and across population groups.

Because of their roles as health care purchasers for Medicaid and State employees as well as their role in protecting the public's health, States have a vested interest in championing prevention of and quality improvement for diabetes. Particularly in an age of rising health care costs, States cannot afford simply to pay for business as usual in health care. Evidence from research indicates that quality improvement is critical to achieving better health outcomes and closing the gaps between what we know and what we do in health care. In addition, there is growing evidence that investments in diabetes quality improvement can yield a significant return on investment both in terms of cost savings and improved quality of life for people with diabetes. Fortunately, there are both existing policy models and new resources that State leaders can use to assess diabetes care quality in their States and devise quality improvement plans.

With a background and understanding of the issues related to diabetes quality improvement, the next step in the quality improvement process is to formulate a set of questions and gather the data to answer them. The NHQR and the NHDR are rich data resources for States to use to help answer questions about the quality of diabetes care in and across States. Module 2: Data presents NHQR and NHDR data. Module 3: Information analyzes the data and provides examples of how States can use the data to make comparisons and assessments of where to focus State efforts to improve diabetes care quality. Module 4: Action presents various diabetes quality improvement approaches that States can use as models for action. The final modules are designed to help State leaders to devise quality improvement strategies that are suited to local settings and circumstances but that draw on national, Federal, and State data and models for action.

Resources for Further Reading

- *National Healthcare Quality Report* and *National Healthcare Disparities Report*, available at: http://www.qualitytools.ahrq.gov

- Institute of Medicine's *Crossing the Quality Chasm: A New Health Care System for the 21st Century,* available at: http://www.iom.edu/report.asp?id=5432

- Institute of Medicine's *Fostering Rapid Advances in Health Care: Learning from System Demonstrations,* available at: http://www.iom.edu/report.asp?id=4294

Associated Appendix for Use With This Module

Appendix A: Acronyms Used in This Resource Guide

The acronyms employed to describe the organizations endorsing the NHQR quality measures are described in Appendix A, along with all other acronyms used throughout this *Resource Guide*.

Module 2: Data — Understanding the Foundation of Quality Improvement

"Health care is crucial to our quality of life and is one of the biggest, and probably the fastest growing financial burdens for government, business and individuals. It is complicated, and we are learning by experience. Good decisions will make (the State) healthier and the State economically competitive, poor decisions will not. We need reliable and current data to make good decisions."

- Robert Huefner, Ph.D., Member, Utah Health Data Committee
Testimony to the Health and Human Services Appropriations Committee, January 10, 2002

Module Overview:

1) Quality Measurement
   a. Background
   b. Diabetes-Related Quality Measures in the NHQR
2) Sources of NHQR Data on Diabetes Care
   a. Process Measures—BRFSS and MEPS Data
   b. Outcome Measures—NHANES, HCUP, and NHDS Data
3) Filling Local Data Gaps
   a. Developing an Inventory of Local Data Sources
   b. Using Published Studies and Readily Available Data To Develop State or Local Estimates
3) Summary and Synthesis
4) Resources for Further Reading
5) List of Associated Appendixes for Use With This Module

Key Ideas in Module 2:

- Data are essential to quality improvement – essential for identifying and measuring problems and setting goals for improvement. The first two steps are: 1) identifying measures and 2) identifying data sources to support those measures.

- The NHQR is a valuable resource for consensus-based measures, national and State-level data sources, and estimates for tracking diabetes care quality.

- State leaders must understand the limitations of data sources to be able to handle challenges who will say that "the data are the problem, not the health care system."

- States also have a wide array of other data sources. Gaps in State-level data can be filled by using methods from published national studies and available State-level data, such as that collected or analyzed by State DPCP staff.

A key ingredient to improving health care quality is data. The term *data* usually refers to values or estimates generated to describe a concept and to track it over time, space, and populations. Data reveal the extent of a problem, the subpopulations involved, and the geographic disparities in outcomes and processes of care. Data are necessary to make the case for diverting scarce State resources (staff or budgets) to a quality improvement initiative.

Exploring *available* data is a productive way to begin the process of identifying quality problems and selecting and defining an improvement project. Furthermore, the quality improvement process is a cycle (explained in Module 5: Improvement) that rests on the backbone of data. Data are necessary to assess the situation at a baseline and ultimately to determine whether an intervention is accomplishing what was intended or whether objectives and actions need to be changed to improve quality.

The National Healthcare Quality Report, with national and sometimes State-level data, is a valuable resource for reviewing and comparing health care quality across the States. It is a source of accepted measures and benchmarks for comparison. (Benchmarks are explained in Module 3: Information.)

This module discusses the basic building blocks of quality improvement – measurement and data. The Module describes the diabetes-related data available in the NHQR and other relevant data sources that States can use.

Even when data are not readily available, estimates can be generated by assembling information from various sources. Two practical examples of this are developed in this module for the Medicaid and State populations. The results of research studies combined with national and State databases are used to estimate the Medicaid spending on diabetes care and the cost burden of diabetes to each State.

What this module does not address are the wide-ranging possibilities, constrained only by resources, of collecting data through surveys tailored to planned projects and aimed at measuring the scope of the quality problem and evaluating the effectiveness of planned interventions. Each State has a cadre of health statisticians and analysts who should be recruited to be part of any quality improvement project aimed at the health care system in the State.

Quality Measurement

Background

This section reviews the concept of quality measurement, available diabetes-related measures in the NHQR, and the importance of using multi-dimensional measure sets. All of this is from the perspective of State quality improvement programs.

Conceptual design of quality measures is necessary before data collection can begin. What is to be measured? How should it be measured? How will it be analyzed?

Fortunately, finding measures of health care quality is not difficult. Much work has been done over the past 30 years to advance the field of quality measurement. In fact, the plethora of measures can actually frustrate health care providers and analysts: Which should be used to guide and evaluate a quality improvement program? What do the measures mean? How should individual values be interpreted?

Quality measures cover a large range, from crude measures (e.g., unadjusted mortality rates) to more refined measures (e.g., percent of an at-risk population achieving glycemic control as evidenced by HbA1c levels). While a full range of measures is essential for a complete picture of health care quality,

specific process measures are needed to move a health care team toward delivering quality care. For example, the number of deaths at a hospital can suggest poor quality of treatment at that hospital, but knowing the number of deaths does not tell the hospital staff how to improve. Quality measures of processes of care that are linked to increases or decreases in deaths or other medical outcomes help medical staff know how to change care in order to improve patient outcomes.

There is a distinction between *quality measures* and *guidelines for quality care.* The health care quality measures used in the NHQR and used for State, regional, or local planning for quality improvement initiatives relate to populations. Such measures are often rates (e.g., percentages) which indicate the number achieving a goal (e.g., glycemic control) relative to a population base (e.g., all people with diabetes in the Nation).

By contrast, guidelines for quality care are recommendations devised via consensus processes of clinical experts that describe standards of care for individual patients. In general, guidelines for quality care of individual patients are used as the theoretical underpinning to develop population-based quality measures.

Most quality improvement efforts focus on process and outcome measures (see text box below). Process measures often reflect evidenced-based guidelines of care for specific conditions. Outcome measures often relate to patient health status. Ideally, improvement in a particular process measure yields improvement in the associated outcome measure. Structural measures of the health care infrastructure are a third type of quality measure, less directly related to quality of care.

Types of Quality Measures:

- **Process measures** often are based on guidelines of care for a specific condition. Process measures are generally considered to be within the control of the provider and, therefore, are considered performance indicators. They also are more likely to reveal actions that can be taken to improve quality (for example, whether a necessary test or medication is given).

- **Outcome measures** generally are based on patient health status. They are considered to be the ultimate objective of quality improvement – improving the patient's health (for example, mortality rates, hospitalization rates, and test results).

- **Structural measures** reflect aspects of health care infrastructure that generally are broad in scope, system wide, and difficult to link to short-term quality improvement (for example, the staff-to-bed ratio in a hospital). The NHQR does not use structural measures.

Diabetes-Related Quality Measures in the NHQR

Although many process measures exist for diabetes care, those listed below survived an extensive consensus process developed for the NHQR and could be estimated from national databases. (See Appendix C for more information on national quality measurement activities and the NHQR measure selection process). The NHQR uses five process measures and seven outcome measures; the outcome measures are of two types—test results and avoidable hospitalizations.

Process Measures

- HbA1c test—Percent of adults with diabetes who had a hemoglobin A1c measurement at least once in the past year.

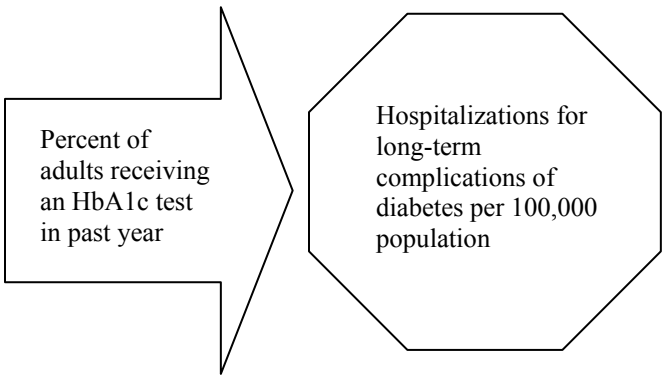
- Lipid profile—Percent of patients with diabetes who had a lipid profile in the past 2 years.
- Eye exam—Percent of adults with diabetes who had a retinal eye examination in the past year.
- Foot exam—Percent of adults with diabetes who had a foot examination in the past year.
- Flu vaccination—Percent of adults with diabetes who had an influenza immunization in the past year.

Outcome Measures

- **Test results—**The NHQR uses the three measures listed below:
    - HbA1c levels—Percent of adults with diagnosed diabetes with HbA1c levels > 9.5 percent (poor control); < 9.0 percent (needs improvement); and < 7.0 percent (optimal control)
    - Cholesterol levels— Percent of adults with diagnosed diabetes with most recent LDL-C level < 130 mg/dL (needs improvement); <100 (optimal)
    - Blood pressure—Percent of adults with diagnosed diabetes with most recent blood pressure <140/90 mm/Hg
- **Avoidable hospitalizations—**The NHQR uses the four measures listed below:
    - Hospital admissions for adults with uncomplicated, uncontrolled diabetes per 100,000 population
    - Hospital admissions for adults with short-term complications of diabetes per 100,000 population
    - Hospital admissions for adults with long-term complications of diabetes per 100,000 population
    - Hospital admissions for lower extremity amputations for patients of all ages with diabetes per 1,000 population

Ideally, improvement in a process measure will yield improvement in an associated outcome measure. An example of this, used by the NHQR is the diabetes process measure of an annual HbA1c test to monitor blood glucose levels. Control of blood glucose in people with diabetes has been connected with the delay of complications. Such complications often result in hospitalization. Hospitalizations for uncontrolled (long-term and short-term) complications of diabetes are outcome measures used in the NHQR. In this case, improvement in the process of monitoring HbAlc is expected to decrease the number of such hospitalizations, as diagramed in Figure 2.1. Of course, the connections are never that simple or direct. An HbA1c test does not necessarily mean that a patient will self-manage the disease sufficiently or the clinician will provide the appropriate intervention to lower an HbA1c level and decrease long-term complications. Effective patient and provider education is a crucial link.

Figure 2.1. Relationship of a diabetes process and outcome measure



Sources of NHRQ Data on Diabetes Care

This section describes actual estimates for the diabetes measures above from the NHQR as well as other sources of data that may help States generate estimates or analyze factors related to the quality of diabetes care. The *quality of the data* itself is discussed throughout this section, because State leaders in quality improvement must understand issues that will be raised in the improvement process. Health care providers may argue that the data, due to limitations, do not reflect reality. They may say: "The data are the problem and not the health care system." Understanding data limitations leads to responsible use of data.

The NHQR uses many different data sources (see Appendix B for a complete list). Different sources use different methods, definitions, and classifications. Some sources produce estimates by State and some by national population subgroup, such as race/ethnicity, gender, age, and income.

The diabetes data in the NHQR come from five data sources:

- Behavioral Risk Factor Surveillance System, a telephone survey designed by the CDC and conducted by individual States. BRFSS data are the only diabetes-related data reported by State in the NHQR (except for a special analysis using HCUP data discussed in Module 3: Information). BRFSS provides State-level estimates for four of the five process measures.

- Medical Expenditure Panel Survey–Household Survey, a national in-person survey, conducted by AHRQ. MEPS data are used for all five process measures and report data by national population subgroup.

- National Health and Nutrition Examination Survey, a physical examination survey conducted by clinicians who staff a tractor-trailer clinic that travels to sampled communities under the auspices of the National Center for Health Statistics (NCHS/CDC). NHANES is used for two laboratory value-related outcome measures that require clinical data from physical examinations.

- Healthcare Cost and Utilization Project (HCUP), a census of hospital discharge records for States (29 in 2000) in a Federal-State-Industry partnership, sponsored by AHRQ. HCUP data are used to report on three outcome measures of avoidable hospitalizations.

- National Hospital Discharge Survey (NHDS), a national sample of hospitals and a sample of their discharges, conducted by NCHS. NHDS is used for one outcome-related avoidable hospitalization.

General information on each data source and its limitations are presented next. The most detail is presented on BRFSS because it is the only NHQR diabetes data that reports by State. Following those discussions, Table 2.1 presents the State-by-State rates for the four BRFSS process measures. Appendix C includes a more in-depth discussion of each data source and other NHQR data tables. Data tables in Appendix C from sources other than BRFSS present national rates and data by subgroup.

Process Measures—BRFSS and MEPS Data

Behavioral Risk Factor Surveillance System

BRFSS data used in the NHQR are from 2001; in that year, 41 States collected data for three of the five diabetes process measures in the NHQR. Those measures include annual HbA1c testing, foot exams, and eye exams. All 50 States collected data on receipt of influenza vaccination in the past year.

The BRFSS data are based on telephone surveys developed by the CDC but administered by each State independently. The survey consists of a core set of questions developed by CDC, additional questions developed by the States, and separate, optional modules for States to use. The diabetes module, which contains the quality-of-care questions, is optional for State use. More information about the BRFSS data and methods as well as interactive databases with some State and local level diabetes data are available at: http://www.cdc.gov/brfss/.

Limitations of BRFSS data: Every data source has limitations. They relate to the population represented, methods used to collect the data, definitions, and analytic approaches. These factors affect the estimates generated from a data set. When similar measures from two data sets differ, the cause can usually be traced to the limitations of the data sets. By understanding the limitation of a data set, the strengths and weakness of estimates from the data set can be assessed and the estimates can be used more responsibly. Limitations of BRFSS data include the following:

- BRFSS samples are kept small to minimize survey costs for States. The State BRFSS samples for the year 2001 range from 1,888 to 8,628 respondents (see: http://www.cdc.gov/brfss/technical_infodata/surveydata/2001/codebook_01.rtf). For respondents with diabetes the sample is even smaller, generally around 200 (Mukhtar, Murphy, Mitchell, 2003; Safran, Mukhtar, Murphy 2003). Small samples increase the variance of estimates and decrease the size of the difference between two subpopulations that can be detected through the survey responses.

- The BRFSS survey excludes people without a residential phone and people who are institutionalized. This means that the total population of interest—all people with diabetes—will not be represented in the estimates that come from the survey (Nelson, Holtzman, Bolen, et al. 2001). This weakness can be dealt with by carefully discussing BRFSS results in relation to the population it represents.

- BRFSS data are self-reported and reflect the perceptions of respondents. An advantage of self-reports is that they can reveal information that cannot be obtained from other sources; for example, the receipt of flu vaccinations for people who don't see a doctor during the year. A disadvantage of self-report data is that respondents may have difficulty recalling events, understanding or interpreting questions, or responding truthfully to questions about socially

unacceptable behaviors. Furthermore, cultural and language barriers and limited health knowledge can affect the quality of self-reported data (Nelson, Holtzman, Bolen, et al. 2001). These problems may occur with different propensity for different subgroups.

- BRFSS data, like most surveys, are limited by budget constraints. Because BRFSS is funded by State which vary considerably in the levels of their budgets allocated to health surveys, these fiscal disparities may affect the quality of the data across States. Such data quality shortcomings can include bias from differential response rates, varying followup periods, and variations in interviewer protocols (e.g., extent of probing for answers).

Addressing small sample size limitations: One way to deal with small samples is by pooling data over two or three years. In 1999, when the CDC incorporated evaluation and program accountability requirements for the State diabetes control programs, it provided baseline estimates of State rates for HbA1c testing, eye exams, foot exams, and self-monitored blood glucose by pooling the data from 1997 through 1999. A more stable baseline facilitated comparisons among the States and enabled States to monitor improvements (Safran, Mukhtar, Murphy, 2003). (Tables C.6 throughC.10 in Appendix C include these baseline estimates and BRFSS trends for various years

Because the NHQR uses data from only one year, Module 3: Information takes sample size into account when interpreting the data on diabetes quality measures from BRFSS.

Despite limitations, BRFSS diabetes data are widely used by State DPCP coordinators. Seventy percent of State coordinators surveyed reported that they used those data for program evaluation, publications, or program implementations. When rating the usefulness of the questions in the diabetes module, State coordinators rated HbAlc testing, eye exams, foot exams, self-monitoring of blood glucose, and diabetes education as "highly useful" (Mukhtar, Murphy, Mitchell, 2003).

BRFSS estimates for diabetes care quality: Table 2.1 shows estimates for the four NHQR measures derived from BRFSS and includes estimates for the revised HP2010 objective for HbA1c testing at least twice annually. These estimates are reported nationally (over all 41 contributing States) and by individual State. Each of the four measures includes the estimate of the rate per 100 people (or percent) and the standard error of the rate (which is affected by the sample size).

Table 2.1 also indicates statistical significance for each State compared to the national average and the top decile of States. (The top decile or "best in class" benchmark is explained in Module 3: Information.) Two different statistical significance tests are represented in symbols as follows:

- Test of difference from the national average—For this test, the symbols + and − represent the State rate that is statistically above (+) or below (−) the national average. States with no adjacent symbol are not statistically different from the national average.

- Test of difference from the average of the best-in-class States—For tests of difference from the top-decile States, the symbol ‡ indicates States that are indistinguishable from the best-in-class States. States without the ‡ symbol are statistically different from the best-in-class average.

The maps in Figure 2.2 summarize the five BRFSS measures found in Table 2.1 in relation to the national average rates. The hues show which States are statistically significantly below or above the average, those that are not different from the average statistically, and those that do not collect data.

Table 2.1. Percent of non-institutionalized adults 18 and over with diabetes who reported having important diabetes tests or health services in the past year, age adjusted, by State, 2001

	Hemoglobin A1c test at least *once* a/			Hemoglobin A1c test at least *twice* a/			Retinal eye examination a/			Foot examination a/			Influenza vaccination adults 18-64 a/		
	Percent		SE	Percent		SE	Percent		SE	Percent		SE	Percent		SE
National Average	79.4		1.1	61.1		1.3	66.7		1.2	64.6		1.2	37.4		1.2
Best In Class Average	95.6		1.3	83.0		2.4	79.6		2.4	81.3		2.5	59.0		4.4
Alabama	82.3		4.5	72.0	+	4.7	59.3		5.1	68.1		4.2	36.9		5.4
Alaska	92.6	‡	4.0	71.3		6.2	53.7		7.1	65.2		7.7	50.2		9.1
Arizona	79.0		5.3	49.2		6.9	68.5		5.5	65.1		6.6	16.5	-	3.3
Arkansas	80.3		6.8	55.7		6.2	62.6		6.2	47.7	-	6.1	44.9		7.2
California	73.8		4.5	47.6	-	4.9	64.4		4.7	60.6		4.8	34.9		5.0
Colorado	82.5		6.1	61.4		7.8	65.4		6.9	50.1	-	7.3	22.4	-	5.6
Connecticut	90.6	+	1.6	68.7		4.1	77.1	‡	4.3	69.7		3.9	38.4		4.3
Delaware	DNC		DNC	DNC		DNC	DNC		DNC	DNC		DNC	35.4		6.3
District of Columbia	82.2		5.8	57.5		7.7	76.2		5.4	73.7		6.3	44.9		8.6
Florida	77.5		4.4	61.1		4.9	73.9		4.3	62.6		4.6	32.8		5.3
Georgia	85.9		3.3	70.5	+	4.0	70.4		3.7	63.3		4.3	30.4		4.5
Hawaii	98.5	‡	0.7	89.3	‡	4.5	75.2		7.2	81.3	‡	5.8	64.4	‡	9.7
Idaho	87.4	+	2.8	59.2		4.8	56.8	-	4.7	57.9		4.6	38.5		4.9
Illinois	DNC		DNC	DNC		DNC	DNC		DNC	DNC		DNC	37.3		10.8
Indiana	DNC		DNC	DNC		DNC	DNC		DNC	DNC		DNC	34.0		4.8
Iowa	85.2		4.4	65.8		5.6	76.4	‡	4.8	68.3		5.2	55.1	‡	6.5
Kansas	85.4		4.2	63.6		4.9	64.8		4.8	61.9		4.8	44.0		5.7
Kentucky	86.2	+	2.7	67.6		4.5	71.1		3.6	60.5		4.1	35.7		4.3
Louisiana	DNC		DNC	DNC		DNC	DNC		DNC	DNC		DNC	25.0	-	3.9
Maine	85.1		4.6	64.7		6.7	82.3	‡	3.5	72.6		5.9	50.9		7.6
Maryland	DNC		DNC	DNC		DNC	DNC		DNC	DNC		DNC	40.7		6.1
Massachusetts	85.4		3.0	69.0		4.2	66.5		4.5	61.5		4.4	44.8		5.5
Michigan	74.5		4.9	55.8		5.2	62.3		4.7	65.2		4.9	26.6	-	4.1
Minnesota	97.3	‡	1.1	83.4	‡	3.2	75.9		5.3	87.2	‡	3.3	49.5	‡	8.1
Mississippi	DNC		DNC	DNC		DNC	DNC		DNC	DNC		DNC	27.7	-	4.2
Missouri	DNC		DNC	DNC		DNC	DNC		DNC	DNC		DNC	35.8		5.3
Montana	75.2		6.7	51.1		7.0	53.8	-	6.3	73.0		6.8	57.6	‡	7.9
Nebraska	85.6		6.6	75.1	‡	7.0	80.4	‡	5.6	68.3		7.5	56.6	‡	9.7
Nevada	90.8	‡	2.9	69.8		7.9	50.2	-	7.7	74.8		6.2	23.0	-	4.7
New Hampshire	87.2		4.1	66.9		5.4	74.7		4.8	69.7		5.3	41.1		5.7
New Jersey	73.6		5.4	63.0		5.4	66.6		5.2	60.1		5.2	34.5		6.2
New Mexico	79.7		4.0	56.5		5.8	69.8		5.3	79.1	‡	4.1	36.1		6.5
New York	85.7		3.6	74.2	‡	4.5	67.9		5.1	67.9		5.0	33.7		5.1
North Carolina	DNC		DNC	DNC		DNC	DNC		DNC	DNC		DNC	47.6		6.0
North Dakota	92.6	‡	3.8	77.0	‡	6.4	67.3		7.4	71.5		6.9	56.1	‡	8.7
Ohio	74.8		5.5	56.8		5.6	72.3		4.3	57.2		5.4	34.7		5.9
Oklahoma	84.9		3.7	61.2		5.0	64.0		4.8	70.3		4.5	49.8	‡	5.4
Oregon	DNC		DNC	DNC		DNC	DNC		DNC	DNC		DNC	41.7		7.7
Pennsylvania	88.6	‡	3.8	67.7		6.1	72.3		5.4	76.6	‡	4.8	43.0		6.6
Rhode Island	84.5		4.8	73.8	‡	5.3	71.6		5.2	76.8	‡	4.8	56.8	‡	6.4
South Carolina	76.1		5.5	62.1		5.4	59.2		5.1	69.7		4.9	47.0		5.9
South Dakota	89.6	‡	3.2	73.8	‡	4.2	74.5		4.3	70.1		4.6	52.8	‡	5.7
Tennessee	73.0		4.8	52.1		5.6	66.7		5.1	64.3		5.0	46.9		6.4
Texas	73.0		3.9	58.2		4.0	58.1		3.9	61.6		3.9	42.0		4.5
Utah	86.1		6.5	73.1		6.9	63.5		7.4	75.2		6.8	40.0		8.0
Vermont	92.1	‡	3.0	79.3	‡	4.9	65.3		6.6	74.9		5.6	50.3		7.8
Virginia	75.8		5.5	60.1		5.7	63.7		5.8	68.0		5.4	38.4		6.3
Washington	88.5	‡	3.4	65.8		5.0	69.7		5.0	69.0		4.8	49.6	‡	6.0
West Virginia	77.6		5.7	57.0		6.4	54.0	-	5.7	63.6		5.4	29.2		5.7
Wisconsin	88.7	‡	4.6	70.6		5.7	82.5	‡	3.1	78.2	‡	5.3	47.8		7.1
Wyoming	64.0	-	6.7	49.6		6.7	59.0		6.8	49.9	-	6.3	40.3		7.2

a/ Measure is age adjusted

DNC - Data system does not collect data for this population.

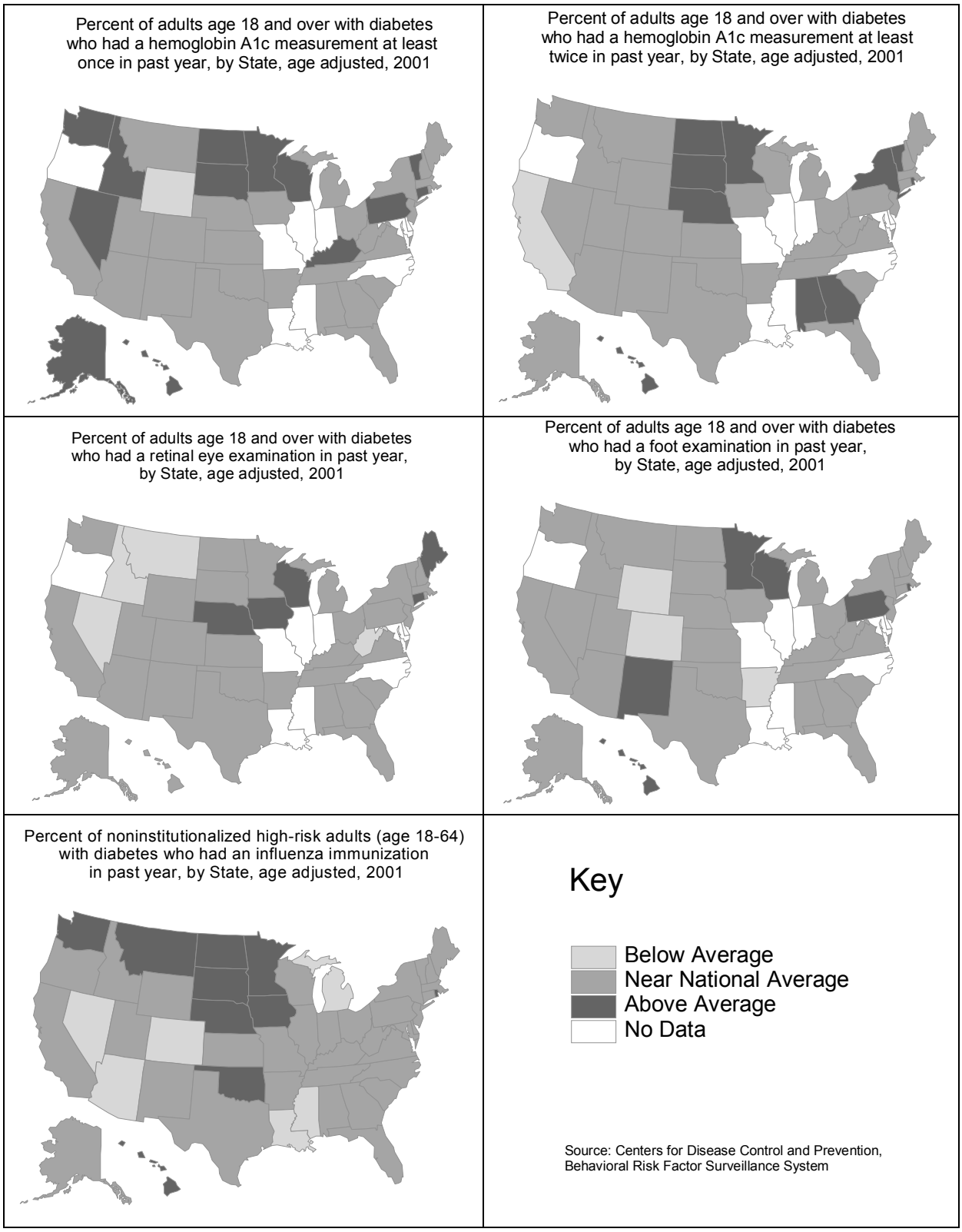
Source: Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance Survey.

+ Indicates that the State percent is significantly above the national average (P<0.05).

- Indicates that the State percent is significantly below the national average (P<0.05).

‡ Indicates that the State percent is **not** significantly different from the best in class average (P<0.05).

Figure 2.2. States above, below, and at the national average for important clinical processes for the noninstitutionalized population with diabetes



Medical Expenditure Panel Survey

The NHQR uses data from the Medical Expenditure Panel Survey to report national rates by national subgroup for five process measures. Four measures are the same as those from BRFSS—HbA1c testing, eye exams, foot exams, and influenza immunizations. The fifth measure is lipid profile—the percentage of people with diabetes who reported receiving a test for lipid profiles in the past 2 years.

MEPS is a family of surveys, including a household survey and surveys of related health care providers. Information is collected annually on health care utilization, expenditures, and health insurance coverage. For the most part, MEPS data are collected using computer-assisted, in-person interviews. The diabetes component is collected via a separate paper and pencil questionnaire distributed to respondents who report that they have been diagnosed with diabetes. More information about MEPS data and methods are available at http://www.meps.ahrq.gov/WhatIsMEPS/Overview.HTM.

Differences between MEPS and BRFSS: MEPS reports on the same process measures as BRFSS nationally but does not produce State-level estimates. Notable differences exist between MEPS and BRFSS national rates for HbA1c testing and influenza immunization. The HbA1c MEPS-BRFSS difference (90 percent versus 79 percent) is due to different survey response options and the order of the questions. The MEPS-BRFSS influenza immunization difference (55 percent versus 37 percent) is due to different age-group definitions between the two surveys; the MEPS rate is for adults age 18 and over; the BRFSS rate is for adults age 18 to 64. Since flu shots are less likely to be given to younger than to elderly people, the BRFSS rate is lower than the MEPS rate. More information on differences between MEPS and BRFSS is provided in Appendix C.

Outcome Measures—NHANES, HCUP, and NHDS Data

National Health and Nutrition Examination Survey

The NHQR uses data from the National Health and Nutrition Examination Survey for two outcome measures related to diabetes—the average blood glucose level over the prior 2 to 3 months and blood pressure at examination. NHANES, which uses a relatively small sample size because of the costliness of conducting physical examinations in communities, does not support State-level estimates. NHANES does provide estimates for the Nation that could be used as benchmarks over time. These benchmarks would be valuable to a State that has the same clinical measures for some population within the State (such as health systems with electronic medical records) or if the State establishes special data collection through health care providers for such measures. (Note: To be comparable to data from providers, the NHANES HbA1c and blood pressure values would have to be recalculated to exclude people who do not use the health care system during a year.) Additional information on NHANES is available at: http://www.cdc.gov/nchs/about/major/nhanes/NHANES99_00.htm.

Healthcare Cost and Utilization Project

The NHQR uses inpatient discharge data from the Healthcare Cost and Utilization Project for national estimates of three outcome measures of avoidable hospitalizations related to diabetes. HCUP is a public-private partnership sponsored by AHRQ with 29 participating States that covers about 80 percent of U.S. discharges in the United States in 2000, the time for which data are included in the first NHQR. While national diabetes estimates from HCUP are included in the NHQR, State-level data are not, except for one special analysis of admissions for uncomplicated uncontrolled diabetes (discussed in Module 3: Information). Additional information on HCUP data is available at: http://www.hcup-us.ahrq.gov/overview.jsp.

AHRQ also has developed the Quality Indicators (AHRQ QIs) for use with HCUP and other hospital administrative data (AHRQ, 2001, 2002, 2003). The AHRQ QIs use sophisticated clinical algorithms of inclusions and exclusions to define patient groups at low risk of poor health outcomes and then calculate the outcomes of these low risk groups across different settings and populations. The algorithms have been tested, reviewed, and hewn by clinical consensus panels under AHRQ sponsorship. The AHRQ QIs include the Prevention Quality Indicators, which estimate rates of avoidable admissions, including diabetes admissions, as an indirect measure of the quality of ambulatory diabetes care in the United States. As tools for local quality improvement, the AHRQ QIs can be used as screens for quality problems that call for more in-depth local study; they are not considered definitive measures of local quality of care. As national measures they capture trends in quality as well as coding of diagnoses. National estimates of the Prevention Quality Indicators are part of the first NHQR and NHDR. Additional information on the AHRQ QIs is available at: http://www.qualityindicators.ahrq.gov/.

Limitations of HCUP data: The main limitation of HCUP data (or any administrative billing data) is that the data are collected for the purpose of payment, and what is coded as clinical diagnoses and procedures can be affected by reimbursement incentives (Keating, Landrum, Landon, 2003). Such incentives can encourage or discourage coding of specific types of conditions or treatments. Nevertheless, HCUP data can be used for many purposes, provided that the bias of coding is considered and ruled out as inconsequential. Thus, while administrative hospital data can be mined for clues to quality of care, analysts should be alert for whether the data contain incomplete entries or inadequate clinical detail.

National Hospital Discharge Survey

The NHQR used the National Hospital Discharge Survey for one outcome measure—lower extremity amputations. The NCHS at CDC uses a national sample of hospitals and a sample of their discharges to collect administrative hospital records for the NHDS (similar to HCUP). The sample consists of about 270,000 inpatient records from about 500 hospitals and is representative of inpatient discharges nationally. Additional information on NHDS data is available at: http://www.cdc.gov/nchs/about/major/hdasd/nhdsdes.htm.

Limitations of NHDS data: The limitation of NHDS data are similar to those for HCUP data (described above) because NHDS also uses discharge records or inpatient claims for reimbursement. In addition, although NHDS is a true probability sample, it has a much smaller sample size than HCUP. As a result, many subgroup estimates that can be made with HCUP cannot be supported with NHDS data.

Filling Local Data Gaps

Finding data is a challenge for quality improvement programs. Two avenues can be used to locate relevant data: 1) developing an inventory of local data sources and 2) using published research to generate local estimates. The latter (generating local estimates) is acceptable for planning purposes, until better local sources are located and analyzed. One of the best sources for filling the data gaps will be the State DPCP staff.

Developing an Inventory of Local Data Sources

Local data (whether State, county, municipal, or individual health care provider data) are essential for quality improvement programs to have an impact locally. Local leaders and health care professionals must see their own data in comparison to other providers and to State, regional, and national benchmarks in order to appreciate the importance of their work.

Health care quality improvement programs should develop a complete inventory of data systems available at the State and local level. Doing so may reduce data-related costs and avoid duplicate data collection. Also, a review of local data in the context of the NHQR and NHDR should make clear where existing local surveys or data systems could be modified to add information comparable to the concepts used in those reports and, thus, to provide the raw materials for insights into health care and its quality at the local level.

Most States have data systems that can contribute to a review of health care quality at the State or local levels. Some of those data systems include:

- BRFSS data, available at the State level through the State health department.
- Statewide inpatient hospital discharge systems, for which HCUP and NHDS data can provide uniform national comparisons.
- State vital statistics, which include mortality rates by cause of death and for which the National Vital Statistics System can provide uniform national comparisons.
- Special disease registries, some of which are focused on diabetes.
- Other special data collection of State departments of health statistics and other State programs.

Specific data systems for populations that the State supports are also available in most States. These include:

- Medicaid information systems based on health care provider claims for reimbursement from Medicaid.
- State employee health benefit claims for reimbursement.
- Patient records from State- or county-run programs, such as mental health and substance abuse programs or school health programs.

Some examples of State-level data sources are available at the National Association of Health Data Organizations' Web site (http://www.nahdo.org/soa/soalist1.asp?Category=State%20Agency).

Other Federal or national systems compile data that describe State and local populations or health resources. These include:

- The CDC's Division of Diabetes Translation Web site, a valuable starting place to identify data and become familiar with the network of organizations and individuals associated with diabetes data collection at the State and national level (http://www.cdc.gov/diabetes/statistics/index.htm).
- Census population data by State, maintained by the U.S. Bureau of the Census (http://eire.census.gov/popest/data/states.php)
- The Area Resource File, a county- and State-level database of health care resources from several surveys and data sources, compiled by the Health Resources and Services Administration (HRSA).

- Quality of care in managed care organizations, provided through the National Committee for Quality Assurance (see: http://www.ncqa.org/). (Local managed care organizations can be an important source of local data on health care quality).

- The Henry J. Kaiser Family Foundation's Web site (http://kff.org/statepolicy/index.cfm), a rich source of health and other information at the State-level compiled from many public databases and published studies.

Using Published Studies and Readily Available Data To Develop State or Local Estimates

Before resources are invested in data collection targeted to an improvement goal, some information can be assembled from existing sources and published research studies. Sometimes published studies on a topic can be used to derive estimates at the State or local level. These "ballpark estimates" should be replaced by more accurate local data when they are available.

To assess the impact of diabetes on the State, studies of diabetes nationally might be used. For example, if a national study shows how subgroups differ in diabetes prevalence or costs and provides estimates by those general subpopulations (e.g., age groups), then those general subpopulation characteristics in the State (or locale) can be applied to the national rates, thus resulting in State (or local) estimates for diabetes.

The more detailed and compatible the data are across sources, the better the estimate will be. However, existing data details are seldom sufficient, which limits the confidence of estimates that can be made from existing tables and published estimates. When this is the case, original analyses of the underlying data may be necessary. When actual data are available from State agencies for all or part of the information components, they are preferable to estimations from national data.

Two examples of deriving State estimates from national data and studies are presented here: 1) Medicaid spending on diabetes care, and 2) total cost burden of diabetes, by State.

Example One—Medicaid Spending on Diabetes Care: This example derives estimates of spending on diabetes care for State Medicaid agencies using the following components:

- National diabetes prevalence by age and by race/ethnicity separately.
- State Medicaid populations by age and by race/ethnicity separately.
- National expenditures related to diabetes for a younger and older adult population from a published study to derive the estimates.

Components	**Location of Data**
Diabetes prevalence rates for 2002	CDC National Diabetes Fact Sheet available at: http://www.cdc.gov/diabetes/pubs/factsheet.htm)
Medicaid populations for each State, by age and separately by race for 1998	CMS Web site: http://www.cms.gov/medicaid/msis/mstats.asp
Change in Medicaid enrollment between 1998 and 2002	CMS Web site: http://www.cms.hhs.gov/medicaid/managedcare/enrolstats.asp.
Expenditures per person with diabetes by age group for 2002	American Diabetes Association funded article: Hogan, Dall, and Nikolov, 2003

Table 2.2 shows the *estimated* expenditures. They are ballpark estimates of such spending likely occurring across State Medicaid agencies. (Figure C.1 in Appendix C charts the flow of data, assumptions, and calculations made to devise the Medicaid spending estimates for diabetes.)

Although the Medicaid population is primarily women and children, the diabetes population is disproportionately elderly. Data from each source were reconfigured to reflect the same underlying population and adjusted to reflect the same year of reference to make data compatible across sources. Because prevalence and cost are so different by age, the estimates were first generated separately for the adult nonelderly population and the elderly population and then were reassembled. Children and youth under 20 were excluded because certain pieces of information were unavailable for them and because prevalence of diabetes (type 1 and type 2) among them is small (0.25 percent).

Another consideration for diabetes is its higher prevalence among certain racial and ethnic groups. Prevalence rates by race/ethnicity were applied to those respective subgroups of Medicaid. Also, Medicaid enrollees of unknown age or race/ethnicity were distributed in proportion to the known age or known race/ethnicity subgroups. Finally, data from different years were adjusted to be compatible.

The estimates in Table 2.2 have limitations. The obvious limitations in these estimates include omission of spending for children and the institutionalized population. First, although spending for children and youth under age 20 is omitted, only 0.25 percent of this population has diabetes and the effect is likely to be small. Second, the omission of the institutionalized population is a more serious downward bias on spending estimates, because people with advanced stages of diabetes are more likely to be hospitalized or to reside in nursing homes and their care is costly. Third, however, for people dually eligible for Medicaid and Medicare (which is most of this Medicaid population over 60 years of age), some of the expenditures for diabetes will be paid for by Medicare and not by Medicaid, which results in higher estimates here than should be the case. The net effect of these latter two offsetting biases cannot be determined from these data. Fourth, the inclusion of spending for *all* medical care for people with diabetes 20 years of age and over is included in these estimates (rather than only the spending related to diabetes) because medical expenditures by type and age could not be identified readily. This overestimates expenditures related to diabetes care. The net effect of all of these limitations is unclear. What is clear is that a State's Medicaid data will be a more accurate source for calculating expenses for Medicaid related to diabetes.

One should note that the estimates presented in Table 2.2 are approximations to State Medicaid spending on diabetes. Estimates calculated from State Medicaid information systems for diabetes prevalence and actual Medicaid payments would be more accurate.

The estimates here can be useful for understanding the implications of diabetes for health care costs and the possible returns from investment in diabetes care quality. States governments (e.g., State Medicaid Directors) may have *actual* costs of diabetes for their population. If so, then these actual costs would be preferable to estimates based on national averages from various data sources. Corroboration from external sources can increase the confidence in State and local estimates based on different methods.

Table 2.2. Medicaid eligible population and their estimated diabetes prevalence and expenditures for medical care, for people 20 to 60 and over 60 years of age, 2002

STATE	Medicaid population age 20-60 with diabetes a/	Estimated Medicaid expense for age 20-60 with diabetes b/	Medicaid population age over 60 with diabetes a/	Estimated Medicaid expense for age over 60 with diabetes b/	Total estimated Medicaid spending on diabetes for age 20 and over
Total US	1,104,393	$6,691,519,926	1,234,060	$12,244,344,613	$18,935,864,539
Alabama	16,139	$97,786,487	30,021	$297,863,727	$395,650,213
Alaska	3,416	$20,696,843	1,608	$15,951,349	$36,648,191
Arizona	24,241	$146,878,240	14,428	$143,158,151	$290,036,390
Arkansas	12,060	$73,073,291	19,765	$196,103,945	$269,177,236
California	154,444	$935,778,273	164,179	$1,628,984,597	$2,564,762,870
Colorado	8,945	$54,198,187	11,209	$111,215,523	$165,413,709
Connecticut	10,345	$62,681,330	13,247	$131,433,590	$194,114,920
Delaware	3,965	$24,024,372	2,641	$26,206,829	$50,231,201
District of Columbia	4,115	$24,932,252	3,682	$36,530,630	$61,462,882
Florida	59,911	$363,001,878	80,423	$797,959,288	$1,160,961,166
Georgia	31,265	$189,432,237	51,583	$511,808,316	$701,240,553
Hawaii	4,343	$26,313,580	4,462	$44,268,070	$70,581,649
Idaho	3,594	$21,775,718	3,617	$35,888,349	$57,664,066
Illinois	50,312	$304,838,613	41,713	$413,879,086	$718,717,699
Indiana	16,061	$97,315,816	20,957	$207,933,209	$305,249,025
Iowa	8,202	$49,696,633	9,509	$94,347,231	$144,043,864
Kansas	6,058	$36,704,388	8,244	$81,794,963	$118,499,351
Kentucky	16,286	$98,677,149	19,566	$194,130,660	$292,807,809
Louisiana	20,479	$124,080,732	29,083	$288,563,572	$412,644,304
Maine	5,871	$35,574,379	6,425	$63,744,253	$99,318,631
Maryland	19,327	$117,103,176	19,502	$193,497,238	$310,600,414
Massachusetts	19,055	$115,454,366	21,937	$217,662,310	$333,116,677
Michigan	33,112	$200,622,985	27,522	$273,077,247	$473,700,232
Minnesota	13,527	$81,957,821	15,645	$155,227,037	$237,184,858
Mississippi	16,915	$102,485,557	30,338	$301,012,315	$403,497,872
Missouri	19,408	$117,592,266	27,210	$269,979,742	$387,572,008
Montana	2,479	$15,019,044	2,064	$20,482,641	$35,501,686
Nebraska	4,579	$27,746,927	5,168	$51,274,605	$79,021,532
Nevada	4,150	$25,147,103	5,368	$53,259,836	$78,406,939
New Hampshire	1,918	$11,622,832	2,537	$25,173,457	$36,796,289
New Jersey	21,327	$129,217,531	33,348	$330,874,754	$460,092,286
New Mexico	7,452	$45,153,897	6,920	$68,657,694	$113,811,592
New York	134,596	$815,518,728	136,338	$1,352,749,703	$2,168,268,431
North Carolina	31,420	$190,371,883	45,614	$452,577,712	$642,949,595
North Dakota	1,571	$9,517,426	2,395	$23,763,607	$33,281,033
Ohio	45,065	$273,050,363	44,493	$441,461,386	$714,511,749
Oklahoma	11,635	$70,495,489	19,067	$189,186,000	$259,681,489
Oregon	16,299	$98,754,168	8,205	$81,412,586	$180,166,753
Pennsylvania	45,216	$273,960,774	42,554	$422,218,995	$696,179,769
Rhode Island	4,363	$26,433,470	5,676	$56,315,654	$82,749,124
South Carolina	23,812	$144,278,202	27,174	$269,622,304	$413,900,506
South Dakota	2,064	$12,506,671	2,411	$23,924,684	$36,431,354
Tennessee	42,000	$254,480,714	29,185	$289,575,174	$544,055,887
Texas	52,326	$317,043,535	83,169	$825,205,171	$1,142,248,706
Utah	4,871	$29,514,717	2,635	$26,141,595	$55,656,313
Vermont	3,652	$22,125,350	3,586	$35,583,924	$57,709,274
Virginia	13,305	$80,613,921	21,200	$210,344,914	$290,958,835
Washington	22,260	$134,874,201	16,739	$166,079,913	$300,954,114
West Virginia	8,117	$49,180,771	6,504	$64,536,008	$113,716,779
Wisconsin	17,605	$106,666,334	25,904	$257,017,269	$363,683,603
Wyoming	1,473	$8,923,032	1,231	$12,209,304	$21,132,337

a/ The estimates for diabetes prevalence among Medicaid eligibles were derived by applying national diabetes prevalence estimates by age and race to the number of Medicaid eligibles by age and race. National diabetes prevalence estimates by age and race were compiled by the Centers for Disease Control and Prevention (CDC) in the National Diabetes Fact Sheet, using data from: National Health Interview Survey (NHIS), the National Health and Nutrition Examination Surveys (NHANES III and NHANES 1999-2000), National Hospital Discharge Survey (NHDS), and surveys of the Behaviorial Risk Factor Surveillance System (BRFSS) among others. The Fact Sheet is available at: http://www.cdc.gov/diabetes/pubs/factsheet.htm.

b/ The costs are based on estimates from Hogan, Dall, Nikolov (2003) for people with diabetes age 0-64 ($6,059 per person) and those over age 64 ($9,922 per person). Because diabetes expenditures per capita are lower for younger age groups, this method probably underestimates the cost of diabetes for Medicaid recipients age 20 years and over.

Example Two—Estimates of the cost burden of diabetes for each State: This example estimates the total cost of diabetes care for each State's total population. The total cost of diabetes care includes its direct and indirect costs. *Direct costs* are directly associated with treatment of the disease, including medical expenditures for routine services, treatment of complications, and the increase in general medical conditions attributable to diabetes. *Indirect costs* are dollar estimates associated with decreased productivity, disability, and premature death. At the end of this section is an exercise for calculating a State's costs with different assumptions that might be generated from State data.

Table 2.3 shows estimates of the cost of diabetes for each State's total population using readily available data and following the methods of Hogan, Dall, and Nikolov (2003). This is a more direct calculation than the Medicaid calculation because a State's total population is more likely to have characteristics similar to the total U.S. population than is the Medicaid population.

Table 2.4 is a step-by-step exercise that shows how the estimates were generated; it provides a guide to States who want to use different assumptions. The data needed include: the size of the State population, the prevalence of diabetes in the State, and estimates of the cost burden. For the estimates in Table 2.3, the State populations are from the U.S. Bureau of the Census (see: http://eire.census.gov/popest/data/states/tables/NST-EST2003-01.php). State-level diabetes prevalence is available through the CDC at: http://www.cdc.gov/diabetes/statistics/prev/state/table15.htm.

The direct and indirect costs of medical care for individuals with and without diabetes were estimated for the Nation by Hogan, Dall, and Nikolov (2003). Although they used diabetes prevalence estimates from the National Health Interview Survey (NHIS), the estimates in Table 2.3 use the CDC's BRFSS prevalence data because they were available by State. Thus, the estimates of State-level direct and indirect costs when summed across all States differ slightly from the Hogan and colleagues' national estimate of cost burden.

For direct cost per person with diabetes, estimates from Hogan et al. are used. Their total direct cost burden per person *with* diabetes in 2002 is $13,243 and their estimate per person *without* diabetes is $2,560. The $10,683 difference is used in Table 2.3 to net out the regular medical care costs for patients with diabetes (that is, cost unrelated to diabetes and its sequelae). The $10,683 cost is then multiplied by the State diabetes prevalence to derive the State estimate for the direct cost of care for diabetes.

For indirect cost per person with diabetes, the Hogan et al. estimate ($3,289 annually) is multiplied by the State diabetes prevalence to derive the State indirect cost estimate. The total cost burden is the sum of the direct and the indirect diabetes costs for each State.

Table 2.3. Estimates of the direct, indirect and total cost burden of diabetes , by State, for 50 States and District of Columbia, 2002

State	Population estimate (in 1,000s) a/	Diabetes prevalence (in 1,000s) b/	Percent with diabetes	*Direct* medical cost of diabetes c/	*Indirect* cost of diabetes d/	Total cost burden of diabetes
United States	288,369	14,569	5.1%	$155,640,627,000	$47,917,441,000	$203,558,068,000
Alabama	4,487	303	6.8%	$3,236,949,000	$996,567,000	$4,233,516,000
Alaska	644	17	2.6%	$181,611,000	$55,913,000	$237,524,000
Arizona	5,456	244	4.5%	$2,606,652,000	$802,516,000	$3,409,168,000
Arkansas	2,710	158	5.8%	$1,687,914,000	$519,662,000	$2,207,576,000
California	35,116	1,754	5.0%	$18,737,982,000	$5,768,906,000	$24,506,888,000
Colorado	4,507	149	3.3%	$1,591,767,000	$490,061,000	$2,081,828,000
Connecticut	3,461	158	4.6%	$1,687,914,000	$519,662,000	$2,207,576,000
Delaware	807	43	5.3%	$459,369,000	$141,427,000	$600,796,000
District of Columbia	571	36	6.3%	$384,588,000	$118,404,000	$502,992,000
Florida	16,713	1,000	6.0%	$10,683,000,000	$3,289,000,000	$13,972,000,000
Georgia	8,560	432	5.0%	$4,615,056,000	$1,420,848,000	$6,035,904,000
Hawaii	1,245	55	4.4%	$587,565,000	$180,895,000	$768,460,000
Idaho	1,341	55	4.1%	$587,565,000	$180,895,000	$768,460,000
Illinois	12,601	625	5.0%	$6,676,875,000	$2,055,625,000	$8,732,500,000
Indiana	6,159	317	5.1%	$3,386,511,000	$1,042,613,000	$4,429,124,000
Iowa	2,937	134	4.6%	$1,431,522,000	$440,726,000	$1,872,248,000
Kansas	2,716	122	4.5%	$1,303,326,000	$401,258,000	$1,704,584,000
Kentucky	4,093	209	5.1%	$2,232,747,000	$687,401,000	$2,920,148,000
Louisiana	4,483	237	5.3%	$2,531,871,000	$779,493,000	$3,311,364,000
Maine	1,294	68	5.3%	$726,444,000	$223,652,000	$950,096,000
Maryland	5,458	277	5.1%	$2,959,191,000	$911,053,000	$3,870,244,000
Massachusetts	6,428	279	4.3%	$2,980,557,000	$917,631,000	$3,898,188,000
Michigan	10,050	560	5.6%	$5,982,480,000	$1,841,840,000	$7,824,320,000
Minnesota	5,019	169	3.4%	$1,805,427,000	$555,841,000	$2,361,268,000
Mississippi	2,872	185	6.4%	$1,976,355,000	$608,465,000	$2,584,820,000
Missouri	5,673	285	5.0%	$3,044,655,000	$937,365,000	$3,982,020,000
Montana	909	37	4.1%	$395,271,000	$121,693,000	$516,964,000
Nebraska	1,729	70	4.0%	$747,810,000	$230,230,000	$978,040,000
Nevada	2,173	94	4.3%	$1,004,202,000	$309,166,000	$1,313,368,000
New Hampshire	1,275	55	4.3%	$587,565,000	$180,895,000	$768,460,000
New Jersey	8,590	426	5.0%	$4,550,958,000	$1,401,114,000	$5,952,072,000
New Mexico	1,855	82	4.4%	$876,006,000	$269,698,000	$1,145,704,000
New York	19,158	997	5.2%	$10,650,951,000	$3,279,133,000	$13,930,084,000
North Carolina	8,320	433	5.2%	$4,625,739,000	$1,424,137,000	$6,049,876,000
North Dakota	634	27	4.3%	$288,441,000	$88,803,000	$377,244,000
Ohio	11,421	630	5.5%	$6,730,290,000	$2,072,070,000	$8,802,360,000
Oklahoma	3,494	186	5.3%	$1,987,038,000	$611,754,000	$2,598,792,000
Oregon	3,522	156	4.4%	$1,666,548,000	$513,084,000	$2,179,632,000
Pennsylvania	12,335	694	5.6%	$7,414,002,000	$2,282,566,000	$9,696,568,000
Rhode Island	1,070	49	4.6%	$523,467,000	$161,161,000	$684,628,000
South Carolina	4,107	249	6.1%	$2,660,067,000	$818,961,000	$3,479,028,000
South Dakota	761	34	4.5%	$363,222,000	$111,826,000	$475,048,000
Tennessee	5,797	352	6.1%	$3,760,416,000	$1,157,728,000	$4,918,144,000
Texas	21,780	1,082	5.0%	$11,559,006,000	$3,558,698,000	$15,117,704,000
Utah	2,316	66	2.8%	$705,078,000	$217,074,000	$922,152,000
Vermont	617	25	4.1%	$267,075,000	$82,225,000	$349,300,000
Virginia	7,294	333	4.6%	$3,557,439,000	$1,095,237,000	$4,652,676,000
Washington	6,069	256	4.2%	$2,734,848,000	$841,984,000	$3,576,832,000
West Virginia	1,802	133	7.4%	$1,420,839,000	$437,437,000	$1,858,276,000
Wisconsin	5,441	214	3.9%	$2,286,162,000	$703,846,000	$2,990,008,000
Wyoming	499	18	3.6%	$192,294,000	$59,202,000	$251,496,000

a/ Source: Population Division, US Census Bureau; Release Date: December 20 2002. Table ST-EST2002-01 Available at: http://eire.census.gov/popest/data/states/tables/ST-EST2002-01.php

b/ Source: CDC, Diabetes Surveillance System. Available at: http://www.cdc.gov/diabetes/statistics/index.htm#prevalence

c/ Estimated direct medical cost per year per person with diabetes is $10,683 in excess of the cost of people without diabetes (Hogan, Dall, Nikolov, 2003)

d/ The estimated indirect cost per year per person with diabetes is $3,289 (Hogan, Dall, Nikolov, 2003)

Table 2.4: Estimating the cost burden of diabetes for a State in 2002	
Step 1: Total prevalence: Find the total diabetes prevalence for the State in 2002, using CDC data.	**1.**_____
Step 2: Direct cost of diabetes care: Multiply the answer from step 1 by $10,683, which is the estimated excess direct medical cost per person with diabetes for diabetes-related medical care. The resulting number is the direct cost for all people with diabetes in the State in 2002.	**2.**_____
Step 3: Indirect cost of diabetes care: Multiply the answer from step 1 by $3,289, which is the estimated indirect cost per person with diabetes. The resulting number is the indirect cost for all people with diabetes in the State in 2002.	**3.**_____
Step 4: Total cost burden for people with diabetes: Add the answers from step 2 and step 3. The result is the total cost burden of diabetes in the State.	**4.**_____

Source for dollar multipliers: Hogan, Dall, and Nikolov (2003).

Summary and Synthesis

This module orients users to the importance of data as the foundation of the quality improvement cycle. Data are essential for assessing the situation and measuring the impact of a quality improvement project. Without it, State leaders could spend effort and resources without accomplishing the most important goal—improving the health outcomes of their residents. Data, used effectively, should guide the quality improvement process and enhance a team's effectiveness in focusing on the right goal and making the right decisions.

Module 2 describes two components of data collection for quality improvement: 1) measurement and 2) data sources. The *National Healthcare Quality Report* and the *National Healthcare Disparities Report* now provide easy access to the health care quality measures and related data sources that are national (and sometimes State-level) in scope. This module highlights the diabetes-related measures and data in those reports.

Important considerations when using data include data limitations and making certain that comparison data are truly comparable to the State-level data. Taking an inventory of existing State and local data sources and using existing national data and studies can help to fill in gaps in local data, at least in the planning stages of a quality improvement program.

Once data have been identified or collected, the next step is analyzing and translating those data into information that can be used to make policy-level decisions. Module 3: Information interprets the data from a State perspective and begins to explore its meaning.

Resources for Further Reading

Data and Data Tools on the Internet

Many data resources are available on the Internet, including many sources used in the NHQR and NHDR. Some Web sites allow users to manipulate the data to produce tables and other useful outputs. Such resources include:

- **HCUPnet**
  http://www.ahrq.gov/hcupnet/

  HCUPnet allows users to select national statistics, or detailed statistics for certain States, for various conditions and procedures. The interactive program also allows users to compare types of patients and types of hospitals.

- **HCUP User Support (HCUP-US)**
  http://www.hcup-us.ahrq.gov/home.jsp

  This Web site is designed to answer HCUP-related questions; provide detailed information on HCUP databases, tools, and products; and offer assistance to HCUP users.

- **MEPSnet**
  http://www.meps.ahrq.gov/MEPSNet/IC/MEPSnetIC.asp

  This Web site offers users statistics and trends about health care expenditures, utilization, and health insurance, including national and regional health insurance estimates.

- **BRFSS Annual Survey data**
  http://www.cdc.gov/brfss/technical_infodata/index.htm

  This Web site has detailed technical information about the survey in addition to downloadable data sets in ASCII and SAS formats.

- **BRFSS**
  http://www.cdc.gov/brfss/

  This Web site provides useful background information about the BRFSS implementation, technical information, and documentation.

- **DATA2010**
  http://wonder.cdc.gov/data2010/

  This Web site includes data from a number of different State and national data sources and can be used to monitor the objectives for Healthy People 2010.

Diabetes Registries

Some additional Web sites offer links to useful tools and information to facilitate data collection at the local level. Two Web sites that offer instruction for implementing disease registries to track the treatments received by people with diabetes and other chronic conditions are:

- http://www.healthdisparities.net/training_manuals_and_tools.html

  This Web site, associated with the HRSA Health Disparities Collaboratives, offers a number of useful tools, including helpful information for creating and assessing computer registries.

- http://www.chcf.org/documents/chronicdisease/ComputerizedRegistriesInChronicDisease.pdf

  This Web site offers a primer on the use of disease registries for a variety of chronic conditions, including diabetes.

Other Useful Web Sites

Agency for Healthcare Research and Quality:	http://www.ahrq.gov/
AHRQ Quality Indicators	http://www.qualityindicators.ahrq.gov
National Committee on Quality Assurance:	http://www.ncqa.org/
National Diabetes Quality Improvement Alliance:	http://www.nationaldiabetesalliance.org/
National Quality Forum:	http://www.qualityforum.org/
National Guideline Clearinghouse:	http://www.guideline.gov/

Associated Appendixes for Use With This Module

Appendix A: Acronyms Used in This Resource Guide

The acronyms employed to describe the organizations endorsing the NHQR quality measures are described in Appendix A, along with all other acronyms used throughout this *Resource Guide*.

Appendix B: List of All NHQR Data Sources, Including Those Supporting State Estimates

Appendix B lists the 25 data sources used in the NHQR and highlights the 10 data sources that provided State-level data in the NHQR.

Appendix C: Additional Data Resources Related to Diabetes Care Quality

Appendix C lists additional data resources that may be helpful in studying diabetes care in a State. It includes separate sections, with accompanying tables, on the NHQR measures selection process (see Table C.1), details on data source description and limitations (Tables C.2-C.10), and steps for estimating Medicaid spending on diabetes care by State (Figure C.1). Details on notable differences between MEPS and BRFSS national rates are included, as well as further information on the data sources for the process and outcome measures discussed in this module.

Module 3: Information – Interpreting State Estimates of Diabetes Quality

Module Overview:

1) Deriving Information From Data
2) Step 1: Identifying Appropriate Metrics and Comparisons
    a. Benchmark Metrics for States
    b. Understanding State Variation
    c. Four States Compared to Benchmarks
3) Step 2: Interpreting the Data: What Does It Mean?
    a. Factors That Affect the Quality of Diabetes Care
    b. Interpreting Process and Outcome Measures Together
4) Summary and Synthesis
5) List of Associated Appendixes for Use With This Module

Key Ideas in Module 3:

- The need for information for understanding and planning is the reason to assemble data on diabetes care.
- Analysis of the NHQR data tables can answer some key questions for States:
    - What measures should be used to set goals for quality diabetes care?
        - Consensus-based measures with national endorsements
    - What goals should be set as targets for specific measures?
        - Best-in-class estimates of achievable and practical levels
    - What factors influence a State's position among other States?
        - Health system factors, consumer behaviors, and immutable population attributes
- Process and outcome measures should be considered together to assess a State's diabetes care quality.
- State-level baseline estimates of diabetes care allow States to assess their starting point and to evaluate their progress over time.
- State-level baseline estimates across *all conditions* studied in the NHQR afford State leaders a broad view of health care quality in their State.

Deriving Information From Data

Data do not necessarily convey information. Information comes from data that have been collected, analyzed and arranged to answer a question. Deriving information from data usually requires original data collection designed to answer the question. However, "secondary" use of data collected for another purpose can often lead to powerful information, obtained efficiently.

Both original and secondary data collection require strategies for summarizing and interpreting the results. For example, to determine how well the health care system has educated and motivated people with diagnosed diabetes to control their blood glucose levels requires original data collection of HbA1c laboratory values from clinical records. The resulting values of HbA1c levels must be summarized (e.g., using overall averages), explored by relevant subgroups (e.g., managed care versus private practice to determine how well providers in different settings educate and motivate their patients), and interpreted in terms of how well the assembled database answers the question and represents the total population (e.g., data collected from clinical records miss people without access to health care with undiagnosed diabetes).

Secondary data assembled from various sources for the NHQR address the overarching question of how well the U.S. health care system provides health care for U.S. residents. Although State-specific estimates are provided in the NHQR for many measures, they are not fully analyzed there from a State perspective.

Steering committees for State quality improvement programs need information to answer many questions on the State's health care quality performance. Among them are:

- What measures should the State use to assess health care quality?
- What metrics and comparisons for each measure should be used to compare with the State?
- What does the State's position among other States mean?
- What goals should be set for quality improvement?

While *all* the questions that a quality improvement committee might raise will not be answerable from data in the NHQR, it is a valuable source for identifying readily available and consensus-based measures, for locating national averages, for deriving other benchmarks, and for selecting achievable targets for improvement. This module shows how to do these things from a State viewpoint. Module 2 presented a minimum set of measures from the NHQR that can be used for assessing diabetes quality within the State. Module 3 uses that measure set to describe two steps:

Step 1: Identifying appropriate metrics and comparisons

Step 2: Interpreting the State's position among other States

While the specific questions that State leaders ask about the quality of health care in the State will determine the comparisons to be made, below is a general guide to thinking about and using the data in the NHQR to create information for State quality improvement programs.

Step 1: Identifying Appropriate Metrics and Comparisons

Benchmark Metrics for States

The NHQR provides a national set of estimates and some State estimates that can be used as benchmarks for quality improvement. A benchmark is an external marker for assessing how one entity, for example a State, compares. The benchmark can represent the best performer or the average performer. How the State fares depends on what the benchmark is.

Several types of metrics or benchmarks can be used for assessing a State. From more to less stringent, they include:

- The **theoretic limit** of aiming for 100-percent achievement (or 0-percent occurrence for avoidable events), which is an ideal but often impractical goal

- A **best-in-class estimate** of the top State or top tier of States (the top 10 percent of States is used in this *Resource Guide*), which shows what has been achieved

- A **national consensus-based goal**, such as Healthy People 2010, set by a consensus of experts; such goals may be set more or less stringently than other benchmarks

- A **national average** over all States, which shows the norm of practice nationwide but, being an average estimate, will represent a weaker goal than the best-in-class estimate

- A **regional average**, which a State can use to compare itself to other States that are more likely to face similar environments, but as a goal it will be less aggressive than the best-in-class goal

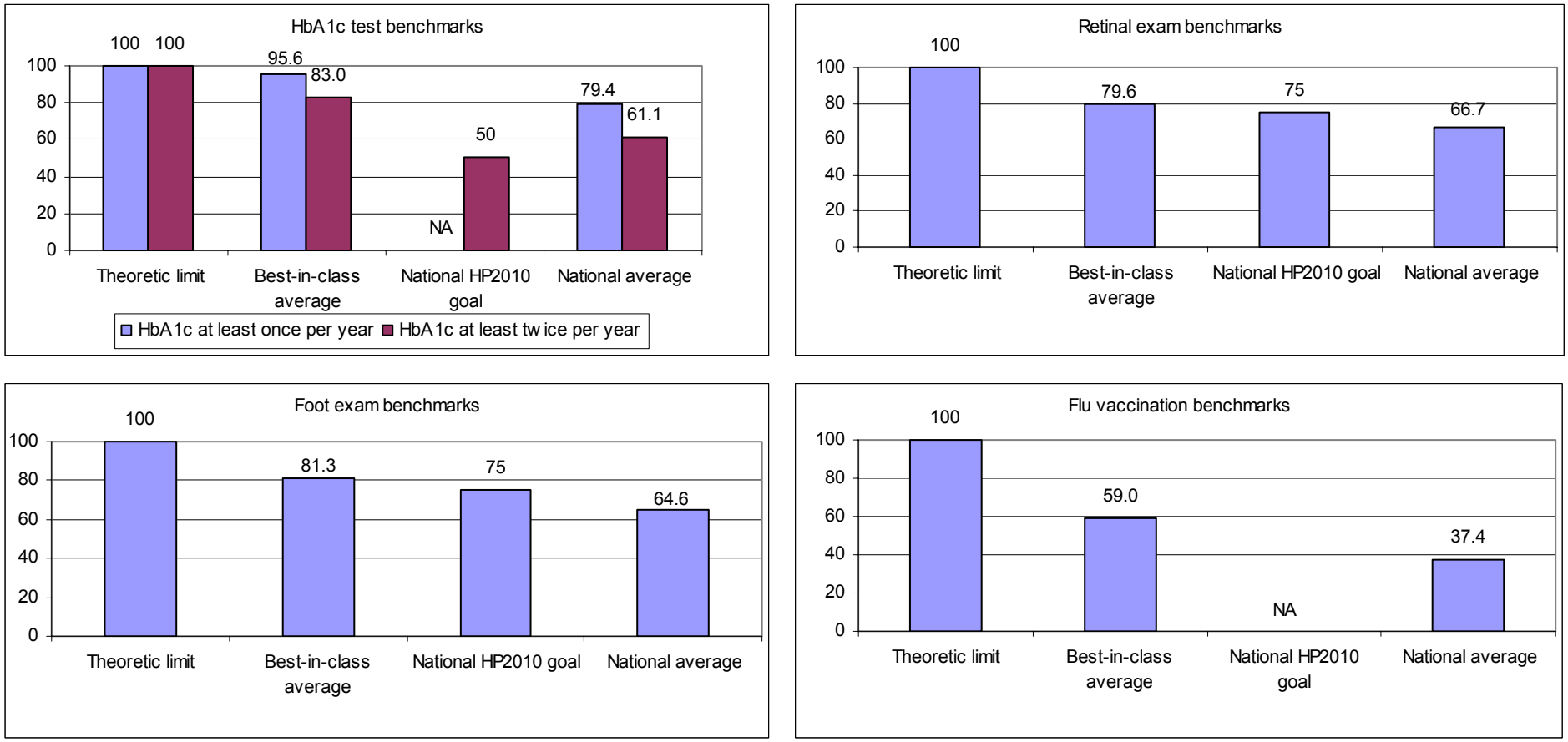
- An **individual State rate**, which itself can be used as a baseline against which to evaluate State-level interventions and progress over time within the State or to offer as a norm for local provider comparisons

Most of these benchmarks can be found in or derived from the NHQR. The best-in-class estimate is not reported in the NHQR, nor is the regional norm based on BRFSS data. Both, however, can be derived from data in the NHQR. Detail on how the best-in-class estimate and other benchmarks are derived is given in Appendix D.

These benchmarks for each of the diabetes care-related measures in the NHQR are reported in Table D.1 in Appendix D. These benchmarks for four measures—HbA1c test, eye exam, foot exam, and flu vaccinations—are graphically displayed in Figure 3.1.

For HbA1c testing, for example, Figure 3.1 shows a range of benchmark values. Though the theoretic limit may be difficult to achieve for many valid reasons, the best-in-class estimate has been achieved by some States. The national average is often used to assess a State's performance. However, Figure 3.1 makes it clear that the national average is not a very difficult level to achieve; about half of the States are above and about half are below that average. The same is true for regional estimates that take into account the practice patterns in different regions of the country.

Figure 3.1. Benchmarks of important tests for adults* who have diabetes, 2001



Source: Derived from the NHQR, 2003, based on CDC BRFSS

*All adults, except for flu vaccination which is for age 18 to 64.

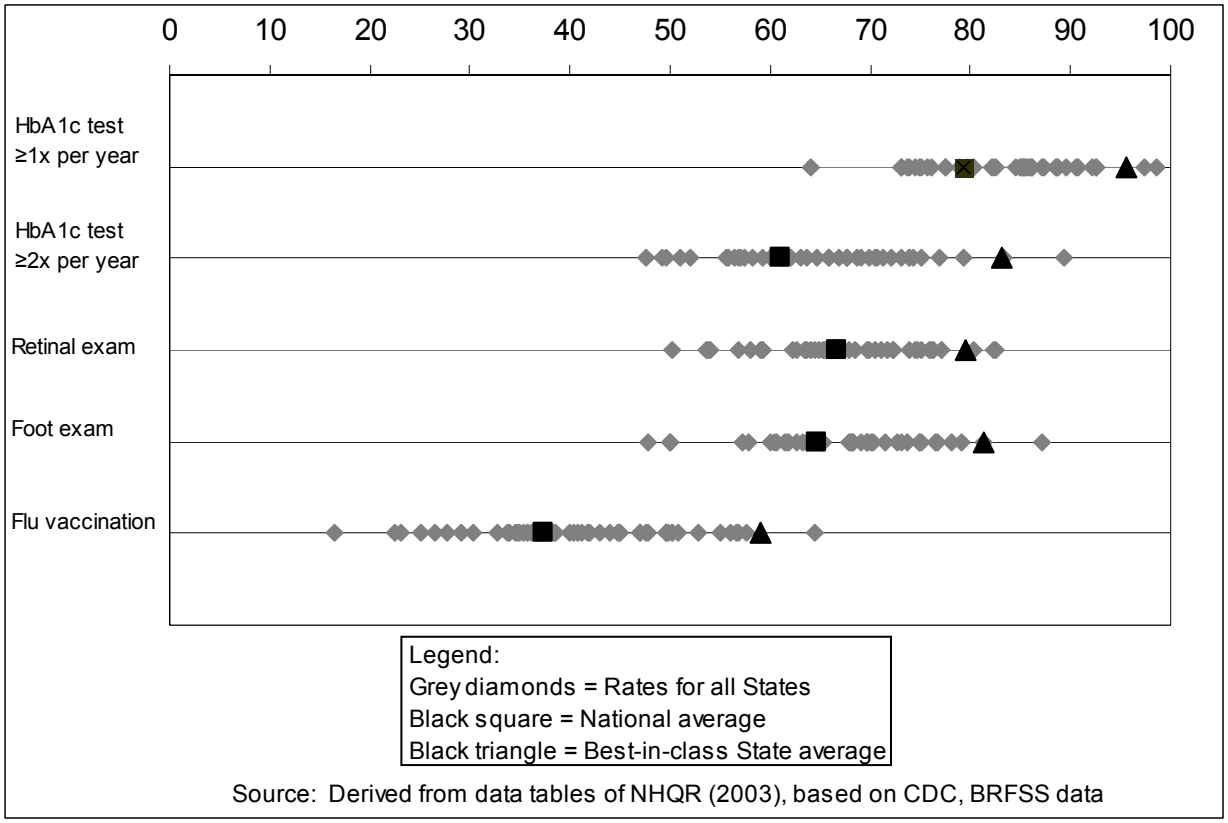
For the eye and foot exam process measures in Figure 3.1, the best-in-class average is above the national Healthy People 2010 goal, which itself still exceeded the national average in 2001. The influenza vaccinations for adults with diabetes have the lowest rates of these process measures partially because adults over age 64 are excluded from this measure (while they are included in the other three measures). Moreover, Healthy People 2010 did not set a goal for influenza immunization of this population.

Understanding State Variation

Although comparing the State's rate to a benchmark shows how far or close the State's rate is from the benchmark, it gives few clues as to the State's position among all other States. If a State's rate is below the national average, is it the lowest of the low States? Or, is it doing better than all the other States that are below the national norm? Knowing this ranking can help a State understand how much effort might be needed to catch up with health care quality in other States.

Average benchmark values do not reveal the degree of variation that exists on any one measure across the Nation. Variation among States can be seen on a scatter diagram, where each State represents one point on the graph. Other indicators can be added to and identified on that scatter diagram with different symbols. Figure 3.2 shows (as gray diamonds) the distribution of State rates for important tests that should be performed each year for people with diabetes. It superimposes the national average as a black square and the best-in-class average as a black triangle.

Figure 3.2. Percent of adults age 18 and over with diabetes who had an important test at least once in past year, age adjusted, all States and benchmarks, 2001



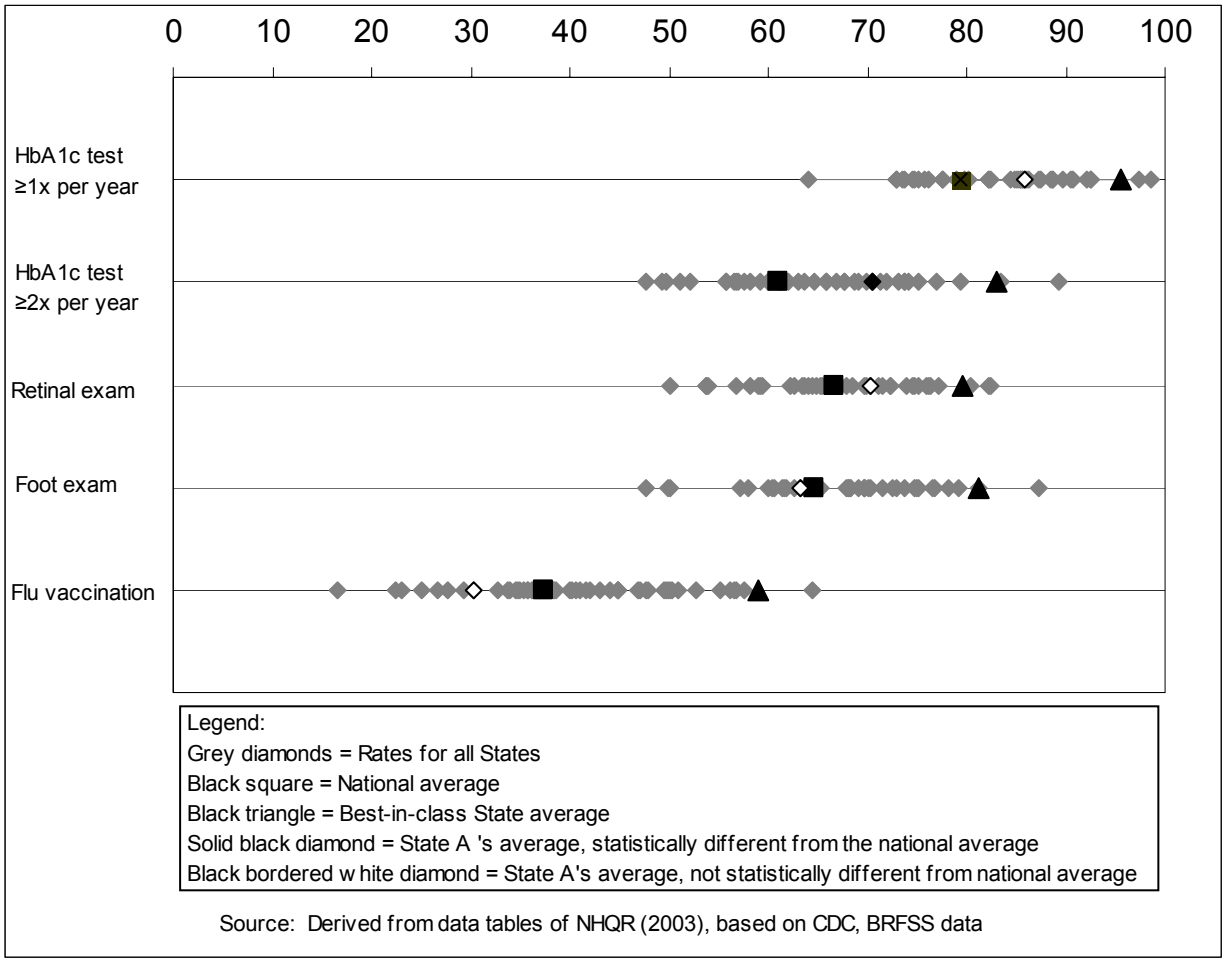
Source: Derived from data tables of NHQR (2003), based on CDC, BRFSS data

Figure 3.2 reveals that immunization for influenza for people with diabetes has the most State variation among the four measures and it has the lowest rates — providers in one State vaccinated only 17 percent

of adults aged 18 to 64 with diabetes. The spread among the States is nearly fourfold, from 17 to 64 percent. Also, the other tests are performed with wide variation — spread from about 50 percent to 80 or 90 percent of adults with diabetes, across the States. Such variation indicates considerable room for improvement for many of the States.

Figure 3.2 was modified to track an individual State (State A) across all the measures of diabetes care quality. For example, in Figure 3.3, State A is represented as a black diamond when it is statistically different from the national average or as a black-bordered white diamond when it is not statistically different from the national average.

Figure 3.3. Tracking your State: Percent of adults age 18 and over with diabetes who had an important test at least once in past year, age adjusted, for State A, all States, and benchmarks, 2001



The solid black diamond in Figure 3.3 shows that State A's rate compared to the national average is considered a statistically significant difference and probably is not attributable to just random variation that appears among the States and within each State. It may well represent some practice difference in State A that is not common nationally. What that difference is caused by cannot be deciphered from these data. Local insights and exploration are needed to understand underlying factors that might influence State A's rate of HbA1c testing.

The black-bordered white diamond in Figure 3.3 indicates that State A's rate compared to the national average is not considered a statistically significant difference and could as easily occur because of random variation as because of any specific practice by health care providers in State A. (Statistical significance and how it is determined is explained in Appendix E.)

In general (although not shown for all States, here), when individual States are tracked across diabetes measures, it becomes apparent that there is uneven performance across measures. No single State consistently ranks highest or lowest across all measures. Thus, all States have some room for improvement compared to national benchmarks and clinical guidelines for the treatment of people with diabetes.

Four States Compared to Benchmarks

To show how States may want to examine their own estimates, four States are compared to national, regional, and best-in-class State-average benchmarks, below. The national average and best-in-class average, when used together, summarize key information across the States and enable graphical comparisons to be simplified as bar charts (see Figures 3.4.A-3.4.D).

In the bar charts, statistical significance from the national average is represented by a **bold** value at the top of the State bar. State values that are not bold are not statistically distinguishable from the national average. (For a discussion of how to consider statistical significance, see the previous section on Understanding State Variation.) Also, statistical tests have been performed to compare the State average to the best-in-class average. These test results are presented in Table 2.1 in Module 2: Data.

The example States were chosen because each comes from a different region of the country and, at the same time, they represent a range of experiences — States performing above or below the national average on individual measures and States with longstanding and relatively new quality improvement programs in diabetes prevention and control. By using four States, it is easier to show the nuances of making comparisons with limited data. The graphical and statistical analysis below can be applied to any State collecting these measures through the BRFSS.

Each of these States is described in terms of the four diabetes care process measures explored generally above. Descriptions of their quality improvement activities can be found in the Module 4: Action.

Georgia: Figure 3.4.A reveals two facts about diabetes care in Georgia compared to national norms:

- **People with diabetes in Georgia are more likely than the national norm to report having had two or more HbA1c test in the past year.** This is a statistically significant finding and suggests that Georgia health care professionals are aware of the importance of glycemic control, are testing their patients, and may be educating their patients about glycemic control. Whether they are successful in helping their patients control their blood glucose cannot be determined from these data. It is possible that Georgia physicians see a more advanced stage of diabetes among their patients and are therefore more concerned about their patients and are testing them more frequently. Special data collection would be necessary to evaluate the blood glucose levels of people with diabetes in the State and the effectiveness of the better-than-average HbA1c testing in Georgia.

- **Georgia does not differ statistically from the national average on the three process measures that relate to eye exams, foot exams, and influenza vaccination for adults with diabetes**. The absence of a statistically significant difference has to be tempered with the fact that BRFSS samples for individual States are often quite small and probably too small to have the power to detect a difference of the size measured here, even if it exists. Thus, the higher rates of eye exams

(statistically insignificant) are simply inconclusive. When compared to the more stringent benchmark of the best-in-class rates for these measures, however, Georgia is not one of the top 10 percent of States (see Table 2.1). This is especially true for immunization against influenza where there is almost a 30-percentage-point difference between Georgia's rate and the best-in-class average (30 percent versus 59 percent).

Massachusetts: Figure 3.4.B reveals the following about Massachusetts compared to national norms:

- **Massachusetts appears to be close to the national average on all of the NHQR process measures for diabetes care quality, using the test of statistical significance.** However, because of the small sample sizes of the BRFSS, consider the magnitude of the differences from the national average. Massachusetts' average for HbA1c testing two or more times per year is 8 percentage points higher than the average State and for flu immunizations its average is 7 points higher — notable differences. In both cases, however, the amount of variation among the States and within Massachusetts makes these statements equivocal, and the higher values could as likely be due to chance as to better performance.

- **Massachusetts is not among the top decile States when compared to best-in-class estimates.** Massachusetts' lower values are statistically different (see Table 2.1), which means the differences are unlikely to be chance occurrences compared to the top 10 percent of States. This suggests that Massachusetts may want to focus system-wide efforts on improving diabetes care quality.

Michigan: Figure 3.4.C shows that:

- **Michigan is similar to the national average across all States for three of four process measures.** For HbA1c testing two or more times per year, and annual eye exams and foot exams, Michigan rates are not statistically different from the national average and the differences are within 5 percentage points.

- **Michigan is below the best-in-class average.** Michigan is below the best-in-class average on all four measures and the differences are statistically significant (Table 2.1). For two measures in particular, the differences are large. Rates for HbA1c testing two or more times per year in Michigan are 27 percentage points lower than the best-in-class average and rates for influenza immunizations are 32 percentage points lower. This result calls for local study and possibly identifies an opportunity for Michigan to focus activities more widely on HbA1c testing and influenza vaccinations for people with diabetes.

Washington State: Figure 3.4.D shows the following for Washington:

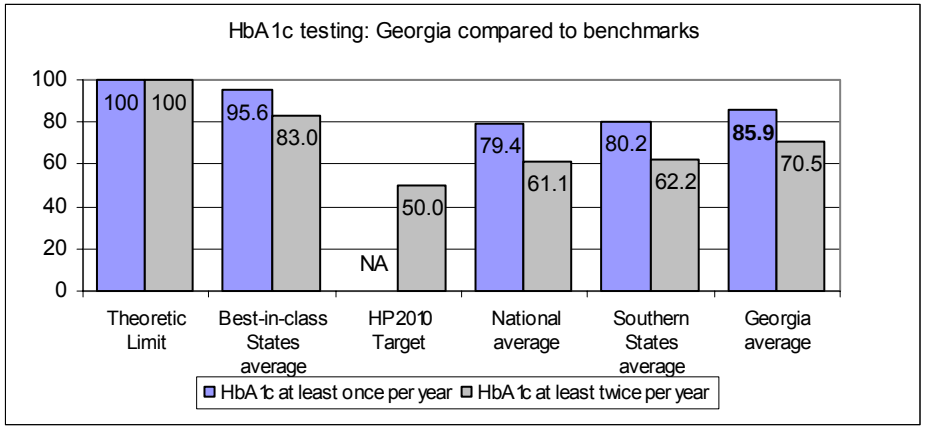
- **Washington State performs better than the national average on influenza immunizations for people with diabetes.** The Washington rate (49.6 percent) is 12 percentage points higher than the national average, and the difference is statistically significant. Furthermore, although Washington is not one of the top decile States (with values averaging 59 percent and ranging from 56 to 64 percent, Table 2.1), Washington did test as not statistically significant from the top decile, given the amount of variation among and within the States. Thus, Washington is doing relatively well in vaccinating its diabetes population. However, given that rates of immunization are low in all States, benefits are possible from activities aimed at improving immunization of people with diabetes against influenza.

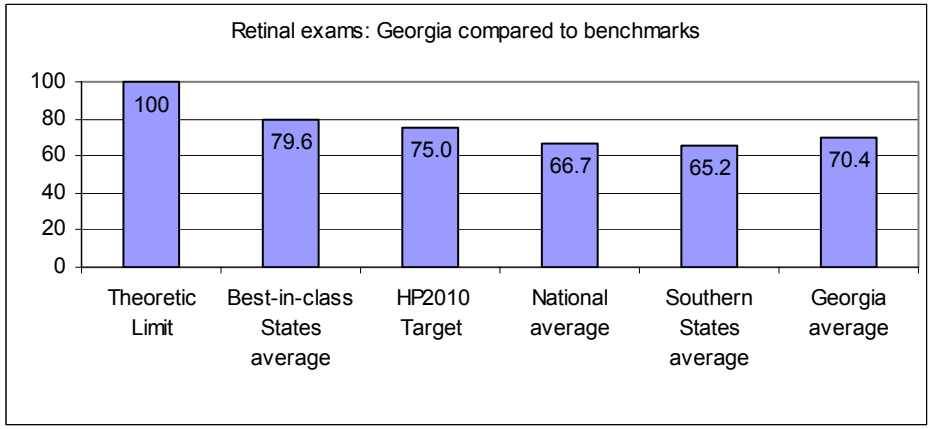
- **Washington is similar to the national average on the other three process measures.** Rates for the State are similar to the national average for HbA1c tests two or more times per year, and annual eye

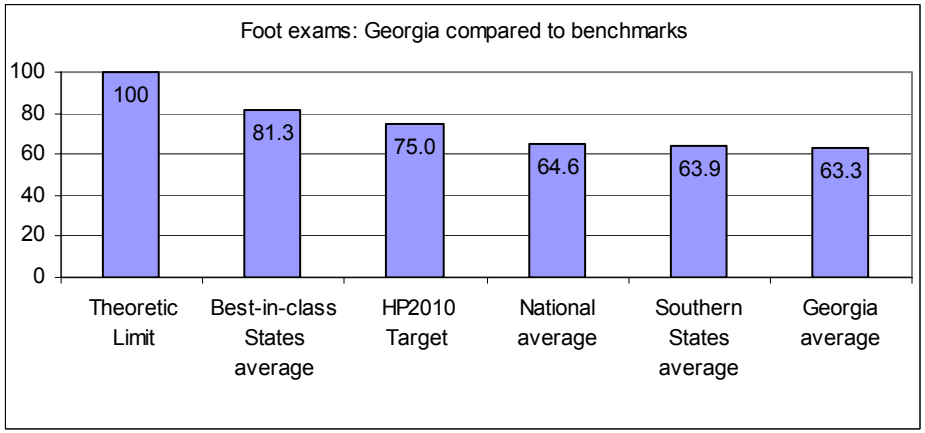
exams, and foot exams. Washington's rates are higher than, but within 5 percentage points, of the national average. Washington, however, is not among the top decile States when compared with best-in-class averages (see Table 2.1).

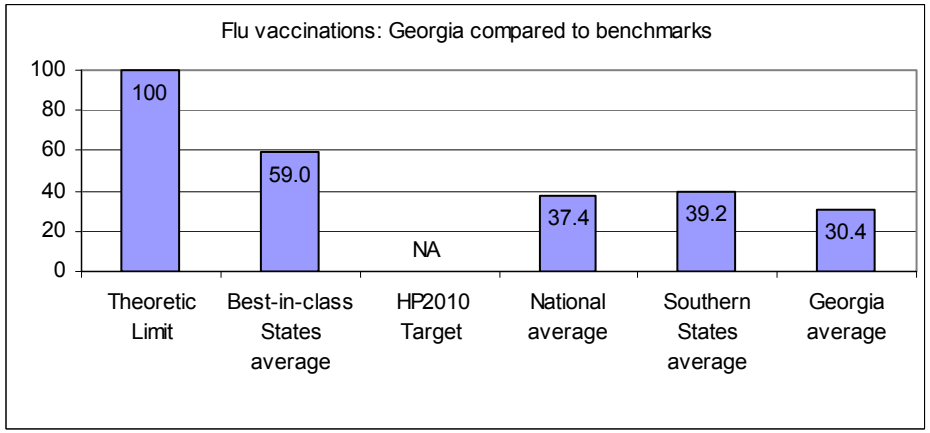
Keep in mind that data on diabetes process measures provide a partial picture of diabetes care in each State. Outcome measures would be a valuable addition for understanding the impact of care processes in each State. The NHQR provided one of its diabetes outcome measures — avoidable admissions for uncontrolled, uncomplicated diabetes — by 14 States including the four example States reviewed above. These data are discussed in Step 2.

Figure 3.4.A. Percent of adults* with diabetes, who had an important test at least once in past year, age adjusted, for Georgia compared to benchmarks, 2001





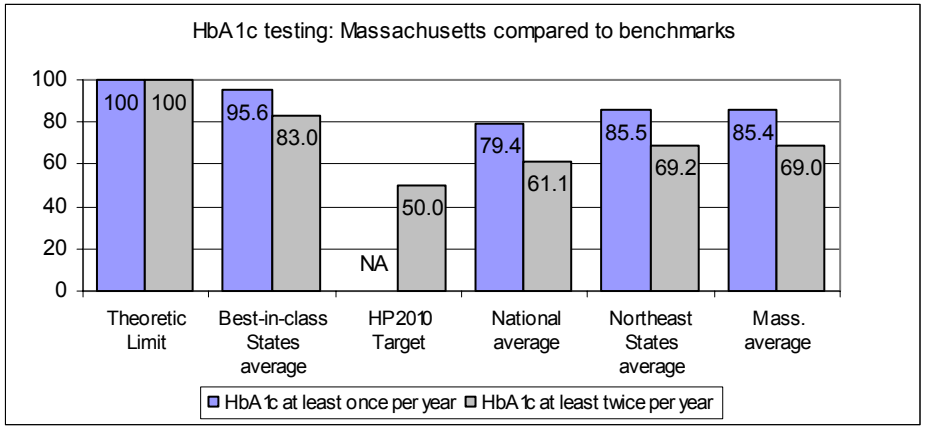


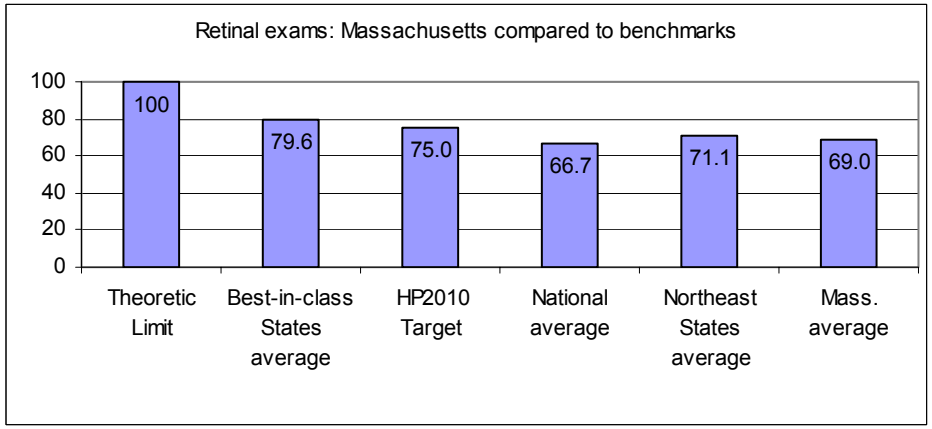


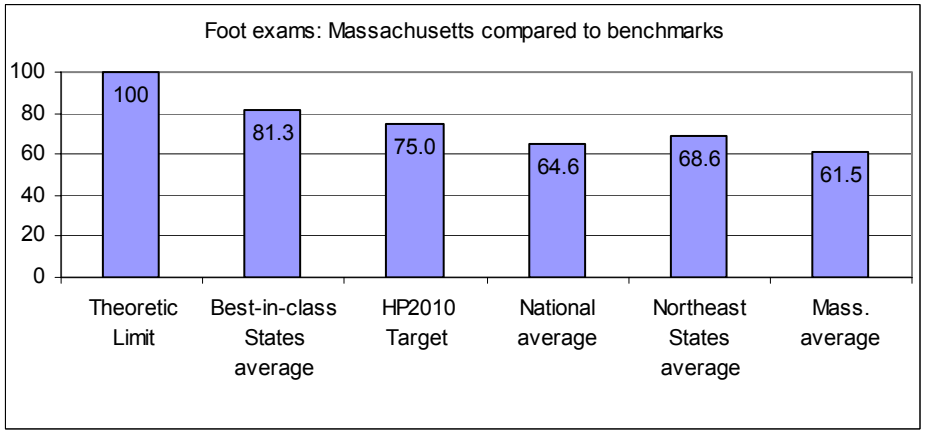
Source: Derived from the NHQR, 2003, based on CDC BRFSS

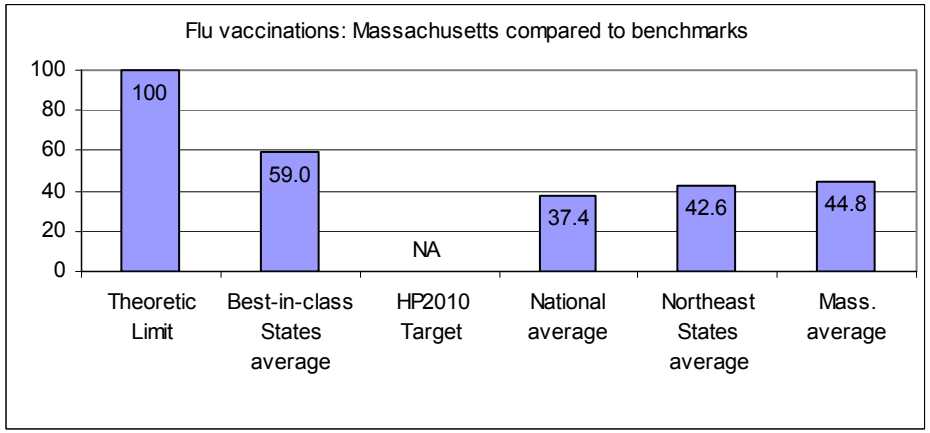
*All adults, except for flu vaccination which is for age 18 to 64.

Figure 3.4.B. Percent of adults* with diabetes, who had an important test at least once in past year, age adjusted, for Massachusetts compared to benchmarks, 2001





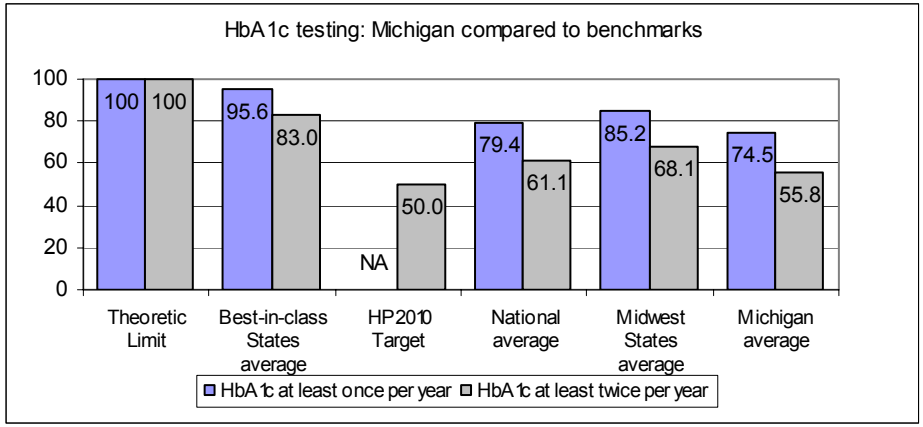


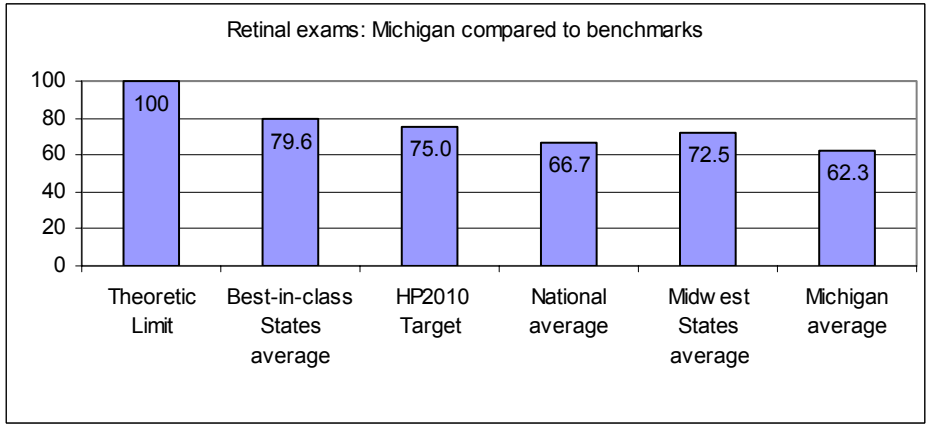


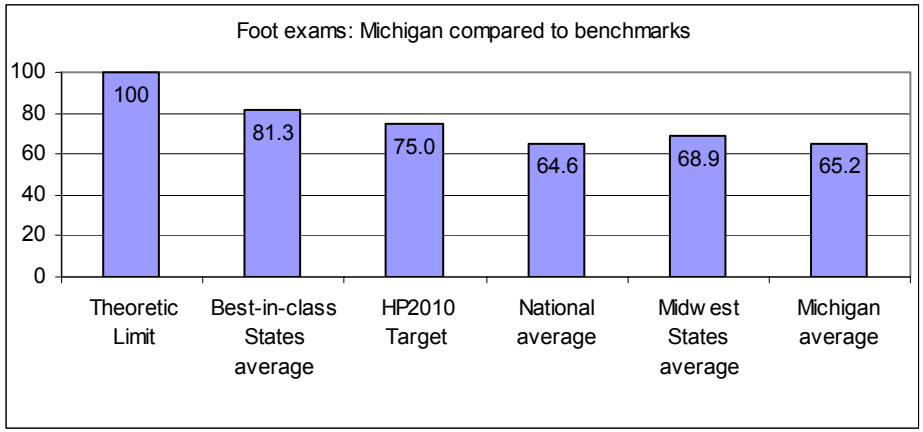
Source: Derived from the NHQR, 2003, based on CDC BRFSS

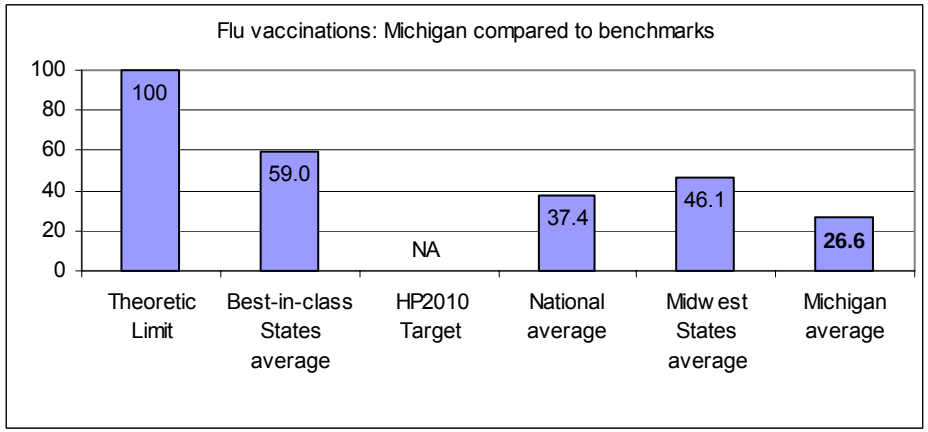
*All adults, except for flu vaccination which is for age 18 to 64.

Figure 3.4.C. Percent of adults* with diabetes, who had an important test at least once in past year, age adjusted, for Michigan compared to benchmarks, 2001





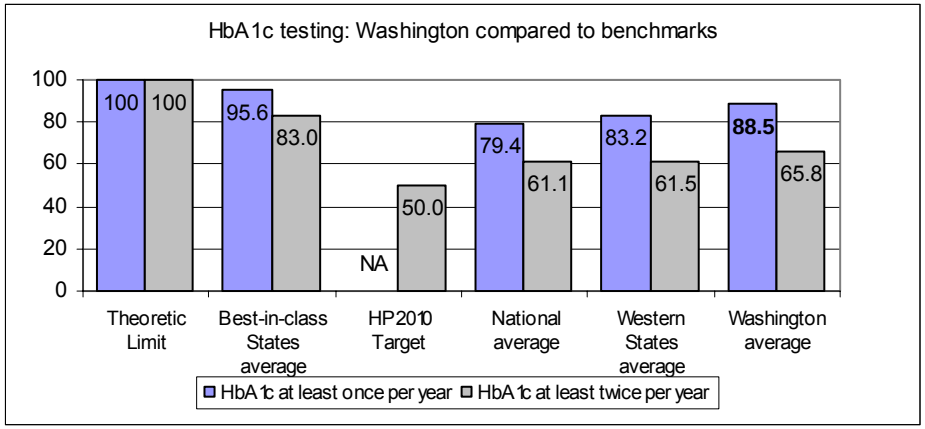


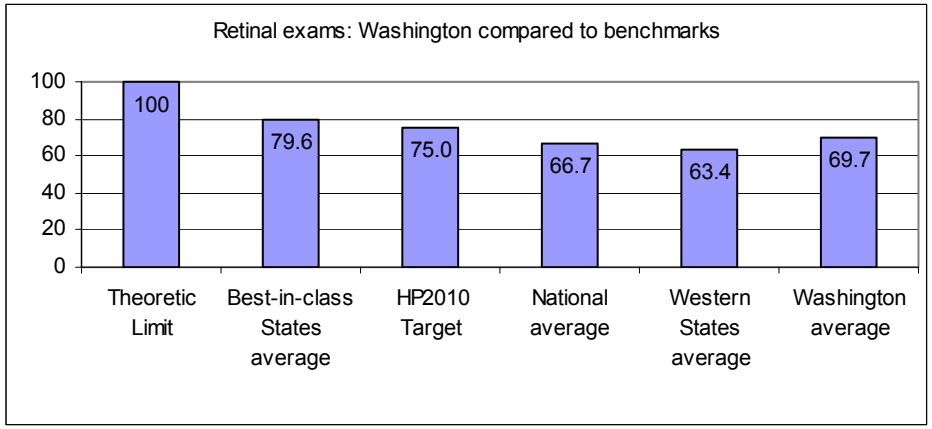


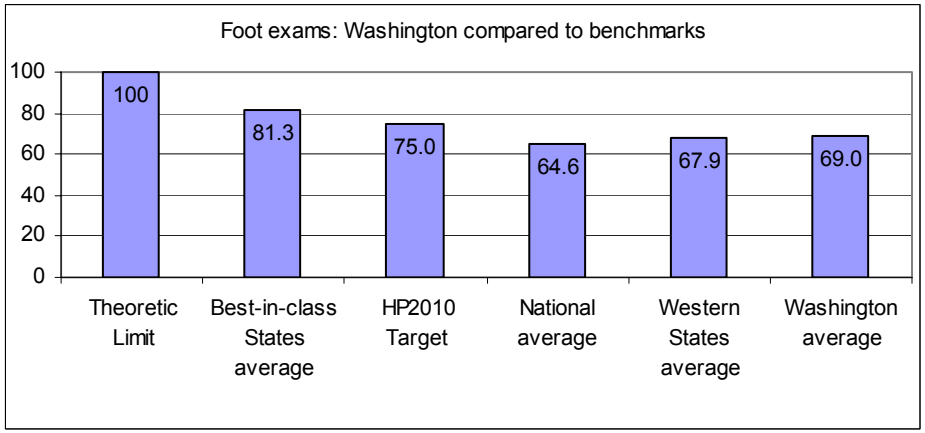
Source: Derived from the NHQR, 2003, based on CDC BRFSS

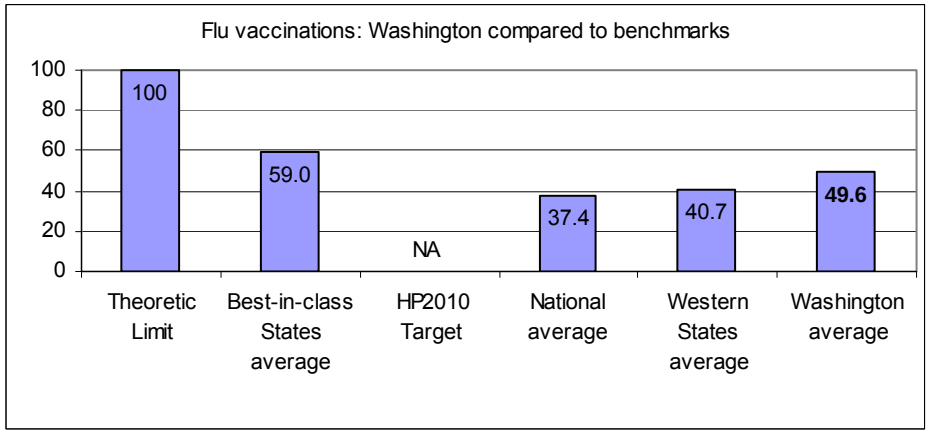
*All adults, except for flu vaccination which is for age 18 to 64.

Figure 3.4.D. Percent of adults* with diabetes, who had an important test at least once in past year, age adjusted, for Washington State compared to benchmarks, 2001









Source: Derived from the NHQR, 2003, based on CDC BRFSS

*All adults, except for flu vaccination which is for age 18 to 64.

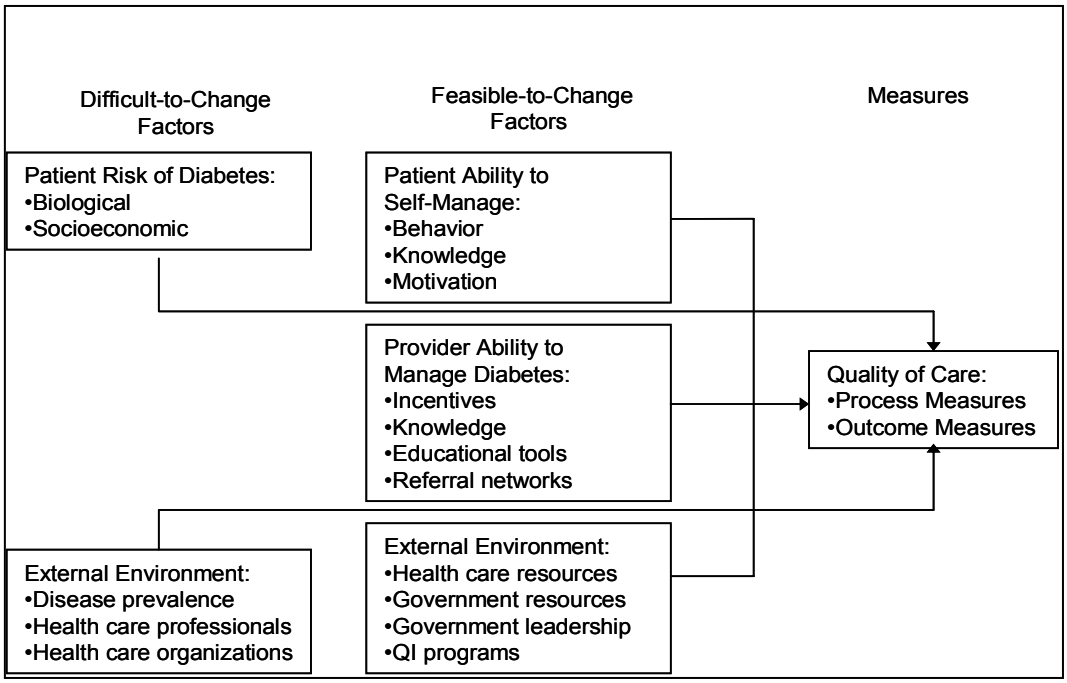
Step 2: Interpreting the Data—What Does It Mean?

The data presented in Step 1 raise a number of questions for anyone involved in quality improvement. What does a State's position on the continuum of quality measures mean? What factors influence that position and the variability among the States? What factors can be controlled through decisionmaking and local efforts?

Factors That Affect the Quality of Diabetes Care

A number of factors affect the quality and outcomes of health care, as Figure 3.5 shows. Some factors may be difficult to change, such as biologically inherited traits; income, education, and social status; and general population characteristics. Others may be changeable in the medium or long term, but unchangeable in the short term, such as the supply of health care professionals, the makeup and mission of health care organizations, and the disease prevalence of the population (which represents ingrained patterns of personal behaviors and health system effectiveness or ineffectiveness).

Figure 3.5. Factors That Affect Diabetes Process and Outcome Measures



Although State government and community leaders do not have control over many of these factors, there are some areas where implementing action at the State level can increase awareness and promote positive change. These include educating people with diabetes, targeting campaigns about the risks of obesity and sedentary lifestyles to the general public, raising awareness among professionals about health care processes that can improve outcomes for people with diabetes, and creating financial incentives to encourage providers to improve management of the disease.

For example, the CDC's Division of Nutrition and Physical Activity began funding 20 State programs on prevention of obesity in 2003. These programs focus on education of people at risk of diabetes and supportive environments for healthy eating and physical activity. (Information on specific State programs can be found at: http://www.cdc.gov/nccdphp/dnpa/obesity/state_programs/index.htm.)

Other States target minority populations that are disproportionately affected by diabetes in an effort to affect individual self-management and other external causes. Also, many States have passed legislation to secure and regulate insurance coverage for people with diabetes because absence of health care coverage can delay diagnosis, evaluation, education, and proper monitoring and management of the disease with disastrous consequences (see information at http://www.ncsl.org/programs/health/diabetes.htm).

To better understand what influences a State's position and how it compares with other States, some factors that are presented in Figure 3.5 are discussed in more detail below.

Racial, Ethnic, and Socioeconomic Factors: As previously noted, the socioeconomic makeup of a State will likely play a role in how it compares to national norms on process and outcome measures. States with a higher proportion of individuals living in poverty, lower average education, and a more diverse racial and ethnic population, for instance, will likely find poorer outcomes for their population compared to the national population (IOM, 2003b).

The NHDR (AHRQ, 2003b) summarizes the racial, ethnic, and socioeconomic differences in diabetes across the entire Nation, where minority or lower socioeconomic status is associated with higher diabetes prevalence, higher diabetes death rates, higher rates of serious complications (including end stage renal disease and amputations). Nevertheless, process-of-care measures generally do not differ greatly among white and minority racial and ethnic groups at the national level (see Table D.2, Appendix D). Absence of differences at the national level does not mean that such differences are nonexistent at the State and local level. Outcomes do differ among racial and income groups at the national level. For example, many more hospitalizations for long-term complications of the disease, including amputation related to diabetes, are seen for blacks compared to whites (Table D.2).

The socioeconomic makeup of a State should also play a role in the strategies that a State uses to improve diabetes care quality. For instance, States may be able to improve diabetes care quality through efforts targeted at population groups particularly at risk for diabetes complications. (The section on Dissemination: Minority and Rural Outreach in Module 4: Action describes approaches being used in some States.)

Biological and Behavioral Factors: The likelihood of developing the most common form of diabetes, type 2, is influenced by both biology and behavior (National Diabetes Education Program [NDEP], undated [a]). Risk factors for type 2 diabetes include:

- **Family history of diabetes—**Particularly, in the immediate family.

- **Gestational diabetes**—Women who develop gestational diabetes during pregnancy, children whose mother had gestational diabetes while carrying them (NDEP, undated [b]), and women who gave birth to at least one baby weighing nine pounds or more.

- **Age —**Risk of diabetes increases with age.

- **Overweight/obesity—**A known risk factor for diabetes. Overweight is defined as a body mass index ≥ 25 (>23 if Asian American and ≥ 26 if Pacific Islander) and obesity is a body mass index of ≥ 30.

- **Lack of exercise —**Exercise less than three times a week is associated with developing diabetes and its future complications.

- **Diet and nutrition—**High calorie intake (proteins, carbohydrates, or fat) increases the risk of developing diabetes and its complications.

Some additional factors that contribute to developing complications in people who already have been diagnosed with diabetes include (NDEP, undated [a]):

- **High blood pressure—**Pressure greater than 140/90 mm/Hg is associated with increased risk of complications for people with diabetes.

- **Abnormal lipid levels—**HDL (high density lipoprotein, or "good") cholesterol less than 40 mg/dL for men and less than 50 mg/dL for women and triglyceride level greater than or equal to 250 mg/dL are danger signs of complications for people with diabetes.

Socioeconomic factors may be related to underlying biological factors or behavioral factors. The accumulated stress of poverty, low levels of control in jobs and relationships, low job and life satisfaction, and societal discrimination against minority groups can influence health status (Williams, 1999).

External Environment: In addition to individual characteristics (some of which are amenable to change with personal motivation), each State has different infrastructure and other environmental factors over which policy-makers may or may not have control. These factors include the collective health status of the population, the distribution of health care services within locales, distribution of wealth and tax resources among communities, and government programs and leadership.

State leaders will face different health care system challenges, including:

- **Health system infrastructure—**Availability of health professionals, emergency rooms, and hospitals beds.

- **Uninsured populations—**The presence of vulnerable and uninsured populations and the need for special State programs to cover the cost of health care for them.

- **Safety net infrastructure—**The availability of a safety net of health care providers as a last resort for those who cannot afford health insurance and private health care.

- **Provider knowledge—**Providers who are not up to date with state-of-the-art knowledge to manage diabetes effectively and of patient education programs to help patients learn to manage their diabetes.

- **Public education—**The need for public education programs that raise patient awareness of the warning signs of the disease, its potential complications, the importance of diet and exercise, and the effectiveness of personal self-management, including knowing when to consult a doctor.

- **Government resources**—The funds, in a time of tight State budgets, to stimulate quality improvement activities related to diabetes care.

- **Leaders to champion quality improvement—** Those leaders who can draw attention to the problems associated with diabetes and harness the commitment of health professionals to change practices and monitor results.

- **Knowledge of what to do—**The identification of effective quality improvement programs that are based on scientific evidence.

- **Adequate data systems to assess progress—** Availability of data systems that can provide comparable comparisons across providers, communities, and even with other States.

The inter-relationship between all of the factors in Figure 3.5, then, affects how a State compares with other States on measures of diabetes care quality. It is difficult to measure all of these factors at the State or local level and to analyze and show their effect with data.[1] One analysis of the NHQR compares hospital admissions for uncomplicated, uncontrolled diabetes to State environmental factors that are readily available — measures of poverty, obesity, and diabetes prevalence.[2] This analysis was possible because 14 States in the Healthcare Cost and Utilization Project[3] provided their State discharge data for inclusion in this analysis for the NHQR.

Figure 3.6 shows the resulting associations among admissions for uncontrolled, uncomplicated diabetes and rates of obesity, poverty, and diabetes prevalence. Diabetes prevalence does not vary much across the States, but obesity and poverty rates do. Admission rates also vary greatly across these States; most of these State admission rates are significantly different from the national average, and the low-to-high rates differ fourfold in magnitude. Furthermore, States that have very high admission rates have higher obesity and poverty rates than the States with lower admission rates.

Yet, as noted earlier in this module, poverty and obesity alone do not account for all the differences between States in rates of avoidable hospitalizations for diabetes. Other factors certainly play a role. The health system infrastructure, rate of the uninsured, provider knowledge and incentives, public education, funding and leadership, knowledge of what to do, and information systems—all will affect the challenges that State leaders face in leading communities to improve health care for people with diabetes.

Interpreting Process and Outcome Measures Together

The four States presented earlier in the State-level comparison are included in Figure 3.6. Examining these States in terms of process measures, this one outcome measure, and underlying population characteristics is instructive.

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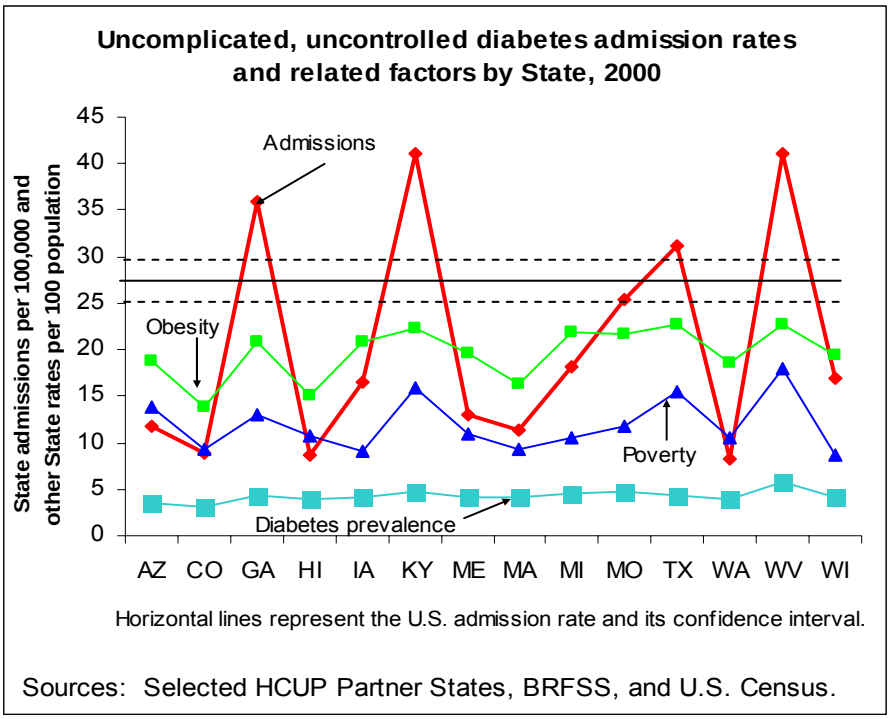
[1] This State-level analysis is feasible because of information collected at the State level. Similar analyses may be possible for smaller geographic areas within States. For example, the HCUP data, described below, permit analyses at the county or finer market areas. Data related to health care resource are generally available at the county level, although data on health risk behaviors of the population generally are not. State analysts could use their county level databases to compare diabetes quality measures based on HCUP data with other characteristics of counties.

[2] Diabetes prevalence, poverty and obesity rates were selected because they were most closely related to admissions for these avoidable hospitalizations among a set of other factors studied (including age of the population, insurance coverage, and health resources).

[3] HCUP Partners providing their data for this analysis were: Arizona Department of Health Services, Colorado Health & Hospital Association, Georgia Hospital Association, Hawaii Health Information Corporation, Iowa Hospital Association, Kentucky Department for Public Health, Maine Health Data Organization, Massachusetts Division of Health Care Finance and Policy, Michigan Health and Hospital Association, Missouri Hospital Association, Texas Health Care Information Council, Washington State Department of Health, West Virginia Health Care Authority, Wisconsin Department of Health and Family Services.

Figure 3.6



- Georgia, which had better HbA1c testing rates for two or more times per year than the other four States, also has very high rates of avoidable hospitalizations for uncomplicated, uncontrolled diabetes. This suggests the need to examine the adequate of ambulatory care; perhaps HbA1c testing is not translating into improved glycemic control for patients. Georgia has one of the highest rates of poverty (usually correlated with lower education) among the States; perhaps additional targeted patient education would be beneficial. Furthermore, Georgia ranks third among States in medically underserved or health personnel shortage areas (Hawkins and Proser, 2004). This suggests that less access to ambulatory care in some areas may lead to more hospitalizations for early stage diabetes. Whenever process and outcomes measures do not agree, they should be examined critically in the context of the State environment.

- Massachusetts, which had process rates that were not distinguishable statistically from the national average but that were notably higher on HbA1c testing rates for two or more times per year and influenza immunization, has one of the lowest rates of uncontrolled diabetes hospitalizations among the 14 States. Massachusetts' population also has lower rates of the underlying problems of obesity and poverty compared to other States.

- Michigan, which had process-of-care rates indistinguishable from the national average and on the lower end of diabetes care quality, had a moderately low rate of these avoidable hospitalizations. This is despite the fact that Michigan has a population with high obesity rates (but not high poverty rates).

- Washington, which had process measures that were fairly similar to the national average with the exception of its high immunization rate, had one of the lowest rates of these avoidable hospitalizations. Washington's population has one of the lowest poverty and obesity rates.

These combined views of diabetes care in the States suggest that the underlying populations and personal risk behaviors and perhaps self-management of the disease have more of an effect on the outcomes of care than whether or not a particular test is given. The test itself is not sufficient for improving diabetes outcomes. Complicated interactions of many factors influence diabetes outcomes. Furthermore, often the results on one measure are not consistent with findings on another measure, even when the measures are related. This indicates the importance of improving information systems that can track problems and enhance understanding of the effectiveness of quality improvement programs.

None of the above analysis tracks State results with their diabetes care quality improvement programs. No full-scale evaluations have yet been published of State interventions in health care quality improvement. Through interviews with State officials, this *Resource Guide* identifies a few programs that likely have influenced the quality measures discussed here. They are described in detail in Module 4: Action.

Summary and Synthesis

This module shows how data from the NHQR can be analyzed and interpreted to answer the question of how a State compares to other States and national benchmarks on health care quality for one disease — diabetes. Maps and charts can be used to help State leaders and quality improvement teams, whether or not they are trained in statistics and analysis, understand where their State stands in terms of diabetes quality.

A key question for all States is: What goals should the State set as targets for specific diabetes care quality measures? The NHQR can be used to identify consensus-based measures, as shown in Module 2: Data. States may identify and define other measures as well. The advantage of the NHQR measures is that the best-in-class State estimate, which can be derived easily from the NHQR, shows what has already been achieved by some States. It is a reasonable target for most measures. However, some measures might be so crucial to good diabetes outcomes that the target should not be limited by what other communities have achieved to date. Improvements above and beyond the best-in-class States may be warranted. Experts in diabetes care and local community leaders can help make these types of judgments.

Another key question is: Are all States able to meet the challenge of the best-in-class States? The answer depends on the measure, the factors that relate to that measure (health system versus consumer actions), and the current health and socioeconomic status of the State population. The analyses in this module reveal that many factors influence diabetes care, making the assessment between diabetes outcomes and processes of care difficult to affirm. Nevertheless, State-level baseline estimates of diabetes care enable States to assess their starting point and to evaluate their progress over time.

Some States may be able to assemble better data than are available nationally to understand the quality of care in their State. This has been done in some States (see for example Michigan in Module 4: Action. State leaders can assess the quality of diabetes care using the NHQR data to obtain an idea of where their State stands in comparison to other States and the Nation. One thing is clear from the NHQR data and the information this module derives from it—no State measures up to all the guidelines for diabetes care completely. The next module provides insights on what actions some States have taken to improve diabetes quality.

Finally, diabetes is only one of many conditions that warrant improvements in health care quality. While this *Resource Guide* focuses only on diabetes, State leaders will ask: What other conditions are ripe for

improvement? The answer will differ by State. Tables F.1 and F.2 in Appendix F present the quality of care measures for all diseases examined in the numerous tables of the NHQR by State. Thus, assembled in one place, State leaders can scan the list of measures to see how their own State compares to the national average across all NHQR measures. Once diabetes quality improvement is on track, State leaders may want to start with Appendix F to inspire their next campaign to improve health care quality.

Associated Appendixes for Use With This Module

Appendix D. Benchmarks From the NHQR

Appendix D provides additional detail on benchmarks and how they were developed and defined for this *Resource Guide*. It also explains the best benchmarks for stimulating quality improvement. This appendix notes that methods used to generate the benchmarks must be understood to ensure they are compatible with a State's estimates.

Appendix E. Information on Statistical Significance

Appendix E shows how to compare State estimates to benchmarks using statistical significance and p-values that take into account the expected random variation in estimates. This appendix also shows how to calculate p-values when estimates and standard errors are provided and when estimates, and thus standard errors, must be derived from the data provided.

Appendix F: NHQR Quality Measures for All Conditions by State

Appendix F lists quality measures for all conditions and topics in the NHQR. It includes the national estimate and then an indicator for whether or not the State estimate (not shown due to space limitation) is statistically greater, lower, or no different from the national average. The measures for which State-level data are not reported in the NHQR are excluded from the table. This resource can help State leaders identify which diseases, in addition to diabetes, are in need of quality improvement. Many of the same data issues related to diabetes are applicable to other disease topics, although different data sources and limitations may apply to them.

Module 4: Action – Learning From Activities Currently Underway

Discussing the role of State government in improving diabetes care, Dr. Lawrence Harkless, Chairman of the Texas Diabetes Council, had advice for State leaders interested in diabetes quality improvement. "Poor quality diabetes care is not about bad people, it's about bad systems. In the fifteen minutes a doctor has with a patient, he/she will address the most pressing health concerns. So many of these patients have multiple conditions that create competing priorities for doctors."

"Until research provides a cure for diabetes, constant efforts to increase awareness, knowledge and skills – in our health sciences schools, our private and community health centers, our schools and our local and State government - are crucial to our success in controlling this destructive disease," he added. "The economic costs from lost productivity, the health care costs of life-threatening complications, and the personal costs of limited fulfillment – these are costs our State can ill afford to pay."

— Dr. Lawrence Harkless, Chairman of the Texas Diabetes Council, and Professor, Department of Orthopedic Surgery, and Louis Bogey Professor of Podiatric Medicine and Surgery, University of Texas Health Sciences, San Antonio, Texas

Module Overview:

1) Selected Public/Private Quality Improvement Initiatives
2) Selected Federal Programs and Resources for Diabetes Care Quality Improvement
3) State Approaches to Diabetes Care Quality Improvement
   a) Partnership/Planning
   b) Program Development
   c) Dissemination
   d) Profiles of Selected Best Practice States
4) Selected Local Quality Improvement Efforts
5) Summary and Synthesis
6) List of Associated Appendixes for Use With This Module

Key Ideas in Module 4:

- There are a variety of quality improvement initiatives at the national, State, and local levels that are sparking change in health systems across the Nation.
- States can use this module for examples and resources for action and for assessing the scope of current diabetes quality improvement efforts in a State.
- No comparative evaluation of State-level diabetes quality improvement programs has been conducted; however, an evidence-based systematic review of clinical efforts has found provider education, disease management and use of multiple interventions most effective in improving diabetes care.

In Module 1: Background, readers had the opportunity to learn about diabetes, its consequences in terms of cost and its toll on human life, and the need for quality improvement in health care, particularly as it relates to diabetes. Module 2: Data introduced readers to data from the NHQR and how these data can be useful to States. Module 3: Information demonstrated how State leaders could use data to make accurate comparisons and assessments of diabetes care quality in their States. This module will examine various models of quality improvement, ranging from private efforts, not directly related to government, to Federal, State, and local government initiatives.

Within health care, many organizations and individuals play a role in efforts to improve quality. Rather than reinvent the wheel, State leaders have the opportunity to learn and draw lessons from initiatives that are ongoing at both the national and State levels in both the public and private arenas. These initiatives also have publications, guidelines, and other resources that can assist the development of new initiatives. Listed below are selected programs that are central to States and their ongoing diabetes quality improvement efforts. Appendix G gives a more extensive listing of various diabetes quality improvement efforts involving national non-governmental organizations and Federal agencies with Internet links for more information for State leaders.

Selected Public/Private Quality Improvement Initiatives

There are a wide range of public and private quality improvement initiatives active at different stages of quality improvement. Although the components of quality improvement are numerous, the examples given below illustrate the action at stages most important for State leaders, including the collection of measurement data and the implementation of quality improvement programs. Some organizations focus on one stage of quality improvement while many play a part at all stages. This list is by no means exhaustive, but it provides examples of how national organizations and partnerships are related to State efforts. These strategies are being widely implemented and fine tuned for various populations and organizations.

National Diabetes Quality Improvement Alliance

One of the most important advances in quality improvement is the development of the consensus-based measures to assess health care quality. Organized by leading diabetes stakeholder groups in 1998, the Diabetes Quality Improvement Project (DQIP) was a voluntary coalition of public and private organizations that have cooperated to develop a national set of diabetes-specific performance and outcome measures. Comprised of the American Diabetes Association, the Centers for Medicare & Medicaid Services (CMS), the Foundation for Accountability, the National Committee for Quality Assurance, the American Academy of Family Physicians, the American College of Physicians, and the Department of Veterans Affairs, DQIP was the first successful collaboration to develop a single set of performance measures to determine the appropriateness and effectiveness of diabetes care. The data collected included measures for HbA1c, blood pressure, lipid profiles, eye and foot exams, and smoking cessation counseling, among others.

In 2001, the DQIP partners joined other leading organizations, including the American Medical Association and the Joint Commission on Accreditation of Healthcare Organizations, to form the National Diabetes Quality Improvement Alliance (NDQIA). The Alliance agreed to work on developing one national performance measurement set for diabetes accepted by all major stakeholders. In October 2002, the newly formed Alliance developed national, uniform consensus standards from all parties – purchaser, provider, and consumer groups. The NHQR includes a subset of these measures for which national data exist. Some States have used the DQIP and NDQIA measures as the basis for developing local diabetes guidelines and reporting. Further information on the Alliance and its national measures is available at http://www.nationaldiabetesalliance.org/.

The Chronic Care Model

One model of quality improvement particularly applicable to diabetes care quality in the clinical setting is the Chronic Care Model. Dr. Edward Wagner and his team at Group Health Cooperative in Seattle, with support from the Robert Wood Johnson Foundation, developed the Chronic Care Model. The U.S. health care system is oriented more toward care for acute episodes of disease rather than prevention and management of chronic conditions. Thus, the Chronic Care Model emphasizes a collaborative approach among health care teams to develop new and better clinical procedures and systems that support providers and patients in treating and managing chronic illness over time. More information is provided below on involvement of State health departments in Diabetes Collaboratives that use the Chronic Care Model to achieve rapid advancement in diabetes care at community health centers. More information on the Chronic Care Model is available on the Improving Chronic Illness Care (ICIC) Web site at: http://improvingchroniccare.org.

The Six Core Components of the Chronic Care Model

- **Community** - Mobilizing all the available community resources to meet the needs of people with chronic illnesses.
- **Health System** – Creating organizational cultures, systems and mechanisms that promote safe, high quality care throughout the health care system.
- **Self-Management Support** – Empowering and preparing patients to manage their health and navigate the health care system.
- **Delivery System Design** – Assuring the delivery of effective, efficient clinical care and self-management support through appropriate design of the delivery system.
- **Decision Support** – Promoting appropriate clinical care consistent with scientific evidence and patient preferences.
- **Clinical Information Systems** – Organizing patient and population data to facilitate efficient and effective care for people with chronic illnesses.

Source: MacColl Institute for Healthcare Innovation, Group Health Cooperative, 2004. The chronic care model: model elements. (ICIC is a national program supported by the Robert Wood Johnson Foundation with direction and technical assistance provided by Group Health Cooperative's MacColl Institute for Healthcare Innovation.)

IHI Breakthrough Series Collaboratives

The Institute for Healthcare Improvement (IHI) created the Breakthrough Series Collaboratives to assist health care organizations with making rapid advances in lowering costs and improving quality for a variety of conditions in a variety of health care settings. A collaborative brings together quality improvement experts and practice teams from many different health care organizations that work together for 6 to 8 months to achieve quality improvement in a specific area. Since 1995 when IHI held the first Collaborative, more than 700 trained teams from over 450 U.S. and Canadian health care organizations have participated in these programs. By capitalizing on the collective wisdom of participating organizations, expert faculty, and improvement advisors, these organizations have dramatically improved outcomes and reduced costs in a variety of areas, including:

- Reduced waste in the form of shorter intensive care unit stays and less waiting time.
- Dramatic reductions in defects such as adverse drug events, long waits for pain medications, and unnecessary hospitalizations for chronic conditions.

- New levels of performance achieved including enhanced control of blood sugar and access to primary care.

IHI combined efforts with the Group Health Cooperative's Improving Chronic Illness Care program to train health care providers and others in using the Chronic Care Model to accomplish real change in the way chronic diseases, including diabetes, are treated and tracked (Institute for Healthcare Improvement, 2002). Hundreds of health care teams around the country are currently using the Breakthrough approach combined with the Chronic Care Model in Health Disparities Collaboratives sponsored by HRSA's Bureau of Primary Health Care. (Health Disparities Collaboratives are discussed in further detail later in this module.) The short-term evaluations of Collaboratives showed improvements in blood sugar control for diabetes patients; dramatic increase in followup for patients with depression; decreased rates of blood pressure among patients with cardiovascular disease; success in providing asthmatic patients with daily preventive medicines; and decreasing health care costs even while increasing the number of patient visits (Wagner, Austin, Davis, et al., 2001). More information about IHI, its Breakthrough Series, and diabetes programs can be found on the following Web sites:

- Breakthrough Collaboratives general information: http://www.ihi.org/IHI/Programs/CollaborativeLearning/

- Improving care for people with chronic conditions – diabetes: http://www.ihi.org/IHI/Topics/ChronicConditions/Diabetes/HowToImprove/

- Report from the Health Disparities Collaborative on Diabetes: http://www.healthdisparities.net/Diabetes_Apr2002.pdf

Other Strategies

Self-Management Programs

Diabetes is one chronic condition whose treatment and outcomes are heavily dependent on how well the patient monitors and manages the disease outside the health care setting. An important approach to quality improvement for diabetes is improving patient self-management. Self-management programs emphasize and focus on patient education and behavior modification. Health care professionals work with patients to build their confidence in managing their own disease, in working within the health care system and the community to have their needs met, and in managing the emotional effects of their illness. Patients are informed about their disease and trained using evidence-based information in how they should manage their condition. A variety of educational tools are used to assist the patient (for example, classes, Internet information, and toll-free hotlines). There are national standards for diabetes self-management and patient education. Because of the critical role of patient self-management in diabetes care, some purchasers are beginning to provide reimbursement for certified diabetes educators to interact with diabetes patients.

One AHRQ-sponsored study conducted by Stanford University researchers showed that 2 years after participating in a self-management program, study participants showed reductions in health distress, made fewer visits to the doctor's office and emergency room, had not experienced any further increases in disability, and had increased self-efficacy (Lorig, Ritter, Stewart, et al., 2001). More information on the Chronic Disease Self-management Program at Stanford University is available at: http://patienteducation.stanford.edu/programs/.

Disease Management Programs

Another model for quality improvement that is capturing attention nationwide is disease management. Disease management is a term that refers to a variety of programs and interventions that seek to:

- Identify patients with a particular chronic condition or set of conditions.
- Establish a coordinated system of interventions and information-sharing for enrolled patients and their providers.
- Encourage doctors and other health care providers to use evidence-based practice guidelines to treat chronic illnesses.
- Educate and train patients in self-management so that they avoid disease complications.
- Monitor interventions and outcomes over time to evaluate the effectiveness of the disease management program.

Disease management has grown rapidly over the past five years and is now used widely by employer-sponsored health plans to manage costs and improve clinical care for many chronic conditions, including diabetes. More recently, State Medicaid programs and Medicare also have begun to use disease management for their populations. Initial assessments from State Medicaid disease management programs are promising in terms of cost control and quality improvement (Brown and Matthews, 2003; Wagner, Austin, Davis, et al., 2001; AAHP/HIAA, 2003). Table 4.1 below lists Medicaid diabetes disease management efforts that are underway. More information on disease management programs in general is available from the Disease Management Association of America's Web site at http://www.dmaa.org. Further information on diabetes disease management programs is available at the Council of State Governments' (CSG) Web site at http://www.csg.org/CSG/Policy/health/chronic+illness/default.htm.

Selected Federal Programs and Resources for Diabetes Care Quality Improvement

In addition to public/private quality improvement efforts, State diabetes efforts are also linked with Federal programs. There are a variety of programs at the Federal level that address diabetes and quality improvement; some of these are partnering with States, and others have useful resources for State efforts.

CDC's Diabetes Prevention and Control Program

The Centers for Disease Control and Prevention currently helps to fund the Diabetes Prevention and Control Program (DPCP) in every State. The DPCP model began as a small number of demonstration projects in the late 1970s. In response to the growing burden of diabetes in the United States, the program has evolved into a nationwide, joint State-Federal effort with the CDC spending $20 million annually throughout the 50 States, the District of Columbia, and 8 U.S. territories and island jurisdictions. These programs and the people who staff them are rich information resources on diabetes. (See http://www.cdc.gov/diabetes/states/index.htm for links to each State DPCP.)

Table 4.1. State diabetes disease management (DM) programs

Colorado	In 2002, Colorado partnered with Eli Lilly to fund a pilot program to improve access to quality care for beneficiaries with diabetes and schizophrenia.
Delaware	In 2003, the State passed a bill to create a task force to evaluate how implementing a statewide DM program could impact quality and cost.
Florida	Florida's Disease Management Initiative program is 7 years old and covers a number of diseases including diabetes.
Illinois	In 2003, Illinois authorized a pilot DM program to evaluate the effect DM has on health outcomes and costs.
Indiana	In Spring 2003, Indiana launched the Coordinated Care Management program to help Medicaid enrollees diagnosed with chronic conditions, including diabetes.
Iowa	In 2003, Iowa authorized a pilot DM program for Medicaid beneficiaries suffering from a range of chronic conditions including diabetes.
Kentucky	Medicaid managed care enrollees with diabetes are identified to receive services ranging from patient education to access to a 24-hour nurse hotline.
Maine	Maine's new Dirigo Health Insurance Plan promotes DM along with disease prevention and quality improvement programs.
Maryland	From 1991-1997 Maryland ran a Diabetes Care Program that provided DM services to Medicaid beneficiaries with diabetes. These services are now provided through the State's Medicaid managed care providers.
Mississippi	For Medicaid beneficiaries with diabetes, Mississippi offers DM services including patient and provider education and case management.
Missouri	Missouri's Disease State Management Program serves fee-for-service Medicaid enrollees with chronic conditions at-risk of negative health outcomes.
New Jersey	Through its Medicaid managed care programs, enrollees have access to DM services for a number of diseases including diabetes.
New Mexico	New Mexico requires Medicaid managed care providers to offer DM services to beneficiaries with chronic conditions. The 2003 law also directs the State to pilot a DM program for the fee-for-service population.
North Carolina	Through its Medicaid managed care program – Carolina ACCESS – North Carolina provides case management services for enrollees with chronic diseases.
Oregon	Oregon's DM program is targeted to save $1.5 million net in the first 6 months of operation.
South Carolina	Since 2001, South Carolina has offered an adult diabetes DM program through its Medicaid managed care program.
Texas	Recently, Texas expanded its DM program to include fee-for-service Medicaid beneficiaries and enrollees in the State's children's health insurance program.
Virginia	In 1997, Virginia's successful pilot DM program was expanded to incorporate other diseases, including diabetes.
Washington	In 2002, Washington rolled out a statewide DM program for Medicaid beneficiaries. In its first year, the diabetes program served 8,468 clients and is estimated to have saved the State $900,000.
West Virginia	The West Virginia Health Initiative Project (WVHIP) works to promote evidence-based best practices in diabetes management.

Source: The Council of State Governments (CSG). This table is derived from a review of State and Federal Web sites and published literature on Medicaid disease management by CSG staff. Published source material included Brown and Matthews, 2003; Wheatley, 2001; Faulkner, 2003; NCSL, 2003, U.S. Department of Health and Human Services, 2003b.

The CDC's DPCP has developed two types of programs: capacity building and basic implementation. Twenty-six States currently have capacity building grants with an average award of $270,000 to:

- Develop initial expertise in diabetes control.
- Provide a focal point for diabetes control.
- Establish systems to define the scope of the diabetes problem..
- Identify gaps in diabetes care, for both patient access and quality-of-care issues.
- Develop and evaluate limited intervention projects.
- Identify external supporters for diabetes control activities.

DPCP's basic implementation program awards an average of $725,000 to State health departments. Twenty-four States currently have basic implementation grants. The implementation grants are to:

- Build on expertise in program, science, and policy areas to control and prevent diabetes.
- Coordinate statewide diabetes control and prevention.
- Expand systems to define and analyze the scope of the diabetes problem.
- Improve access to diabetes care for all people and raise the quality of that care..
- Use statewide public health projects to reduce diabetes-related problems.
- Inform, educate, and empower external supporters to control and prevent diabetes.

To qualify for CDC funds, State governments are required to provide matching support through State funds or in-kind commitments of personnel or other resources. The amount of State funding varies. Some States provide a significant level of their own funding for diabetes efforts, surpassing CDC funding by two or three times. Texas, for example, appropriated more than $6 million in State funding for diabetes in fiscal year 2003-2004. Other States provide more modest support or no additional support. In addition, money is often provided through private grants. States with higher incidence of diabetes also do not necessarily spend more on their diabetes prevention and control programs. CDC aims to assist State health departments in developing programs to address the disease; CDC funding amounts to approximately $1.27 per American with diabetes (see Appendix H for a breakdown of CDC and State DPCP funding for all 50 States).

In 1999, the CDC required each State to establish measurement and evaluation procedures to track and promote program success. DPCP uses a "model of influence" approach. As such, the DPCP acts as a mechanism for improving diabetes care through strategic partnering and programmatic interventions. The purpose is to ultimately affect broad change in the health system and the health of the community. The evaluation and accountability requirements are meant to stimulate such activity on the part of the DPCP (Safran, Mukhtar, Murphy, 2003). The evaluation framework of this policy shift is detailed in the discussion on evaluation in Module 5: Improvement.

Diabetes Detection Initiative and Steps to a HealthierUS

Under the leadership of Secretary Tommy G. Thompson, the U.S. Department of Health and Human Services has developed a new initiative, the "Diabetes Detection Initiative: Finding the Undiagnosed." More than 5 million of the 18.2 million people with diabetes in the United States do not know they have the disease. The Diabetes Detection Initiative (DDI) is a community-based effort to identify individuals with type 2 diabetes who have not been diagnosed. The DDI is designed to raise awareness of diabetes risk factors, increase blood testing of individuals at risk for diabetes, and increase diagnosis and treatment for those people who do not know they have the condition.

Ten communities around the Nation with high risk populations are serving as DDI pilot sites, including Oakland, California; Wichita and Sedgwick County, Kansas; Springfield/Holyoke, Massachusetts; Flint, Michigan; East Harlem, New York, Choctaw Nation, Oklahoma; Orangeburg County, South Carolina; Seattle, Washington; Fayette and Greenbrier Counties, West Virginia; and Wind River Indian Reservation, Wyoming. Future plans calls for the DDI to expand to other locations across the country. The Diabetes Detection Initiative is aligned with other Federal health initiatives, including the Secretary's Steps to a HealthierUS and the President's HealthierUS programs, which are aimed at encouraging physical activity, improved nutrition, and a more prevention-oriented society. More information on the DDI is available at http://www.ndep.nih.gov/ddi; additional information on Steps to a HealthierUS is available at http://www.healthierus.gov/steps/index.html.

HRSA's Health Disparities Collaboratives

HRSA's Bureau of Primary Heath Care (BPHC) and the CDC's Diabetes Prevention and Control Program sponsor Health Disparities Collaboratives, a unique partnership with community health centers (CHCs) across the country aimed at improving chronic illness care for underserved and minority communities. CHCs are the key safety net providers for low-income, uninsured patients throughout the country. The low-income and ethnically and racially diverse populations at community health centers have an increased risk of complications from chronic illness (NACHC, 2003). In an ambitious program to reduce health disparities, HRSA began the first Diabetes Collaborative in 1999 with 85 CHCs. The CHCs developed registries and enrolled 16,000 people with diabetes in the collaboratives. In 2000, another 120 health centers participated in a second Diabetes Collaborative.

The Health Disparities Collaboratives incorporate the change model created by the IHI Breakthrough Series and the Chronic Care Model for diabetes care improvement. This program has allowed CHCs to participate in team training to apply best practice models of care for chronic disease. The population-based model of care relies on identifying which patients have an illness and ensuring that they receive evidence-based care. The model helps patients to participate and manage their conditions. Over the course of the 1-year collaborative, the CHC teams participate in learning sessions and set goals, such as data collection on certain outcomes (for example, blood tests). Then they develop, test, and implement evidence-based strategies for a specific clinical area (for example, diabetes) and for a specific community. Between meetings, CHC teams focus on implementing goals and measuring changes in their health centers. The team collects data to measure the impact of the changes and additional learning opportunities allow teams to improve processes over time. The teams share information and learn from national experts and each other through a Listserv, regular site visits, monthly progress reports, and conference calls. Results indicate the rate of HbA1c testing for people with diabetes increased significantly at the participating centers over the first year (Health Disparities Collaborative, 2004).

Additional information on the Bureau of Primary Care and the Health Disparities Collaboratives is available at http://bphc.hrsa.gov/programs/HDCProgramInfo.htm and http://www.healthdisparities.net/.

National Diabetes Education Program

The National Diabetes Education Program (NDEP) is a national collaboration sponsored jointly by the National Institutes of Health (NIH) and the CDC. The NDEP includes over 200 partners at all levels of government and society. Many State DPCPs use NDEP materials and partner on NDEP initiatives. The goal of the NDEP program is to improve prevention and treatment of diabetes, thereby reducing illness and death from this disease. Because so many of the complications from diabetes are preventable, the NDEP seeks to help educate the public about diabetes, promote better patient self-management, improve the quality of care for diabetes, address health policies that may improve quality and access to care, and reduce disparities among racial and ethnic populations that are disproportionately affected by diabetes. A variety of resources on diabetes quality of care improvement as well as education and awareness campaigns and other resources are available at the NDEP Web site at http://ndep.nih.gov. Another part of the NDEP is a Web site devoted to improving diabetes care at http://www.betterdiabetescare.org. The site has information, resources and tools for providers, educators, and organizations on how to participate in and advance quality improvement in diabetes care.

CMS' Quality Improvement Organizations

Under Titles 11 and 18 of the Social Security Act, Quality Improvement Organizations (QIOs) are designated as the guardians of quality, cost-effective care for both Medicare and Medicaid. The 37 QIOs in the United States, also known as peer review organizations, are non-profit organizations that operate under the direction of the Centers for Medicare & Medicaid Services. QIOs are responsible for using medical reviews, data collection and analysis, and other functions authorized by CMS as a means to achieve national, State, and local quality improvement goals. QIOs are vital partners in CMS' Health Care Quality Improvement Program due to their collaborative relationships with local networks of hospitals and providers. QIOs have been involved in several State and local quality improvement projects related to diabetes. Qualis, a QIO in Washington State, was a partner with the Washington State Department of Health and the Improving Chronic Illness Care program of the Robert Wood Johnson Foundation in the Washington State Diabetes Collaborative. Missouri's QIO, MissouriPRO, participated in the HRSA Health Disparities Collaborative for diabetes in community health centers in the State. North Dakota's QIO has assisted clinics with implementing diabetes flow sheets, increasing preventive care and screening and establishing a diabetes care tracking system that generates reminders for routine diabetes checks. General information on the role of QIOs is available at http://www.cms.hhs.gov/qio/. Specific information on QIO diabetes quality improvement initiatives is available at http://www.medqic.org/content/nationalpriorities/topics/projectdes.jsp?topicID=477&showMeasures=yes&showSteps=yes. Examples of QIO initiatives in various States are available on the American Health Quality Association Web site at http://www.ahqa.org/pub/quality/161_689_2974.cfm.

State Approaches to Diabetes Care Quality Improvement

The following sections summarize various kinds of State diabetes quality improvement approaches relating to partnership/planning activities, program development, and dissemination. A few States are highlighted under each type of approach to illustrate examples of best practices.

States have undertaken a variety of diabetes initiatives over the years, most of which have been spearheaded by State DPCPs. Although the mandate of State DPCPs covers many aspects of diabetes

prevention and control, States DPCPs have included quality improvement as a part of their diabetes work. States have used CDC funding to establish creative programs to address diabetes quality improvement, ranging from using the Chronic Care Model in collaboratives to developing diabetes guidelines.

There are also stand-alone State initiatives that are not directly connected to CDC and State DPCP efforts. States have established diabetes disease management programs in Medicaid and have partnered with the private sector on quality improvement related to diabetes. Many States have also tried to integrate CDC-funded efforts with private-sector and Medicaid efforts.

Types of Approaches to Organizing Diabetes Programs

States structure their public health programs differently. Listed below are samples of different ways that States have approached diabetes quality improvement programs.

- **Regional structures**
  Georgia provides diabetes services through its seven existing public health districts.
- **Pilot projects**
  Massachusetts worked in three pilot communities to enhance diabetes care by integrating the health system with community diabetes development.
- **Community-based grant support**
  New Hampshire and South Carolina conduct many diabetes activities through grants to community health centers or community organizations throughout the State.

The range of State activities makes it difficult to present all of the possibilities. Instead, various activities and programs States have used to address diabetes care quality are listed below. Except where other citations are provided, the information provided below was derived from a review of State health department Web sites, CDC resources, Internet research, and in-person interviews with State agency officials. A focus group of State officials and diabetes experts also assisted with formulating the categories for State diabetes quality improvement approaches. State examples were selected in order to provide a sampling of State efforts that reflects regional, size and funding differences between States. Also, the uniqueness of the State efforts in relation to similar programs was taken into consideration. Although not an exhaustive list, it demonstrates a range of efforts States have undertaken related to diabetes quality improvement. These efforts may be cataloged as follows:

Partnership/Planning Activities

- Coalitions
- Advisory bodies and councils
- Working across State agency lines

Program Development

- Developing and complying with diabetes guidelines
- Data measurement and reporting
- Use of technology
- Self-management/patient education
- Collaboratives
- Provider training
- State disease management programs

Dissemination

- Raising awareness through public relations
- Minority and rural outreach

Partnership/Planning Activities

> *"Partnerships are key to everything we do – they are key to public health. The strength and commitment of our partners underlies our success."*
>
> - Wisconsin Department of Health Official

Coalitions

Creating networks of support has been critical for States that have established far reaching programs addressing diabetes quality improvement. Coalitions bring together a broad variety of stakeholders in a State to work together to identify areas of strength, common objectives, and gaps in service. They also develop plans to assure that the essential treatment and educational services for managing diabetes are in place in a community. Coalitions also include community representatives and nontraditional partners such as the corner grocery store owner, faith communities, health organizations, social service agencies, and more. Coalitions can develop strategic nontraditional plans and establish measures and processes for determining community success.

- **California's** Diabetes Coalition, which includes representatives from the general public, the State DPCP, local health departments, universities, volunteer organizations, pharmaceutical companies, and community-based organizations, has developed evidence-based guidelines, a patient survey, and a model patient record.

Advisory Bodies and Councils

> *"The bottom line, no matter how you cut, is that it's about relationships and identifying what people bring to the table. You look at your objectives and those of other agencies or groups and see where it makes sense to work together. Then you help people to understand where the synergy is by finding like goals."*
>
> - Missouri Department of Health Official

A number of States also have advisory boards and councils that assist with statewide diabetes planning and quality improvement efforts. Whereas coalitions are broad-based, voluntary efforts, advisory bodies are usually smaller, more formalized entities with objectives and structure that are established by law. Advisory bodies and councils include a variety of experts and stakeholder groups such as the American Diabetes Association, State professional associations, and provider organizations, among others.

- **Florida's** Diabetes Advisory Council advises the Governor and the Secretary of the Department of Health on emerging diabetes issues affecting care, treatment, and quality of life.

> *"The environment is so dynamic and things are changing so quickly – science, policy, reimbursement. We need some way to keep the finger on the pulse and adjust quickly. The Advisory Committee helps us do that."*
>
> - Minnesota Department of Health Official

- The **Texas** Diabetes Council was created by the Texas legislature in 1983 to promote diabetes prevention and awareness, to work with private and public health care organizations, and advise the legislature on laws needed to further education and health services for people with diabetes.

Working Across State Agency Lines

State programs often operate in isolation from one another. However, several States have recognized that their diabetes prevention and control program can work with other agencies within State government to reduce diabetes and its complications. This approach can be highly efficient and effective in reaching targeted groups for prevention and disease management.

> *"In setting up partnerships, think strategically about who might be a good partner. We sat down and thought about how people with diabetes get from A to Z and who is involved in the process. From there we identified all the people, from individual families to large health plans that could have an influence on the process. Then we invited input and involvement that would represent all of those points of view."*
>
> - California Department of Health Official

- **Maryland's** Medicaid program adapted the Maryland DPCP's Model for Comprehensive Diabetes Management, paying for a package of preventive services, equipment, and supplies for diabetes care. Although the program was later handed over to Medicaid managed health plans, an independent evaluation found that the diabetes care program saved an average of almost $4,600 a year per program participant.

- **Massachusetts'** Diabetes Program partnered with the Division of Medical Assistance to implement a patient education and provider training initiative incorporating the Massachusetts Guidelines for Adult Diabetes Care. This involved quality improvement and measurement initiatives related to health outcomes for people with diabetes.

- **California** worked with the training division of the Department of Motor Vehicles to educate officers in evaluating people who come to the department's attention due to diabetes.

- **West Virginia's** DPCP has established a worksite health promotion program for State employees that facilitates lifestyle changes to improve the health and self-care practices of people with diabetes.

Program Development Activities

Developing and Complying With Diabetes Guidelines

To close the gap between research and practice, several States are promoting the use of evidence-based clinical guidelines for diabetes care. Many States have adopted existing guidelines established by the National Quality Forum, HEDIS® Comprehensive Diabetes Care Measures or the American Diabetes Association, while others have worked through the process of developing their own.

- **Massachusetts** DPCP convened a Diabetes Guidelines Work Group to develop the Massachusetts Guidelines for Adult Diabetes Care and accompanying tools for primary care settings.

- **Nebraska's** Medicaid program has established a Diabetes Subcommittee that is developing consensus guidelines and working with health plans and providers to ensure implementation of the guidelines among those covered by Medicaid.

Data Measurement and Reporting

As Module 2: Data indicated earlier, data measurement and analysis is a fundamental step in quality improvement. State DPCP and others organizations have come together to agree on consensus measures on diabetes quality and used the data to compare quality performance among health plans and providers.

- **Michigan's** DPCP established its Diabetes Core Measures Initiative in collaboration with the Michigan Associate of Health Plans. The measures were developed to ensure that all patients with diabetes receive evidenced-based care.

- The **New Jersey** DPCP developed and implemented diabetes care performance measures and integrated them into routine clinical practice in several managed care and community health care settings. The performance measures are published in a State newsletter and on the Internet at http://www.state.nj.us/health/fhs/diabnews.htm.

> *"States are intimidated that there is so much they have to know. We rely on our partners to give us this knowledge. You don't have to know everything you just have to know the right people. The environment may be changing, but the experts aren't."*
>
> - Minnesota Department of Health Official

Use of Technology

States are taking advantage of new technologies to improve diabetes care through better communication and more efficient services.

- **California** created a series of electronic seminars on diabetes-related issues for DPCPs around the country and coalition members throughout the State.

- **Maine's** Consortium for Clinical Office System Improvement has worked to implement an array of tools for primary care practices aimed at quality improvement, prevention and chronic disease management, including the Cardiovascular & Diabetes Electronic Management System.

- **Oklahoma** partnered with the University of Oklahoma's Ophthalmology Department to enable rural Oklahomans to receive diabetic retinopathy screening in their own communities using a state-of-the-art fiber optic telemedicine design.

Self-Management/Patient Education

Patient self-management is critical for good diabetes outcomes. Several States have established certification programs for diabetes self-management educators. By requiring this training, States can set a high standard based on the latest evidence-based information. Patient education programs are best conducted in a variety of settings that are easily accessible to target populations, including: churches, neighborhood associations, and other community-based organizations that are well recognized in a community. These programs can be conducted in small groups or one-on-one, based on the identified needs of the population. For more information on diabetes education programs, visit the ADA's Web site at http://www.diabetes.org/education/edustate2.asp.

- **Rhode Island** created a statewide initiative called *My Diabetes Record,* which is aimed at improving self-management of diabetes and meeting the national HP2010 objectives for eye care, foot care, HbA1c tests, lipid profiles, and influenza and pneumonia vaccinations. All third-party insurers use this standard tool.

- **Utah's** DPCP has a State-sponsored certification process for outpatient diabetes self-management programs. The voluntary program uses national guidelines and evaluates diabetes clinical quality improvement.

- **Arkansas**' Medicaid and DPCP have partnered with the Eli Lilly and Company to provide diabetes self-management education in underserved areas of the State.

Collaboratives

Improving the quality of care for diabetes is a systemic issue. The entire health care system and all its actors need to be mobilized to deal with diabetes. Thus, a number of States established their own statewide collaboratives or have worked with community health centers on the HRSA Health Disparities Collaboratives to achieve diabetes quality improvement.

- **New Mexico** was one of several States to participate in the first HRSA Health Disparities Collaborative focused on diabetes. Eleven clinics or practices participated and used an electronic diabetes patient registry to ensure people with diabetes received recommended care with the State health department serving as technical advisor to the participants.

- The State of **Washington** leads the way in establishing State-based diabetes collaboratives. Since 1999, Washington's three diabetes collaboratives have reached 65 clinical practice teams and accomplished significant clinical improvements, such as reductions in HbA1c levels, cholesterol, and blood pressure. There was also improvement of 35-50 percent in the number of patients who received foot examinations, blood pressure screenings, and cholesterol tests (Daniel, Norman, Davis, et al., 2004).

> *"Don't get so bogged down in the details that you loose sight of the big picture. Diabetes is the quintessential chronic disease and you need to look at the entire system of care. Simply telling providers to work harder and better will not work if the system is not structured to support them in quality improvement."*
>
> - California Department of Health Official

- **Wisconsin** developed a unique public-private initiative in conjunction with managed care plans in the State. The Wisconsin Collaborative Diabetes Quality Improvement Project monitors and evaluates plan performance on diabetes measures and works together on quality improvement initiatives. More in-depth information about this initiative is provided in Module 5: Improvement.

Provider Training

Because health care providers are a key element in improving diabetes quality care, many States have actively sought their involvement in developing programs. In addition, States are providing outreach and support to health care professionals as they seek to implement new evidence-based care guidelines.

- **New York** established three diabetes centers of excellence. Medical centers in the State competed for the recognition and additional funding available for the designated centers of excellence. The centers conduct research and provide health care professionals, providers, and patients with information and resources aimed at improving diabetes prevention and treatment (Cornell, 2003).

- **New Hampshire** offers an annual statewide multi-track professional training conference targeted to primary care health care professionals, insurers, legislators, podiatrists, school nurses, occupational health nurses, and other health and human service professionals.

- **North Carolina** provides scholarships for local health department staff to attend the East Carolina University School of Medicine's Clinical Fellowship in Diabetes. The week-long continuing education program is led by a diverse group of faculty who address everything from quality clinical care for diabetes patients to increasing the cultural competencies of providers. The health care professionals who attend are then required to train colleagues in their local communities.

State Disease Management Programs

Because States are looking for ways to control costs while maintaining or improving quality in Medicaid, more than 20 States are implementing disease management programs, many of them targeting diabetes (Smith, Ellis, Gifford, et. al., 2002; see table 4.1 below). Medicaid disease management programs seek to increase patient knowledge and self-management skills, improve provider adherence to clinical guidelines, and implement technology to track patients more effectively. Improved care management for diabetes is aimed at decreasing preventable complications, thereby controlling costs and potentially improving long term health outcomes.

- **Florida**'s Disease Management Initiative has the longest running Medicaid disease management program in the Nation, addressing a variety of chronic illnesses, including diabetes (Brown and Matthews, 2003).

> *"Getting the right people to share your message is the best thing you can do to make sure people listen."*
>
> - North Carolina Department of Health Official

- **Indiana** launched the Coordinated Care Management program, a voluntary disease management program for Medicaid patients with diabetes, chronic heart failure, asthma, and other costly conditions for Medicaid. The program will hire 80 new nurse managers over a 2-year period to perform assessments and conduct patient education (U.S. Department of Health and Human Services, 2003).

- **Kentucky's** Medicaid Managed Care plan, Passport**,** identifies members with diabetes through claim review, the nurse advice line, and referrals from doctors. The plan uses patient education and provider interventions to improve self-management and compliance with treatment guidelines. Since its inception in 1999, enrollees are doing better than the national average in monitoring symptoms and controlling the disease, and patient adherence and performance has improved each year of the program (Atkins, 2003).

Dissemination Activities

Raising Awareness Through Public Relations

An important component of addressing diabetes care involves raising awareness. Surprisingly, while there are 13 million diagnosed cases of diabetes in the U.S. in 2002, there were 5.2 million undiagnosed cases of diabetes (CDC, 2003c). If the diabetes goes too long without proper diagnosis, lasting damage to an individual's health can occur. Thus, it is important that the general public and providers be aware of the disease and its symptoms. States use a variety of methods to spread the word about diabetes.

- **Wyoming's** DPCP published a brochure, "What Wyoming Should Know about Diabetes," and distributed it to 21,000 Medicaid-eligible households and to more than 50,000 other citizens.

> *"It is vitally important that you include the people who are your target audience in the planning of these programs."*
>
> - California Department of Health Official

- **Tennessee's** DPCP collaborated with the ADA, the Tennessee Academy of Ophthalmology, and the University of Tennessee Agricultural Extension Service to bring the National Eye Institute's traveling vision exhibit to Tennessee.

Minority and Rural Outreach

The prevalence of type 2 diabetes is increasing most rapidly among minority populations. In addition, millions of people living in rural area have diabetes, and special attention must be given to ensure they are receiving quality health care. The NHDR reveals that minority racial/ethnic groups and lower socioeconomic groups receive fewer services for diabetes care, and that African Americans and Hispanics have higher hospitalization rates for complications of diabetes (AHRQ, 2003b).

Several States have developed innovative programs to target these groups. A first step in addressing this concern is making patient information available in an understandable format. This could involve using pictorial representations or providing documents in languages other than English. Reaching these groups also involves tailoring the message or targeting the delivery.

> *"We feel strongly that if we want them to partner, we need to be a partner back. This involves going to meetings they want us to be at and always following through. We take great care with our partners and always put them out front to get credit for their efforts. We want them to see how important they are to this."*
>
> - Wisconsin Department of Health Official

Removing the Language Barrier

- **Florida** has made their entire DPCP Web site available in Spanish.

- **Washington** has 20 self-management educators who are specially trained in delivering diabetes programs in Spanish.

Targeting the Message

- **North Carolina** partnered with the General Baptist State Convention and the State's Office of Minority Health, to conduct programs for African American congregations throughout the State that focus on awareness, risk factors, complications, and prevention strategies. The program provides educational presentations, workshops, and materials and develops public service announcements to radio stations with a predominantly African American listening audience.

- **Minnesota's** DPCP coordinates with the Office of Minority Health to address diabetes among minorities. Funds earmarked for reducing disparities in the minority and Native American population pay the salaries of two staff members who work on diabetes efforts targeted at these groups.

Rural Outreach Efforts

- **Colorado** implemented the Rural Diabetes Project that promotes diabetes preventive practices through a tracking and followup system with private eye care and primary care providers for eye disease screening and blood pressure control. Colorado also coordinates the *Buddy System*, a network of health professionals that provide diabetes education in hospitals, clinics, and public health agencies. Rural educators are matched with certified diabetes educators for one-on-one consultations.

Profiles of Selected Best Practice States

This section examines the mix of programs that four different States DPCPs use to improve diabetes care quality. The States profiled here were selected based on a variety of criteria. A list of high-performing States was developed based on rankings in the NHQR on diabetes care quality. This list was supplemented by information on best practices from the CDC, the Assistant Surgeon General's office, and research on other innovative diabetes quality improvement programs. From this list a cross section of States was selected that represented different areas of the country, geographic and population differences, and baselines for diabetes care quality. Some the States listed below score well on diabetes quality of care measures in the NHQR. Others are below national averages according to NHQR data. Thus, these States demonstrate real-world approaches to improving diabetes care that attempt to surmount the challenges that States face.

California

California uses a variety of approaches and partnerships to address diabetes in the State. The State's Medicaid program, MediCal, identified diabetes as a high-cost disease. The DPCP investigated the effect of case management on the Medicaid population. The 4-year study showed that case management resulted in a significant reduction in HbA1c levels (California Medi-Cal Type 2 Diabetes Study Group, 2004). Now that the DPCP has shown that this strategy works, it is working on funding for a study that will help determine whether this effort would be cost effective and feasible throughout the Medicaid population.

The California Cooperative Healthcare Reporting Initiative (CCHRI**)** is an innovative public-private partnership that has developed a program for measuring diabetes quality of care (see box below). California is part of the HRSA Health Disparities Collaborative which works with community clinics on diabetes care. The California Primary Care Association expanded the program to include more clinics with the funding support of the California Health Care Foundation. California is also one of five States involved in the HRSA sponsored diabetes collaboratives that focused on identifying pre-diabetes. California also uses NDEP educational materials and is participating in the national Diabetes Detection Initiative (DDI) of the U.S. Department of Health and Human Services. The primary focus of this initiative is to help people understand their diabetes risk by knowing the risk factors and assist high-risk people in linking with various health care systems and health care professionals to discuss testing.

California has evaluated the success of its efforts through multiple methods that identify short-term, long-term and process outcomes. The State is following CDC's logic modeling, looking at data to inform and help guide future efforts. They are using measures that are already being collected and then deriving ways to fill in the gaps. In addition to quantitative data, California is collecting qualitative information through focus groups and surveys of partners about the effectiveness of communications and messages.

California's Diabetes Continuous Quality Improvement Project

In an effort to address problems with undiagnosed diabetes and gaps in quality for diabetes care, the California Cooperative Healthcare Reporting Initiative (CCHRI) created the Diabetes Continuous Quality Improvement Project (Diabetes CQI). The CCHRI is an alliance of purchasers, health plans and providers in California that seek to improve health care quality through collecting performance data, providing a forum for all sectors of the health care industry to collaborate on quality improvement, and disseminating information to a variety of audiences. CCHRI is administered by the Pacific Business Group on Health (PBGH).

A unique collaboration of purchasers, health plans, and providers, California's Diabetes CQI project seeks to:

- Improve identification of diabetes
- Improve data exchange between providers and health plans
- Improve routine monitoring and testing of diabetes patients
- Show measurable improvements in the health of diabetes patients
- Develop a toolkit of interventions to help achieve project objectives
- Evaluate the effectiveness of project interventions
- Standardize clinical guidelines to create efficiencies across providers
- Promote information sharing and best practices

Collaborators in the Diabetes CQI include the State's largest employer coalition, the Pacific Business Group on Health, as well as seven of California's largest health plans and 24 medical groups and independent practice associations. The California State DPCP is involved as a partner in the project and has provided diabetes expertise as well as a public health perspective to the business model being used by private sector groups. Collaborators have agreed on common treatment guidelines for diabetes (developed by DPCP and Diabetes Coalition of California) that are in agreement with ADA clinical practice recommendations and a common toolkit of interventions, eliminating confusion and conflicting information from different sources.

Different parts of the project's overall objectives are accomplished through several programs:

- **The Quality Improvement, Learning and Teaching program (QUILT)** provides support to provider groups that are fostering population-based practice improvements. Site visits and initial assessments, monthly teleconferences, quarterly meetings and individualized consultation help advance quality improvements in clinical settings.
- **The Clinical Benchmarking Study** collects data on the quality of care provided to people with diabetes by the 24 provider organizations. Provider organizations and employers can use the information to track improvements in care over time, improve disease management interventions, and identify and disseminate best practices.
- The project developed a common **Intervention Toolkit** for providers that includes patient and provider education materials, medical chart inserts and checklists, and other tools to improve clinical care quality. More than 300 tools were evaluated for a variety of clinical criteria and then evaluated for ease of use. The project arrived at 40 reliable resources that it included in the Intervention Toolkit, distributed it to plans and providers, and provided training on how to use it.

More information on the Diabetes CQI is available at http://www.diabetescqi.org/about/index.asp.

Legislative Options for Improving Diabetes Care

- California SB 64 passed in 1999 mandated insurance coverage for diabetes supplies and outpatient education including medical nutrition therapy.
- In 1996, Maine's legislature passed Public Law 592 requiring all health insurance policies in Maine to cover ambulatory diabetes education and followup programs.
- Recognizing the devastating effects of this disease without a comprehensive approach to treatment, the Florida legislature passed legislation in 1996 that requires all insurers to provide coverage for all medically appropriate equipment and supplies in addition to diabetes outpatient self-management training and educational services used to treat diabetes.
- California AB 942, enacted in October 2003, allows non-licensed school personnel to administer glucagon and also allows students with diabetes to test their blood glucose levels in the classroom and self-manage their disease anywhere on school grounds or at school sponsored events and field trips.
- A number of States have passed authorizing legislation for Medicaid disease management programs, many of them aimed at diabetes. Examples of recent State legislation include: Delaware 2003 House Joint Resolution 10; Illinois 2003 SB 0064; Iowa 2003 House File 619; New Mexico 2003 SB 0338; Texas 2003 HB 727 and 2003 HB 1735.

Michigan

As part of its DPCP, the State of Michigan has set up a statewide network aimed at ensuring comprehensive diabetes management.

Michigan Diabetes Statistics

- 707,200 adults and 6,200 children are diagnosed with diabetes in Michigan.
- Diabetes related medical care costs Michigan almost $6 billion per year
- Sixty percent of direct costs were due to hospitalization.
- An additional cost of $3.5 billion is attributable to lost productivity from premature death, disability, and illness.
- Much of the indirect cost was related to complications of blindness and amputation.

The program, established as part of the Michigan Department of Community Health, Division of Chronic Disease and Injury Control, gained more resources in 1994 after receiving a CDC comprehensive grant and funds from the new State tobacco tax revenues. The State's Upper Peninsula region staff developed a model for working with health care providers on providing quality care and professional education aimed at improving diabetes care in the Finnish population. When the data showed that people served in the region had better outcomes, DPCP established six regional Diabetes Outreach Networks (DONs) statewide. Michigan's DON Diabetes Care Improvement Project was recognized as a Best Practice Initiative in 2002 by the Assistant Secretary for Health at the U.S. Department of Health and Human Services.

Each DON in Michigan develops collaborative partnerships with health care delivery agencies, sponsoring and providing professional education, and coordinating and developing diabetes resources within their service region. Such collaboration of diabetes care resources is aimed at increasing awareness and ensuring that persons with diabetes and at risk for diabetes are identified and receive ongoing diabetes care and education. While the regional networks have some efforts that are unique to their area, much

work is done on a statewide basis. The entire staff meets three times a year and holds conference calls on a monthly basis to coordinate efforts and develop programs.

> *"Simple lifestyle modifications such as healthy eating, moderate exercise, and weight control have conclusively been shown to prevent Type 2 diabetes by up to 60 percent. These solutions are low-tech and low cost, and yet they produce a high impact."*
>
> - Dr. Kimberlydawn Wisdom, Michigan Surgeon General

Results from the Michigan DON demonstrate that working with health care agencies and providers through a statewide Diabetes Care Improvement Project can result in improved outcomes for persons with diabetes. Trends in follow-up data from fiscal year 1996-2001 show a significant increase in the number of persons with diabetes receiving important tests. Individualized data analysis from the regional DONs also shows a positive downward trend in the levels of HbA1c, which is associated with significantly reduced risk of complications. The program has demonstrated local reductions in diabetes-related hospitalizations, amputations, and mortality. The program began seeing these results relatively soon after implementation and has begun to close the gap between Michigan's diabetes averages and the national average.

Michigan's Diabetes Policy Advisory Council works with DON directors and provides an opportunity for sharing information, best practices, and networking. In an effort to increase awareness and gain more support, regional directors meet regularly with area legislators to share information, identify gaps, and discuss how the legislature can help reduce the burden of diabetes. In addition, they meet with citizens and inform them about how they can seek legislative support.

Involvement by elected officials in diabetes related events has created momentum for the effort. Michigan was one of a group of States that participated in the Chronic Disease Academy sponsored by the CDC and hosted by the National Governors' Association. A team of agency directors, legislators, and advocacy groups attended this 3-day session and created a strategic plan for addressing chronic disease issues in the State. One of the ideas the State has implemented is a prevention caucus for legislators. Recently the group launched a challenge among State officials to adopt healthier habits. People in all branches of State government are now clocking their steps when they exercise and competing to be the most active. Even the Governor is wearing a pedometer. Involvement by elected leaders has attracted press attention and is raising public awareness.

The appointment of the State's first Surgeon General, Dr. Kimberlydawn Wisdom, has served to identify synergies between various efforts. In October 2003, Michigan presented its new Michigan Diabetes Strategic Plan. Developed by the Michigan Department of Community Health, the Michigan Diabetes Prevention and Control Program, and the Michigan Diabetes Strategic Plan Task Force and its Steering Committee, the plan addresses issues related to diabetes care and prevention. It also establishes a unified course of action among health care providers, public and private health officials, researchers, businesses, community groups, and people with diabetes to implement the most promising diabetes prevention and control strategies in the most cost-effective ways. Some highlights of the report include:

- Expanding diabetes primary prevention activities
- Developing an ongoing public awareness campaign
- Developing a Statewide diabetes consumer advisory group
- Reducing diabetes-related health disparities among minority populations
- Providing quality diabetes pregnancy-related care and education to women

Dr. Wisdom and U.S. Surgeon General Dr. Richard Carmona recently announced the involvement of Flint, Michigan in the DDI. In Michigan, the DDI will concentrate on the undiagnosed populations with a paper risk assessment test that can be followed up by a blood test and further treatment as necessary. Materials for the paper assessment are available through a variety of community channels such as social services, faith-based establishments, retail outlets, and fraternal organizations.

Missouri

The State's DPCP has identified diabetes as a serious public health problem (Missouri Department of Health and Senior Services, 2002). Citing studies showing that interventions can prevent or delay diabetes complications, the State's DPCP has led the effort to implement the Chronic Care Model.

The department has collaborated with federally qualified health centers (FQHCs) and one National Health Service Corp site in HRSA's Health Disparities Collaborative for diabetes. Participating clinics were chosen strategically in an effort to align disease impact with a service provider who was ready and willing to work on the project. Each center implemented the Chronic Care Model in one or more clinics, forming teams of diabetes-related health care specialists. Each center established an initial registry of patients with diabetes. Additional provider and/or site registries were added as the year progressed. The electronic registries were used to monitor indicators of health behavior, health status, and services received. Monthly summary registry reports were sent to the State's DPCP, where the data were aggregated. The State's DPCP provided FQHCs with financial support, a local learning session, technical assistance on registry development, maintenance, health system redesign, monthly reports, and evaluation skills.

From June 2000 to May 2003, preliminary results indicated health centers significantly improved 12 of 16 diabetes-related care measures, including increases in the prevalence of at least two HbA1c tests at least 3 months apart (an increase of 15 percent), dilated eye exams (190 percent), foot exams (47 percent), influenza vaccinations (76 percent), and whether the patient set self-management goals (37 percent). Future efforts will focus on maintaining these improvements and extending Collaborative activities to other health care sites.

The DPCP has tapped other resources by working closely with the State's cardiovascular disease program and MissouriPRO, which has a contract from CMS to manage quality improvement on behalf of beneficiaries. MissouriPRO helped lead the training and implementation process for expanding the Collaborative to include 10 additional health providers. DPCP sees this partnership as a strategic alignment, expecting changes by CMS providers ultimately to have an impact on the rest of the State.

North Carolina

North Carolina's DPCP initiated a number of diabetes initiatives including a unique community-based program, Project DIRECT, that targets diabetes prevention and care efforts in the African-American community. Using a comprehensive approach, Project DIRECT (Diabetes Interventions Reaching and Educating Communities Together) encouraged exercise and improved nutrition, promoted awareness of diabetes, and increased screening for diabetes (CDC, 2003e).

Early on, the DPCP pulled together a statewide diabetes advisory council that included all stakeholders. The group became active in advocacy and policy issues. Their support was crucial in helping secure matching funds from the State legislature that allowed them to gain more resources from CDC as a basic implementation program. In 1996, members of the council successfully pushed legislation mandating that insurance cover diabetes education and testing strips. The most recent legislative action was the 2002 Care for School Children with Diabetes Act. At the time of passage in 2002 only three States had this

kind of legislation for children in the public school system. The law ensures that the needs of students are addressed through an individualized diabetes care plan that includes provisions for snacks, testing, and assistance from an adult. The advisory council was very active in getting the bill passed.

North Carolina has reached 91 percent of its diabetes goals in the last 4 years, seeing increases in foot exams, eye exams, flu shots and HbA1c tests. The State has also met its goals in improvement among minority groups. The DPCP has begun working with the State QIO to examine Medicaid reimbursement claims for diabetes care, especially information on children.

Selected Local Quality Improvement Efforts

In addition to national, Federal, and State quality improvement approaches, there are also local efforts to improve diabetes care quality. Local quality improvement initiatives are a crucial part of overall efforts because they are closer to and have more direct contact with providers and local health systems. Quality improvement programs and models, such as the Breakthrough Collaboratives or the Plan-Do-Study-Act model (discussed further in Module 5: Improvement), are best implemented at the local level. Yet, State-level support is critical to local efforts because payment structures, as well as the legal and regulatory structure of the health care market, are largely a State responsibility.

There are any number of local quality improvement initiatives that exist for diabetes, too many to list here. In addition to the Health Disparities Collaboratives (which involve the Federal, State, and local levels), two additional examples of local diabetes projects are included as illustrations of the links between national, Federal, State, and local contexts:

- The St. Louis Diabetes Coalition is a voluntary network of health plans, provider groups, and other community organizations and companies that are working together to improve diabetes awareness, education and adherence to standards of care in the St. Louis area. The Coalition has worked together on a number of initiatives, including its Diabetes Screening and Treatment Guidelines**.** The treatment guidelines were endorsed by all of the major health plans in the St. Louis region, giving providers a single source for diabetes guidelines acceptable to all major payers. The Missouri Department of Health and Senior Services worked alongside the Coalition members to distribute the guidelines to more than 5,000 physicians in St. Louis and other parts of Missouri. More information about this and other the St. Louis Diabetes Coalition initiatives is available at http://www.diabetescoalition.org.

- The Niagara Health Quality Coalition (NHQC) is a local organization of employers, providers, physicians and insurers in western New York dedicated to working together to achieve quality, affordable health care. NHQC is affiliated with the Buffalo Niagara Partnership, the largest employer organization in the Niagara area representing 3,300 firms with more than 200,000 employees. Stating that data are national but change is local, the NHQC provides links to both State and national data that can help local organizations, companies, and individuals become informed about the quality performance of various health care sectors. The NHQC's Web site, http://www.myhealthfinder.com, links to hospital, health plan, physician, and long term-care quality data. The site also has links to clinical care guidelines for diabetes that were developed by the State diabetes coalition.

Summary and Synthesis

The breadth of diabetes quality improvement activities both nationally and across the States provides State leaders with a variety of proven experiences, useful resources, lessons learned, and best practices for enhancing initiatives and partnerships in their own States. State programs have been successful in making inroads in diabetes prevention and quality improvement.

Yet, there is still much that can be done. Despite the efforts of States, national organizations, the Federal Government and a host of local and community efforts, there is still room for improvement. Diabetes rates continue to rise, substantial gaps in care for diabetes exist, preventable complications occur all too frequently, and the Nation is paying the price in higher health care costs and lower productivity and quality of life.

State leaders may also wonder which quality improvement strategies are the most promising approaches to achieving real improvements in diabetes care quality. While this question cannot be answered conclusively for the public policy arena, a recent research analysis of diabetes quality improvement strategies in clinical settings provides some evidence for prioritizing certain approaches. A systematic review of the literature on clinical diabetes quality improvement strategies found that provider education (i.e., meetings or conferences, outreach visits, and distribution of educational materials) and disease management were the most effective strategies in achieving significant improvements in patient HbA1c levels. However, the study also found multiple quality improvement interventions achieved more significant improvements in HbA1c levels and provider adherence to clinical guidelines than single interventions (Shojania, McDonald, Wachter, et al., 2004).

Before embarking on any particular public policy approach, however, State leaders will need to assess what is already being done to address diabetes care quality in their State. Talking with DPCP officials in the State health department, Medicaid directors, State employee benefit officials, State and community stakeholder group leaders, provider associations and professional societies can help State leaders assess what is already underway in the State, which efforts have been most successful and where additional efforts are needed. The State Diabetes Quality Improvement (QI) Inventory, presented in Table 4.2, is designed to assist State leaders in assessing the range of diabetes programming and determining the appropriate stage of development of an activity.

Based on this inventory, State leaders are ready to move to the next stage in the quality improvement process – actually developing a quality improvement strategy for a State. The next module of the *Resource Guide* is designed to assist State leaders with planning and implementing diabetes quality improvement action strategies by using information from previous modules in applying the PDSA model of quality improvement to the public policy setting. Module 5: Improvement also discusses important components of evaluation plans for State efforts.

Associated Appendixes for Use With This Module

Appendix G: Index of Diabetes Quality Improvement Initiatives

Appendix G provides brief descriptions and links to further information for a variety of national and federal diabetes quality improvement initiatives. State leaders may want to review and consider these programs as models or resources for State action.

Appendix H: CDC and State Funding for DPCP, by State, 2003-2004

Appendix H shows the funding provided by the CDC to each State for the DPCP and each State's contribution. State contributions are shown by "general funds" and "in-kind" resources.

Table 4.2 State Diabetes Quality Improvement (QI) Inventory			
	Stage of Development		
State QI Actions	Planning	Implementation	Evaluation
PARTNERSHIP/PLANNING ACTIVITIES			
Coalition/Advisory Board			
Collaborative			
Cross-Agency Initiatives			
PROGRAM DEVELOPMENT ACTIVITIES			
Diabetes Care Guidelines			
Data Measurement & Reporting			
Information Technology			
Self-Management/Patient Education			
Provider Training			
Collaborative			
Disease Management			
DISSEMINATION ACTIVITIES			
Raising Awareness			
Minority & Rural Outreach			
OTHER STATE DPCP ACTIVITIES			
Other QI Action in my State			
Non-Governmental Initiatives			
Federal Initiatives			
Local Initiatives			

Module 5: Improvement - Developing a Strategy for Diabetes Quality Improvement

"As rates of diabetes increase across the country, roughly tracking with increases in obesity rates, States are quickly approaching a time when budgets will not be able to withstand the pressure of treating the flood of obesity-related diseases. Consequently, while we search for better and more efficient ways of treating diabetes and helping people manage the disease so that costly procedures can be prevented, we must find more ways to create incentives for people to make healthy lifestyle choices. The State that figures out how to do this, while respecting and protecting individual liberties, will be the model for the Nation."

– An Interview with Governor Mike Huckabee, Arkansas

Module Overview:

1) A Model for Quality Improvement
    a. Plan-Do-Study-Act (PDSA) Model
    b. PDSA Case Study: Wisconsin Collaborative Diabetes Quality Improvement Project
2) Developing a State Strategy for Improving Diabetes Care Quality
3) Integrating Quality Improvement Activities Across Conditions
4) The Importance of Evaluation
5) Summary and Synthesis
6) Resources for Further Reading

Key Ideas in Module 5:

- Although local contexts differ, standard quality improvement techniques should be a part of any health care quality improvement strategy at the State level.
- A variety of models can be used to inform State strategies to improve health care. This module focuses on the PDSA model adapted for the State policymaking context.
- State leaders can use the adapted PDSA model and the tools in this module to gather State-specific data, information, and action to produce a quality improvement strategy suited to their locale.
- State leaders can integrate quality improvement efforts for diabetes with other conditions or design more overarching quality improvement strategies that target multiple health care conditions.

Quality health care is a goal that all health care professionals and policymakers can achieve, yet many do not know where to begin.

The challenge of the health care system is to define what is "quality health care" and lead participants in the health care system to increase quality, reduce mistakes, and attain quality results for every patient every time. Some may view this as impossible. Others can point to the great strides that have been made in manufacturing and other services by applying the principles of quality improvement. And some can point to dramatic improvements in reducing deaths in U.S. hospitals from applying the principles of quality improvement (Gabor, 2004). Additionally, a number of States today can point to gains that they have made in diabetes outcomes for their citizens to confirm that quality improvement in health care is possible.

Module 1: Background provided an overview of diabetes and quality improvement. Module 2: Data provided a variety of data sources with State-specific data on diabetes quality of care. Module 3: Information helped State leaders understand how data must be examined to make comparisons and create information for guiding decisions and leading change. Module 4: Action offered a variety of national, Federal, State, and local approaches, resources, and best practices that can inform State quality improvement efforts.

This module aims to assist State leaders to develop diabetes quality improvement strategies suited to State contexts. Module 5: Improvement provides models for quality improvement, presents a case study of how one State – Wisconsin – undertook an ambitious quality improvement effort, and discusses how State leaders can begin to develop their own State-specific strategies to improve diabetes care quality.

A Model for Quality Improvement

While local contexts differ, models of quality improvement give the common elements needed to stimulate change and improvement in any situation. As State leaders embark on new initiatives or revitalize existing ones, quality improvement models can inform those efforts. The key is to find a suitable model for an individual State and its partners, and then pick and choose the components that are most useful for a specific local context. Explained below is a model that may be useful for State leaders developing quality improvement strategies.

Plan-Do-Study-Act (PDSA) Model

A time-tested quality improvement tool still useful today is the "Plan-Do-Check-Act" or the "Plan-Do-Study-Act" model for guiding quality enhancement projects of all types (see Figure 5.2). The PDSA model conceptualizes the continuing cycle of improvement.

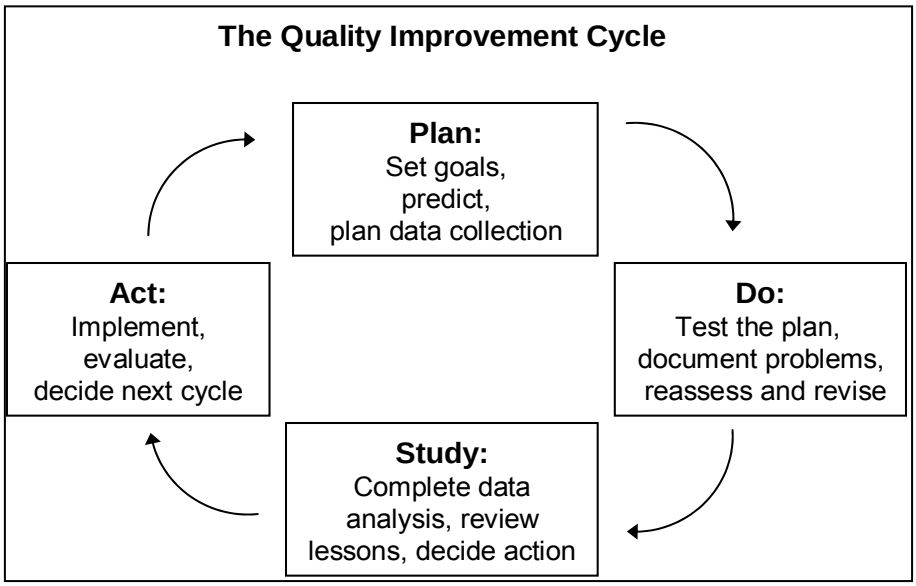
> W. Edwards Deming popularized the Plan-Do-Check-Act model (an idea of Walter Shewhart, a statistician at the Bell Telephone Laboratories) and focused manufacturers on the need to apply the model constantly to the production process. Deming is credited with General Douglas McArthur for rebuilding Japan after World War II and setting the foundation for Japanese production quality (Tortorella, 1995).

Its steps for effective quality improvement include:

- **Plan** — Set the goals of the quality improvement cycle—questions, predictions, data to be collected, and the who, what, when, where of the project.
- **Do** — Carry out the plan and document problems and unexpected observations.
- **Study** — Complete the analysis of the data, compare to predictions, and summarize lessons.

- **Act** — Determine changes to be made and decide what will happen in the next cycle (Langley, Nolan, Nolan, et al., 1996).

Figure 5.1



Source: Adapted from Langley G, Nolan K, Nolan T, et al. The Improvement Guide: A Practical Approach to Enhancing Organizational Performance. San Francisco: Jossey-Bass Publishers, 1996.

The PDSA cycle usually applies at the point of production, in this case to the front-line of health care at the point of care. The concept also can be applied to the quality improvement role of State leaders. Drawing on insights from State quality improvement activities around diabetes care, State leaders might consider a "Partner-Plan-Do-Study-Act" model.

- **Partner** — Decide who are strategic partners of quality improvement and recruit them to the project — champions in health care production, stakeholders (e.g., consumer/patient groups, health care professionals, purchasers, health plans, and topic experts, among others), and key State leaders and agencies (e.g., visible champions, diabetes experts, program planning/evaluation staff and quality improvement experts). Is the group large enough to include key leaders and perspectives, yet small enough to be productive?

- **Plan** — The goals of a project will be broad in the context of statewide activities because many partners and processes will need to be involved. What does the group predict are the current obstacles to quality care? How will the goals be put into action? What data need to be collected to prove that the changes are indeed improvements?

- **Do** — Test the plan and document problems and unexpected observations as data are collected. Initial plans seldom produce desired results the first time. Pilot test the ideas of the group with front-line health care programs, providers, and consumers. Reconvene the partners and discuss successes and problems.

- **Study** — Complete the data analysis, compare the results to predictions, and summarize lessons learned. Do the test results convince the partners that full-scale implementation will be successful?

Because the scope of activities may be broad and costs may be involved, the planned action should be based on reasonable data and results.

- **Act** — Determine the changes to be made. Implement the changes State- or district-wide. Continually assess those changes through data collection and analysis. Are the changes working? What will happen in the next cycle?

The PDSA is one model of quality improvement that has withstood the test of time. There are other tools and methodologies for quality improvement to suit the various stages at which States find themselves. Following are additional resources that States might want to use to facilitate quality improvement wherever they are along the continuum.

- The Quality Assurance Project, sponsored by the United States Agency for International Development (USAID), presents models based on quality improvement on an international scale. These models are useful and easily translated for States (information available at http://www.qaproject.org/resourcesintro.html).

- The IHI breakthrough series focuses on change at the provider level, but is an important approach that State leaders should understand for developing change agents (information available at http://www.ihi.org/ihi).

Numerous tools are also available to further assist quality improvement projects. Quality improvement tools suited for policymakers are available on AHRQ's Quality Tools Web site at: http://www.qualitytools.ahrq.gov/channels/channel.aspx?mode=3&inc=browse.policy_makers.inc. For another quality toolbox, see Tague (1995).

The PDSA model can be applied to the context of State leadership in quality improvement. The actual approaches and actions that States will take will be as varied as the examples that appear in Module 4: Action of this *Resource Guide*. One State's experience, in particular, can help illustrate how the PDSA model can be applied to an actual quality improvement project.

PDSA Case Study: Wisconsin Collaborative Diabetes Quality Improvement Project

Wisconsin's DPCP, part of the Wisconsin Department of Health and Family Services, received CDC funding in 1994 and other funding since then. Over time the DPCP developed an ambitious strategy to improve diabetes care quality for clients of managed care organizations. Wisconsin's diabetes quality improvement efforts in many ways mirror the stages of the PDSA model described above.

- **Partner** — In 1996, the DPCP formed the **Diabetes Advisory Group** comprised of over 50 diverse groups and organizations**.** Wisconsin's health maintenance organizations (HMOs) were key partners in the advisory group.

- **Plan** — One of the first plans developed by the Diabetes Advisory Group was the development of **Diabetes Mellitus Care Guidelines** and supporting documents for use by all health care providers in the State. Released in 1998, these guidelines were endorsed by the Advisory board members, and members promoted the use of the guidelines throughout the health care system blanketing the State with a common message about quality diabetes care. The DPCP used materials from other States and also worked with the University of Wisconsin-Madison to use data to assess the status of diabetes care in the State and adherence to the Diabetes Mellitus Care Guidelines.

- **Do** — Out of this successful effort, the **Wisconsin Collaborative Diabetes Quality Improvement Project** was established in 1999. The goal of the Diabetes Quality Improvement Project is to improve the quality of diabetes care for people who receive services through Wisconsin's HMOs and two other large health systems by:
  - Evaluating implementation of the Wisconsin Essential Diabetes Mellitus Care Guidelines.
  - Sharing data issues, strategies, initiatives and lessons learned.
  - Improving diabetes care through collaborative quality improvement initiatives.

  Collaborators included university experts, Wisconsin's QIO, the State Medicaid program, and other health care industry partners. The department used a two-pronged approach to convince the HMOs to sign on. First, they leveraged the support of a well-connected spokesperson to discuss the guidelines and the possibility of forming the collaborative. Secondly, they participated in ongoing discussions about quality improvement in the private sector. They presented the collaboration as a potential win-win opportunity. HMOs would get value from the project through access to information, tools and ongoing support as well as receiving good media coverage for their work with the State. The DPCP would reach the 68 percent of the State's population served by the participating HMOs.

- **Study** — Collaborators used the Health Plan Employer Data and Information Set **(HEDIS®) comprehensive diabetes care measures** to track progress in improving diabetes care. The State's DPCP contracted with the University of Wisconsin to provide confidential analysis and reporting. Each HMO was given a confidential identifying number so it could see how its performance compared with other organizations. The project was careful to use these data results cooperatively, not competitively, with a goal of improving diabetes care in Wisconsin. Participants in the Collaborative continued to discuss issues and strategies such as registry development, data collection, and provider profiles.

  > *"Being a member of the statewide diabetes collaborative project allowed our plan to access materials, data, and people resources that would otherwise have taken years to develop. Being part of the collaborative group gave us the means to send a coordinated, statewide message consistently and coherently in a variety of formats."*
  >
  > - Quality Management Specialist, Prevea Health Plan

  The quality improvement plan included evaluative efforts to assess improvements in diabetes care. An evaluation of the HEDIS® data showed that the project:
  - Increased eye exams for people with diabetes from 62 to 69 percent.
  - Increased cholesterol screening and control from 72 to 78 percent and 45 to 51 percent, respectively.
  - Increased kidney disease monitoring from 47 to 52 percent.

- **Act** — With data collection and reporting in place, the Wisconsin Collaborative Diabetes Quality Improvement Project took further action by focusing its quality improvement efforts. With HbA1c rates already at 90 percent in the State but eye examination rates much lower, the partners determined that the project should establish a statewide Diabetes Eye Care Initiative. In 2001, this project began with the goal of increasing eye examination rates and enhancing communication among specialists and primary care providers related to diabetes eye care.

  In October 2003, the project released a compendium of the diabetes quality initiatives implemented in the 5years since the project began. In addition to describing the interventions used, the compendium

provided information on barriers, ongoing challenges, and lessons learned. Some of the lessons and strategies used to achieve the encouraging results of the project were:

- More inclusive quality improvement teams over time
- Increased use of diabetes care teams, champions, and case management services
- More in-depth barrier analysis and intervention evaluation
- Community collaboration
- More advanced information systems for developing, tracking, and feedback on "targeted" interventions
- Support for providers and clinics
- An increased focus on the role of the consumer
- Increased use of technology to enhance communication and outreach (Wisconsin Department of Health and Family Services, 2003).

More information on the Wisconsin Collaborative Diabetes Quality Improvement Project, is available at: http://www.dhfs.state.wi.us/Health/diabetes/Diabetes_Collaborative_Improvement_Project.htm

As this case study demonstrates, quality improvement can take many years and iterations before actual change and quality improvement can be documented. However, the reward is that once the partnerships and processes are in place there is the opportunity to see measurable advances in care quality and in health outcomes.

Developing a State Strategy for Improving Diabetes Care Quality

The PDSA quality improvement model described above can be combined with previous modules of this *Resource Guide* to build a strategy for improving diabetes care quality. AHRQ has also developed a companion *Workbook* that can assist State leaders through a step-by-step process for using the data, information and resources from this *Resource Guide* to develop the case for diabetes quality improvement in a particular State, examine strategic areas for improvement, and develop a detailed strategy.

Described below are tools that can help State leaders develop a State quality improvement strategy. These tools can be used in conjunction with the *Workbook* exercises. The first tool is the State Diabetes Quality Improvement Worksheet (see Figure 5.2) that can assist State leaders with assembling the data about their State and diabetes. Another tool is the PDSA checklist that provides the common steps State leaders need to take to build a quality improvement strategy. In working through these tools, State leaders are advised to work closely with State DPCP officials to plan and develop their State's diabetes quality improvement strategy.

Building the Case for Diabetes Quality Improvement

One step in the process of developing a quality improvement strategy is for State leaders to gather information about diabetes in their State. The worksheet below helps State leaders to assemble State-specific information on diabetes prevalence, cost and quality of care to assess opportunities for improvement. This worksheet information combined with the inventory of programmatic activities related to diabetes assembled at the end of Module 4: Action allows State leaders to assess the current condition of diabetes care and public policy in their State. Using this information, they can make the case that diabetes quality improvement is important for their State.

Figure 5.2. State Diabetes Quality Improvement Worksheet

From Table 2.3 – State-Specific Estimate of Cost Burden of Diabetes:

- Number of people with diabetes _____
- Percent of the population with diabetes _____
- Direct cost of diabetes in the State _____
- Indirect cost of diabetes in the State _____

From Table 2.1 – NHQR Diabetes Quality Measures

- HbA1c testing rate (two or more times per year) in the State _____
  - national average 61
  - HP 2010 goal 50
  - Best in class State average 82
- Retinal eye examination rate in the State _____
  - national average 67
  - HP 2010 goal 75
  - Best in class State average 81
- Foot examination rate in the State _____
  - national average 65
  - HP 2010 goal 75
  - Best in class State average 82
- Flu vaccination rate in the State _____
  - national average 37
  - HP 2010 goal n/a
  - Best in class State average 58

From Appendix H – CDC and State Funding for Diabetes Program

- CDC funding _____
- State in-kind and general funding _____
- State funding in States with similar disease burden _____
- State funding ranges in surrounding States _____

From Appendix F – NHQR Quality Measures for Various Conditions

Measures on which state is below average (indicated by a minus sign in the column for the state)

- _____
- _____
- _____
- _____

Putting the PDSA Model To Work

The adapted PDSA model is a general model intended to capture the most important components of quality improvement; but State leaders may wonder how to put it to use. Provided below is a checklist of PDSA quality improvement steps. This checklist outlines the common steps that State leaders need to take to develop a quality improvement strategy. Using the checklist as a framework, State leaders can fill in the State and local background, data, information, public policy approaches and other resources to develop a strategy suited to their particular context.

As State leaders do this, one of the most important factors to bear in mind is the cyclical nature of quality improvement. Improving health care quality is not a one-time activity but must be ongoing. Sustained improvement usually occurs over many years. Thus, the most effective action plans will include not only short-term goals but long-range ones as well.

Integrating Quality Improvement Activities Across Conditions

Diabetes is one of several chronic illnesses with demonstrated opportunities for quality of care improvements. Care for asthma, cancer, heart disease, and other common chronic conditions affecting millions of Americans too often falls short of what research has indicated to be the most effective treatments. Diabetes and other chronic conditions combined account for 78 percent of all health care spending and 7 out of 10 deaths.

Are there other quality improvement opportunities in my State in addition to diabetes?

Each State should view its performance across the broad spectrum of quality improvement measures, such as those contained in the NHQR. The NHQR contains data on many other chronic conditions that could be targets for quality improvement initiatives. Appendix F assembles all of the measures from the NHQR that include State-level estimates.

The models, processes, and tools for quality improvement in diabetes care in this *Resource Guide* can be applied to other disease areas that may also be fruitful targets for quality improvement.

State leaders can use this information to help decide how broadly or narrowly to focus their quality improvement efforts. Diabetes may be just one of several costly health care conditions that are appropriate areas to invest in quality improvement efforts in a given State. In addition, there may be advantages to integrating quality improvement efforts across several conditions, such as stretching scarce resources by using economies of scale across programs, minimizing investment costs in infrastructure, and maximizing the effect of systemic changes in health care delivery.

Thus, some States may choose to expand on existing diabetes quality improvement efforts while other States may want to establish comprehensive quality improvement efforts that target several diseases at once. For example, several States, including Wisconsin, have expanded their efforts with diabetes to address heart disease since the two are related. On the other hand, Vermont has initiated a broader chronic care initiative to improve the quality of care for all chronic diseases but has chosen diabetes as the first focus area for the initiative. (See the Vermont Chronic Care Initiative Web site at http://www.healthyvermonters.info/hi/chronic/chroniccare.shtml for more information.)

Checklist of PDSA Quality Improvement Steps

Partner

- ✓ **Establish or redesign an advisory board or steering committee to identify areas of health care most in need of quality improvement in the State.** *(The NHQR State-level data across all disease (Appendix F) and the NHDR socioeconomic data might inform these deliberations.)*
- ✓ **Include the key experts and stakeholders in quality improvement,** including State DPCP officials and champions in health care who will carry key messages to the front line of health care.

Plan (with Partners)

- ✓ **Decide on a set of questions or topic areas related to quality improvement.**
- ✓ **Develop an appraisal of how the State performs, why, and how the State could improve.**
- ✓ **Develop goals for quality improvement.** *(Some of the State-level results described in the Module 4: Action, as well as NHQR data, might inform the process.)*
- ✓ **Take an inventory of current diabetes quality improvement programs in the State, including DPCP programming, and other local and nongovernmental initiatives. Make a preliminary list of additional actions to take** *(See Table 5.2 above)*
- ✓ **Identify data needs:**
  - – **Identify measures that address the topic, that have readily available benchmarks, and that relate to action needed.** *(NHQR data could inform this step.)*
  - – **Develop an inventory of potential data sources for the State or locality that can address the topic and help analyze variation in practice across the State.** *(This Resource Guide points to some possible data sources for States in Module 2: Data and describes approaches to analyzing data in Module 3: Information.)*
  - – **Determine whether special data collection must be undertaken and how that can be accomplished.**
- ✓ **Develop a preliminary evaluation plan to inform data collection needs.**

Do

- ✓ **Assemble data.**
- ✓ **Make initial estimates of measures agreed to by the Partners and compare them to benchmarks. Initial assessments may lead the Committee to revise its original plan.** *(NHQR benchmarks should inform this step.)*
- ✓ **Conduct (or commission) analyses to answer the questions raised in the planning stage and to develop information for deciding on actions to be taken.**

Study

- ✓ **Study the data and its implications for the quality improvement strategy**
- ✓ **Prioritize areas for improvement.**
- ✓ **Put together the case for taking action.**

Act

- ✓ **Refine the action and evaluation plans with the Partners.**
- ✓ **Find resources to develop and support the initiative.**
- ✓ **Implement the action plan.**
- ✓ **Implement the evaluation plan.**
- ✓ **Assess whether improvement has occurred based on the evaluation data.**

The Importance of Evaluation

Evaluation is essential to understand whether a quality improvement activity is accomplishing planned goals, whether goals and actions are ultimately improving the health outcomes of the population, and what adjustments are necessary. Evaluation in quality improvement can be done quickly, as often

suggested by facilitators, to maintain momentum of the quality improvement activity. Evaluation can also look at longer term, underlying components of the program. One program that can serve as a resource for State leaders in developing an evaluation plan for diabetes quality improvement efforts is the CDC's accountability efforts for State DPCPs.

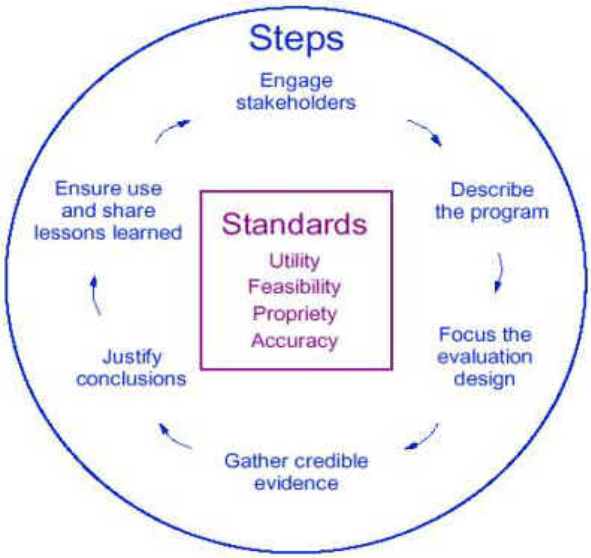
In 1999, the CDC began addressing the need for more systematic State-level programmatic evaluation and accountability in the National Diabetes Prevention and Control Program. The CDC devised seven national objectives for diabetes care, including increasing the percentages of people with diabetes receiving HbA1c testing, eye exam, foot exam, and influenza vaccination. In addition, the national objectives include reducing health disparities and establishing linkages to other wellness programs, such as: physical activity or smoking cessation programs for people with diabetes.

The CDC asked States to devise their own State objectives for improved diabetes population health in order to address the uniqueness of each State's population. A critical objective that States usually include is to establish measurement procedures to track progress. The CDC focus on evaluation emphasizes the importance of measurement. The State DPCP has become a catalyst for statewide improvements through partnering and accountability on various operational levels.

CDC Model for Program Evaluation

The CDC employs a model of evaluation that includes four groupings of standards for program evaluation, and six repeating steps in the evaluation process as illustrated in Figure 5.3.

Figure 5.3. CDC model of evaluation



Source: Centers for Disease Control and Prevention. Framework for Program Evaluation in Public Health. MMWR 1999;48(No. RR-11). Available at: http://www.cdc.gov/eval/framework.htm (accessed March 3, 2004).

The CDC provides 30 standards under the four subgroups of utility, feasibility, propriety, and accuracy. These standards are guidelines for conducting sound and fair evaluations and may be briefly described as follows:

- **Utility** ensures that the evaluation serves the needs of intended users.
- **Feasibility** results in evaluations that are realistic and sensible.
- **Propriety** ensures ethical integrity in the conduct of the evaluation.
- **Accuracy** leads to information that is technically sound.

Steps in the Evaluation Process

The six steps in the evaluation process may vary as to when they are carried out, though one step usually lays a foundation for the next. Steps will be repeated as results become clear and new issues arise. Each step serves to ensure the effectiveness of the evaluation.

- **Engaging stakeholders** is essential to ensure that the evaluation addresses the important elements of the program and that the evaluation is used. Stakeholders include those served by the program, those planning and directing the program, and those involved in program operations.

- **Describing the program** serves two functions. First, it lays out in detail the program's goals and strategies so that everyone involved understands them. Second, it provides an opportunity for consensus building around the goals and strategies.

- **Focusing the evaluation design** addresses the greatest issues of concern. This step includes identifying the purpose of the evaluation; defining the users and usefulness of the evaluation; listing stakeholders' questions that need to be addressed; establishing methods to ascertain information upon which the evaluation will be based; and developing consensus around particular roles and responsibilities pertaining to the evaluation.

- **Gathering credible evidence** contributes to the robustness of the evaluation. Developing credible evidence involves defining appropriate indicators, identifying legitimate sources of information; ensuring the quality of data gathered; and aligning the infrastructure for collecting evidence with the environment (and individuals) from which the information is gathered.

- **Justifying conclusions** is important to ensure that the evaluation will be used. When consensus is reached regarding the goals and strategies of the program, when the values of the evaluation are aligned, and when the evidence gathered is credible, then conclusions will naturally be justified. At this point, conclusions and recommendation can be made.

- **Ensuring use and sharing lessons learned** includes designing mechanisms for feedback and dissemination of the information gained in the evaluation.

Employing an evaluation specialists or, at the least, assembling an evaluation team with a designated leader will help facilitate the process. Issues regarding internal bias and external influences must be addressed to ensure integrity of the analytic work and a trusted evaluation of a program or project.

To be effective, however, evaluation strategies must be timely and useful. They should be considered at the beginning of the project and they should have a reasonable deadline for completion. Including an experienced evaluator on the quality improvement team can help ensure that the evaluation will be sound, useful, and timely. The evaluation should feed back to the quality improvement cycle and direct future actions.

Other Ideas for State Action to Improve Diabetes Care

For some State leaders, broad statewide quality improvement efforts may seem unattainable or unrealistic, given the scope of their responsibilities or the status of their budgets. There are, however, other activities that help raise awareness of quality improvement and build support over time for larger diabetes quality improvement efforts. Some options include the following:

- Talk with other organizations and individuals about ways to improve diabetes care in your State (e.g., DPCP staff in the State health department, diabetes advocacy organizations, health care professional organizations for diabetes, as well as providers and health plans).
- Convene a conference or advisory group of diabetes experts in the State to discuss strategies for quality improvement or work with one that already exists.
- Hold/participate in a legislative hearing or town-hall meeting on health care quality in the State.
- Participate in State efforts to raise public awareness about obesity and diabetes.
- Consider public-private partnerships and public-private collaboratives to address diabetes quality improvement
- Examine ways for State employee health programs, the State DPCP, and Medicaid offices to work together to control diabetes and improve care.
- Help establish a disease management program for diabetes for State employees or Medicaid clients by partnering with private sector organizations for services.

Summary and Synthesis

Module 5 has provided a model of quality improvement, a case study of one State's innovative quality improvement strategy and some tools and considerations to help State leaders develop their own quality improvement strategy. This module does not provide States with one approach or answer. Instead, decisions about the kind of quality improvement strategies that a State should pursue are the responsibility of State leaders and their partners, who are positioned to know what is best suited for their State context.

There are common elements to quality improvement that can inform the development of State strategies. The PDSA model adapted for the policymaking context is one approach that can assist State leaders. It is also important that State innovators examine the current condition of diabetes care and what diabetes programs are underway. State quality improvement efforts can then build on and fill in the gaps to develop a more comprehensive, coordinated approach to improving care. Because quality improvement occurs over a long time frame, evaluation is crucial to determine what effects the strategy has had and to justify continued efforts and resources over time.

Resources for Further Reading

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Associated Appendix for Use With This Module

Appendix F: NHQR Quality Measures for All Conditions by State

Appendix F provides quality measures for all conditions and topics in the NHQR. It includes the national estimate and an indicator for whether or not the State estimate (not shown due to space limitation) is statistically greater, lower, or no different from the national average. This resource can help States identify which diseases and their treatments may be in need of attention.

Module 6: The Way Forward – Promoting Quality Improvement in the States

> *"Quality health care means doing the right thing at the right time in the right way for the right person and having the best results possible."* (AHRQ, 2003c)

Health care analysts and researchers have long documented extensive gaps in the quality of care delivered to Americans. Despite unrivaled technological innovation in American health care, too much of the care that is delivered to patients does not meet the accepted standards of quality. The findings of the *National Healthcare Quality Report* and the *National Healthcare Disparities Report* provided further confirmation that, while in some areas care is improving, the health care system in America has a long way to go before it delivers care that is consistent with accepted guidelines and does not vary significantly by geography, race, ethnicity, or socioeconomic status.

There is a great deal that State leaders can do to support and encourage quality improvement, and thereby, to improve health outcomes, reduce the burden of disease, and possibly increase the efficiency of the health care system. As guardians of public health and health care innovators, States can champion quality improvement and best practices that can transform health care systems. In most cases, State government is also one of the largest health care purchasers in a State due to Medicaid and State employee health insurance programs. With States experiencing budget problems and high growth in health care costs, States cannot afford to pay for a product that does not meet accepted standards of quality. Alone or in concert with other purchasers, State governments can help steer the health care system toward the consistent delivery of high quality care.

Diabetes is one chronic condition that has a compelling case for quality improvement for States. The disease burden from diabetes is great in terms of the number of people affected, the cost of complications, its effect on quality of life, and the disparities in care between racial and ethnic groups. Despite its prevalence and cost, research has demonstrated that type 2 diabetes can be prevented, and complications from both type 1 and type 2 diabetes can be prevented or significantly delayed with appropriate treatment. Diabetes also has widely accepted, evidence-based guidelines for care and a strong case for a return on investment for purchasers and society from diabetes quality improvement efforts.

The NHQR provides an array of national and State-level data that can help States focus their quality improvement efforts. This *Resource Guide* has taken the data from the NHQR on diabetes and placed it within a model of quality improvement to assist States with improving diabetes care. State leaders now have the opportunity to contribute to the growing momentum to improve the quality of care in America through State initiatives.

What Can State Leaders Contribute to Quality Improvement?

As State leaders examine how they can be involved in improving the health care quality, there are a number of essential elements that State leaders can contribute to the process. These elements include: providing leadership and shared vision, fostering partnerships and collaborations between key parties, planning and setting goals, enhancing measurement and reporting, improving the infrastructure of health care quality, assuring evaluation and accountability, and creating incentives.

- **Providing leadership and vision—**Quality improvement requires leadership. It will not emerge without a champion who can provide leadership for organizations and individuals to work together to

develop a shared vision and common goals for health care quality. Whether initiatives are developing locally, statewide or nationally, effective leadership is essential to quality improvement. However, health care quality cannot be accomplished by one champion, be it a person or an organization. Leadership must be a catalyst for others to become involved in developing shared vision and goals for improving health care quality.

- **Forming partnerships and collaborations—**In addition to leadership and vision, partnerships and collaborations are vital to improving quality. Health care quality is the product of many different parts of the health care system but ultimately must affect what happens in the community, the patient environment, and the clinical setting. Thus, all of the groups that have an effect on patient care should participate in quality improvement efforts for an initiative to be successful, including health care professionals, providers, patients, and purchasers. Health care professionals and providers need to establish systems that deliver appropriate, quality care consistently; patients need to demand and participate in the best available care; and purchasers must demand and pay for the highest quality, most cost-effective delivery of care. Consumer groups with interest in diabetes can be powerful allies for change and a source of expertise. State health department staff and other diabetes care experts from private sector organizations can provide support and expertise for State initiatives.

- **Assisting planning and goal setting—**Once partnerships and collaborations are initiated, the quality improvement group must develop an action plan with specific goals for quality improvement in the State. The action plan must include timelines for specific steps and deliverables to help ensure that all partners move together. The plan should include specific responsibilities and benefits for as many project partners as possible to ensure buy-in and continued involvement.

- **Enhancing measurement and reporting—**Another essential piece for understanding quality is defining quality standards and developing measures to track how well or poorly the quality improvement intervention is working and the health care system is performing. In addition to assessing quality-improvement activities, measurement and reporting provide a mechanism for comparing how well any given health plan or provider is doing in a selected area of care. Quality measurement can involve counting the number of patients who received a needed immunization or screening or how often patients had to be hospitalized due to complications after a surgery by a given provider. Health care providers and companies must have data systems that are robust enough to estimate a given set of measures of health care quality. Results then must be made available for purchasers and consumers to be able to make meaningful comparisons of the performance of various providers. As discussed earlier in the *Resource Guide*, there is a well developed set of measures for diabetes care quality and many existing data collection and reporting systems that are available to States. There is a wide array of public measures and publicly available data sources reported in the NHQR, as well as other important measures that States may want to incorporate into a quality improvement and evaluation strategy.

- **Improving the health care infrastructure**—Part of quality improvement is the ability to make necessary adjustments in the infrastructure of health care. Infrastructure in health care can include professional education, data systems, financing and delivery systems, research, and patient education resources, among others. Health care quality evaluation by its nature highlights areas for improvement, thus drawing attention to areas where health care professionals may need additional education or training, where providers may need to redesign systems of care, where payers need to improve financial incentives, and where purchasers need to allocate more resources to address quality concerns and reward superior performance. Evaluation of health care quality can also reveal areas for further research and ways that patients can be actively engaged in managing their care and changing

behavior such as smoking cessation, nutritional improvements, or other areas that may contribute to health care problems.

- **Assuring evaluation and accountability—**After establishing partnerships with solid leadership and common vision and goals, measuring and collecting data on quality, and reporting it for comparison, there also is the need for evaluation of both health system performance and accountability for health care quality. Evaluation allows partners to identify the most troublesome areas and prioritize resources and attention to those areas that most need improvement. Evaluation promotes the opportunity to celebrate areas where there is solid performance or conduct improvement over time. It may require some technical input and expertise, but it is an important component of the quality improvement process. Without evaluation, impact of the program will be unknown and future direction for the program will be haphazard.

- **Creating incentives—**While reporting data on performance is often enough to spur low performers toward improvement, there is also the need to tie rewards to high performance. Currently, the American health care system essentially pays all providers the same regardless of the level of quality that they deliver. Without adequate rewards for improvement, health care quality will languish. As one of the largest health care purchasers in any given State, State governments can have a tremendous influence over incentives for quality improvement in the health care system through their payment structures.

This *Resource Guide* has attempted to demonstrate for State leaders the need for quality improvement in diabetes. Much has been done, but data from the NHQR show that much remains to be done to achieve quality diabetes care for all people with diabetes. The number of people newly diagnosed with diabetes and the number suffering its complications are still growing.

By reviewing and analyzing this *Resource Guide*, assessing their local context, and designing a diabetes quality improvement strategy, State leaders can identify opportunities to make a difference in the quality of care their constituents receive. The experiences of States that have implemented quality improvement for diabetes care provide valuable insights into what can be accomplished through innovative, visionary efforts by State leaders.

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Appendix A: Acronyms Used in This Resource Guide

AAHP/HIAA = American Association of Health Plans/Health Insurance Association of America

ADA = American Diabetes Association

AHCA = Agency for Health Care Administration (of Florida)

AHRQ = Agency for Healthcare Research and Quality

AHRQ QIs = AHRQ Quality Indicators

AMA = American Medical Association

BRFSS = Behavioral Risk Factor Surveillance System

BPHC = Bureau of Primary Health Care (of HRSA)

CDC = Centers for Disease Control and Prevention

CHC = Community Health Center

CMS = Centers for Medicare & Medicaid Services

CSG = Council of State Governments

CPS = Current Population Survey

DCCT = Diabetes Control and Complications Trial

DDI = Diabetes Detection Initiative (of Michigan)

DHHS = (U.S.) Department of Health and Human Services

DON = Diabetes Outreach Network (of Michigan)

DPCP = Diabetes Prevention and Control Program (joint CDC/State program)

DQIP = Diabetes Quality Improvement Program

FQHC = Federally Qualified Health Centers

HDL = High density lipoproteins

HCUP = Healthcare Cost and Utilization Project

HEDIS® = Health Plan and Employer Data and Information Set

HP2010 = Healthy People 2010 (of NIH and CDC)

HRSA = Health Resources and Services Administration

ICIC = Improving Chronic Illness Care

IHI = Institute for Healthcare Improvement

IHS = Indian Health Services

IOM = Institute of Medicine

JCAHO = Joint Commission on Accreditation of Healthcare Organizations

MEPS = Medical Expenditure Panel Survey

MSA = Metropolitan Statistical Area

NCSL = National Conference of State Legislatures

NCQA = National Committee for Quality Assurance

NDCP = National Diabetes Control Program

NDPCP = National Diabetes Prevention and Control Program

NDEP = National Diabetes Education Program

NDIC = National Diabetes Information Clearinghouse

NDQIA = National Diabetes Quality Improvement Alliance;
the NDQIA includes AHRQ, American Academy of Family Physicians; American Association of Clinical Endocrinologists; American College of Physicians; American Diabetes Association; American Medical Association; Centers for Disease Control and Prevention; Centers for Medicare & Medicaid Services; Joint Commission on Accreditation of Healthcare Organizations; National Committee for Quality Assurance; National Institute of Diabetes and Digestive and Kidney Disease; The Endocrine Society; U.S. Department of Veterans Affairs

NHIS = National Health Interview Survey

NHANES = National Health and Nutrition Examination Survey

NHDR = National Healthcare Disparities Report

NHDS = National Hospital Discharge Survey

NHQR = National Healthcare Quality Report

NIH = National Institutes of Health

PDSA = Plan-Do-Study-Act

QIO = Quality Improvement Organization (of CMS)

Appendix B: List of NHQR Data Sources, Including Those Supporting State Estimates

The following is a list of the data sources assembled and used in the NHQR. Those sources in **bold** collect data and support analyses at the State level, although they may or may not be available in the NHQR:

- **Behavioral Risk Factor Surveillance System (BRFSS)**
- Dialysis Facility Compare (DFC)
- **Healthcare Cost and Utilization Project (HCUP)**
- Health Plan Employer Data and Information Set (HEDIS®)
- HIV/AIDS Surveillance System
- Medical Expenditure Panel Survey (MEPS)
- Medicare Quality Monitoring System (MQMS)
- **Minimum Data Set (MDS)**
- National Ambulatory Medical Care Survey (NAMCS)
- **National CAHPS® Benchmarking Database (NCBD)**
- National Health and Nutrition Examination Survey (NHANES)
- National Health Interview Survey (NHIS)
- National Home and Hospice Care Survey (NHHCS)
- National Hospital Ambulatory Medical Care Survey (NHAMCS)
- National Hospital Discharge Survey (NHDS)
- **National Immunization Survey (NIS)**
- National Nosocomial Infections Surveillance (NNIS)
- National Nursing Home Survey (NNHS)
- National TB Surveillance System (NTBSS)
- **National Vital Statistics System —Linked Birth and Infant Death Data (NVSS-I)**
- **National Vital Statistics System, Mortality (NVSS-M)**
- **Outcome and Assessment Information Set (OASIS)**
- **Quality Improvement Organization (QIO)**
- Surveillance, Epidemiology, and End Results Program (SEER)
- **United States Renal Data System (USRDS)**

Appendix C: Additional Data Resources Related to Diabetes Care Quality

This appendix contains additional information and detailed tables on the following:

- *National Healthcare Quality Report measures selection process*

  Table C.1: Diabetes measure set for the NHQR with endorsing organizations, data sources, and level of data

- *Descriptions of data sources for the process and outcome measures discussed in this Resource Guide (including notable differences between MEPS and BRFSS national rates) and data tables from the NHQR*

  Table C.2: Percent of non-institutionalized adults over age 18 saying they were diagnosed with diabetes who reported having important tests in the past year (or two years in one case), by national population subgroup, United States, 2000

  Table C.3: Percent of adults age 18 and over with diagnosed diabetes who have specific HbA1c levels and who have specific blood pressure levels, United States, 1999-2000

  Table C.4: Hospital admission for adults over age 18 for specific diabetes complications (excluding obstetric and neonatal admissions and transfers from other institutions) per 100,000 population age 18 and older, Healthcare Cost and Utilization Project (HCUP), United States, 2000

  Table C.5: Lower extremity amputations in persons with diabetes per 1,000 population (all ages), National Hospital Discharge Survey, United States, 1997-2000

  Table C.6: CDC Three-Year Baseline: Percent of adults age 18 and over with diabetes who had recommended diabetes tests in the past year, pooled 1997-1999

  Table C.7: CDC Annual Trends: Percent who had a dilated-eye examination in the past year per 100 adults with diabetes, crude rates and age-adjusted rates, by State, 1995-2002

  Table C.8: CDC Annual Trends: Percent who had a foot examination in the past year per 100 adults with diabetes, crude rates and age-adjusted rates, by State, 1995-2002

  Table C.9: CDC Annual Trends: Percent who had an influenza vaccination in the past year per 100 adults with diabetes, crude rates and age-adjusted rates, by State, 1995-2002

- *Flow chart of steps for estimating State Medicaid spending on diabetes care*

  Figure C.1: Estimation steps for Medicaid spending on diabetes care

National Healthcare Quality Report Measures Selection Process

Researchers have developed health care quality measures based on scientific evidence, practice guidelines, and consensus processes. Consensus building around measure sets has been used recently to narrow the list of measures and increase their acceptance.

Consensus building is a process by which stakeholders and experts in a field identify a connection between a measure and quality health care. The process generally includes expert judgment and evaluation, rigorous testing of the measure in the field to ensure that improved performance is linked to improved health, and review and agreement of the experts. Several organizations are involved in developing national quality measure sets, including:

- The National Diabetes Quality Improvement Alliance (discussed in Module 4: Action)
- The National Quality Forum
- The National Committee on Quality Assurance, the accrediting body for managed care health plans, with its HEDIS® performance measures

In the first NHQR, AHRQ pursued a careful process to define the first set of NHQR measures. The underlying framework for selecting the NHQR measure set was developed by the Institute of Medicine in *Envisioning the National Health Care Quality Report*. Their matrix framework crosses components of health system quality (effectiveness, safety, timeliness, and patient centeredness) with consumers' health care needs (staying healthy, getting better, living with illness or disability, and end-of-life care). Measures were chosen to fill the cells of this matrix so that all areas of health care quality would be addressed. The measure selection process:

1. Invited organizations with consensus-based measures (developed with experts and often rigorous testing) to submit them for review.

2. Issued a public call for measures and data sources.

3. Convened a Federal Interagency Workgroup to evaluate (based on importance, scientific soundness and feasibility) the 600 measures submitted and to select the final set of 147 measures.

4. Invited public review of the final measure set.

Out of the set of 147 measures in the NHQR, 12 are diabetes measures. All diabetes measures were developed through consensus processes of the endorsing organizations. Table C.1 below lists the NHQR diabetes measures, the organizations that endorse them through a consensus process, the data sources, and the analytic level (State or national) supported by the data.

Table C.1. Diabetes measure set for the NHQR with endorsing organizations, data sources and level of data

Diabetes measure	Organizations that endorse through consensus process	Data source	Analytic level
Process: Percent of adults with diabetes who had a hemoglobin A1c measurement at least once in past year	AHRQ, AMA, HP2010, JCAHO, NCQA, NDQIA	MEPS BRFSS	National and State
Process: Percent of patients with diabetes who had a lipid profile in past 2 years	AHRQ, JCAHO, NCQA, NDQIA	MEPS	National
Process: Percent of adults with diabetes who had a retinal eye examination in past year	AHRQ, HP2010, JCAHO, NCQA, NDQIA	MEPS BRFSS	National and State
Process: Percent of adults with diabetes who had a foot examination in past year	AHRQ, JCAHO, NCQA, NDQIA	MEPS BRFSS	National and State
Process: Percent of adults with diabetes who had an influenza immunization in past year	AHRQ, JCAHO, NCQA, NDQIA	MEPS BRFSS	National and State
Outcome: Percent of adults with diagnosed diabetes with HbA1c level > 9.5 percent (poor control); < 9.0 percent (needs improvement); < 7.0 percent (optimal)	NDQIA	NHANES	National
Outcome: Percent of adults with diagnosed diabetes with most recent LDL-C level < 130 mg/dL(needs improvement); <100 (optimal)	NDQIA	n/a	n/a
Outcome: Percent of adults with diagnosed diabetes with most recent blood pressure <140/90 mm/Hg	NDQIA	NHANES	National
Outcome: Hospital admissions for uncontrolled diabetes per 100,000 population	AHRQ,	HCUP	National
Outcome: Hospital admissions for short term complications of diabetes per 100,000 population	AHRQ	HCUP	National
Outcome: Hospital admissions for long term complications of diabetes per 100,000 population	AHRQ	HCUP	National
Outcome: Hospital admissions for lower extremity amputations in patients with diabetes per 1,000 population	AHRQ, HP2010, JCAHO, NCQA	NHDS	National

Key: AHRQ=Agency for Healthcare Research and Quality; AMA = American Medical Association; BRFSS=Behavioral Risk Factor Surveillance System; HCUP=Healthcare Cost and Utilization Project; HP2010=Healthy People 2010; JCAHO = Joint Commission on Accreditation of Healthcare Organizations; NCQA=National Committee for Quality Assurance; NDQIA=National Diabetes Quality Improvement Alliance; NHANES=National Health and Nutrition Examination Survey; NHDS = National Hospital Discharge Survey.

Data Source Description, Limitations, and Data Tables From the NHQR

Notable Differences Between MEPS and BRFSS National Rates

Some of the MEPS and BRFSS measures on diabetes are the same and both are used in the NHQR. However, only one MEPS measure is used in this *Resource Guide* because not only does MEPS not give State-level estimates, the methods used to derive the MEPS and BRFSS estimates for the same measures differ. As a result, the NHQR diabetes estimates from MEPS and BRFSS show notable differences for the HbA1c and immunization measures. MEPS reports that 90 percent of people with diabetes get one or more HbA1c test per year; BFRSS reports 79 percent. MEPS reports 55 percent of people with diabetes receive a flu vaccination; BRFSS reports 37 percent. MEPS and BRFSS are very close on the eye and foot examination rates, 67 versus 67 percent and 66 versus 65 percent, respectively.

The difference for the HbA1c test rate is in part due to the structure of the survey questions and in part due to the treatment of respondents who "have not heard of HbA1c." While BRFSS allows for this distinction to be made in the response options, MEPS does not. These respondents are counted as though they answered "no" in BRFSS, and potentially not included in MEPS. The percentage of these responses in BRFSS is fairly low, at about 5% in 2001, but will still affect the final rate.

The difference for influenza immunizations is due to definitional differences between BRFSS and MEPS. The BRFSS rate is for adults age 18 to 64; the MEPS rate is for adults age 18 and over. Since flu shots are more often given to the elderly, the BRFSS rate is lower than the MEPS rate.

There are other differences between the two data sources that can contribute to the differences between estimates of the same measures. The surveys relate to different time periods, use different sampling approaches, and use different interview techniques, to name the obvious. Because of the differences in the estimates of the same measures and because only BRFSS permits State estimates, only BRFSS estimates are discussed in Module 3: Information of this *Resource Guide*.

Process Measures—MEPS data

The MEPS data provide national benchmarks by important segments of the population. Its breakdowns identify subgroups for whom diabetes care quality can be problematic and for whom solutions need to be targeted.

Table C.2 shows estimates for the five MEPS diabetes-related measures in the NHQR. The estimates are provided by national subgroups related to race, ethnicity, sex, age, education, employment status, income, health insurance status, respondent's location, and perceived health status. Table C.2 shows the rate per 100 respondents (or percent) and the standard error for each measure and subgroup. Only estimates that have a standard error that is less than 30 percent of the estimate (relative standard error < 30 percent) are shown on Table C.2. No statistical comparison tests were performed in Table C.2 but the estimates and standard errors can be used to make such comparisons (see Appendix E for how to do this).

Table C.2. Percent of non-institutionalized adults over age 18 saying they were diagnosed with diabetes who reported having important tests in the past year (or two years in one case), by national population subgroup, United States, 2000

		HbA1c test a/		Lipid profile in past two years		Retinal eye examination		Foot examination		Influenza immunization	
Population group	**Population total**	**Percent d/**	**Standard error**	**Percent d/**	**Standard error**	**Percent d/**	**Standard error**	**Percent d/**	**Standard error**	**Percent d/**	**Standard error**
Total	12,608,034	89.85	1.27	94.32	0.87	66.51	1.76	66.40	1.73	54.79	2.20
Race											
White	9,900,291	90.35	1.36	94.06	0.92	66.71	2.04	67.60	2.06	57.38	2.31
Black	2,168,837	85.08	3.92	94.94	1.61	64.30	4.63	60.36	4.11	42.90	4.79
Asian/Pacific Islander	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU
Aleut/Eskimo/American Indian	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU
Hispanic ethnicity											
Hispanic	1,633,326	85.72	3.17	91.22	2.12	58.34	4.33	66.19	4.06	46.58	3.61
Non-Hispanic	10,974,708	90.49	1.32	94.78	0.89	67.71	1.88	66.43	1.99	56.00	2.46
Ethnicity											
Non-Hispanic, White	8,414,743	91.07	1.42	94.62	0.95	67.79	2.25	67.88	2.37	59.18	2.55
Non-Hispanic, Black	2,080,623	86.00	3.67	94.76	1.67	65.75	4.67	60.40	4.36	43.41	4.86
Non-Hispanic, Other	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU
Gender											
Male	5,872,199	90.04	1.81	95.57	1.08	69.18	2.72	68.67	2.39	56.64	2.93
Female	6,735,836	89.68	1.79	93.22	1.19	64.17	2.16	64.40	2.29	53.18	2.64
Age											
18-44	2,072,046	83.41	3.92	87.63	3.47	53.81	4.90	59.45	3.73	29.94	4.77
45-64	5,308,843	92.28	1.63	94.82	1.21	66.05	2.78	66.54	2.74	48.70	2.85
65 and over	5,227,145	90.24	1.99	96.46	1.07	72.10	2.58	69.13	2.60	70.82	2.88
Education b/											
Less than high school (<12 years)	3,985,853	87.26	2.51	93.74	1.48	63.73	2.76	66.69	2.88	54.05	3.25
High school graduate (=12 years)	4,210,763	89.81	2.29	94.56	1.35	60.99	3.37	64.08	2.72	51.65	2.82
At least some college (>12 years)	4,245,485	92.02	1.73	95.09	1.44	74.48	2.46	67.44	3.05	58.39	4.03
Employment status c/											
Employed	4,812,613	87.44	1.97	93.70	1.41	60.24	3.30	62.07	2.76	42.37	3.36
Not employed	2,537,705	94.29	2.18	91.01	2.10	67.17	3.45	70.13	2.99	46.04	3.55
Insurance											
Age 18-64											
Any private	5,329,710	90.78	1.85	94.04	1.28	62.92	3.00	65.69	2.54	44.52	3.10
Public only	DSU	DSU	DSU	88.67	3.62	68.27	4.33	64.73	5.38	42.96	5.37
Uninsured	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU
Age 65 and over											
Medicare only	DSU	DSU	DSU	95.60	1.72	76.68	4.68	68.87	4.82	65.15	5.82
Medicare and private	2,749,323	91.40	2.58	97.79	1.09	71.29	3.82	69.48	3.94	75.96	3.79
Medicare and other public	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU
No insurance/private only	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU	DSU
Family income											
Negative or poor(<100% of poverty level)	1,778,855	86.81	3.39	86.69	2.94	63.44	3.44	60.28	4.33	48.12	5.26
Near poor/low income(100-<200% of poverty level)	3,021,438	88.85	2.83	93.95	1.61	64.43	3.47	68.18	3.15	57.57	3.72
Middle income(200-<400% of poverty level)	3,722,916	90.14	2.13	94.08	1.41	60.94	3.75	65.41	2.80	51.26	3.78
High income(>=400% of poverty level)	4,084,825	91.41	2.19	98.00	0.89	74.49	2.60	68.66	2.95	58.75	3.19
MSA status											
MSA	9,671,403	89.54	1.54	94.80	0.99	67.19	2.04	67.24	1.99	54.86	2.60
Non-MSA	2,936,632	90.91	2.28	92.74	1.41	64.27	3.18	63.61	3.35	54.55	3.91
Perceived health status											
Excellent/very good/good	7,588,200	90.22	1.48	94.91	1.17	68.02	1.93	63.32	2.35	53.87	2.44
Fair/poor	5,019,834	89.22	2.15	93.42	1.21	64.22	2.99	71.12	2.64	56.20	3.04

a/ See page preceding page for a discussion of the differences in denominators for BRFSS data and MEPS data
b/ Persons 18 and over with unknown education status not included.
c/ Employment status for persons 18-64 only.
d/ For all values, RSE < 30 percent.
DSU - Data do not meet the criteria for statistical reliability, data quality or confidentiality.
Source: Agency for Healthcare Research and Quality, Center for Financing, Access and Cost Trends, Medical Expenditure Panel Survey.

Outcome Measures—NHANES, HCUP, and NHDS Data

NHANES Data

The NHQR uses data from the National Health and Nutrition Examination Survey for two outcome measures related to diabetes—the HbA1c, a measure of blood glucose level over the prior two to three months, and blood pressure at examination. NHANES does not support State-level estimates but does provide clinical outcome estimates for the total national population that could be used as benchmarks. [Note: To be comparable to data from providers, the NHANES HbA1c and blood pressure values would have to be recalculated to exclude people who do not use the health care system during a year.]

The NHANES collects data from in-person interviews, physical examinations, and medical tests from a mobile vehicle which is set up as a medical office. With this survey method, NHANES is able to collect data that are detailed clinically, including laboratory results. Because of the expense of the NHANES (e.g., the cost of the mobile clinic and staff), the sample size on the NHANES is small, 9,965 participants, and does not support either State-level estimates or national subgroup estimates within the population of people with diabetes. Additional information on NHANES is available at: http://www.cdc.gov/nchs/about/major/nhanes/NHANES99_00.htm.

Table C.3 shows the percent of adults with diabetes by specific test values. The percent and standard error are provided.

Table C.3. Percent of adults age 18 and over with diagnosed diabetes who have specific HbA1c levels and who have specific blood pressure levels, United States, 1999-2000

Test Results	Percent	Standard error
HbA1c Levels:		
> 9.5 percent (poor control)	13.5	2.6
< 9.0 percent (needs improvement)	79.1	2.7
< 7.0 percent (optimal)	37.0	3.8
Average blood pressure at exam		
<140/90 mm/Hg	59.3	3.5

Source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey.

In addition to the HbA1c and blood pressure values, NHANES can provide LDL-C levels (< 130 mg/dL (needs improvement) and <100 (optimal)). Those LDL estimates were not available in time for publication of the first NHQR. The measure remains part of the official NHQR measure set and is to be included in the future.

HCUP Data

The NHQR uses inpatient discharge abstract data from the Healthcare Cost and Utilization Project for national estimates of three outcome measures that provide a window on the quality of ambulatory care—avoidable hospitalizations related to diabetes. While the national estimates are included in the NHQR, State-level data are not, except for one special analysis of admissions for uncomplicated uncontrolled diabetes (discussed in Module 3: Information). For year 2000 data used in the NHQR, 29 States contributed and more States had statewide discharge data systems maintained by State data agencies, State hospital associations, or statewide data consortia. These data systems can be used to generate these three outcome measures.

HCUP is a public-private partnership sponsored by AHRQ with 29 participating States in 2000, the time for which data are included in the first NHQR. The data are from statewide historical administrative databases going back to 1988. In 2000, HCUP included the:

- Nationwide Inpatient Sample (NIS) — all hospitals and all of their inpatient discharges (6 to 7 million records per year) across the 29 States, weighted so that national estimates can be derived from it.

- State Inpatient Databases (SID) — a census of inpatient discharge records for each participating State covering nearly 80 percent of the 36 million U.S. hospital discharges per year in 2000.

- State Ambulatory Surgery Databases (SASD) — all discharge records for ambulatory surgery centers (hospital based and freestanding).

- Kids' Inpatient Database (KID) — A sample of children's discharges from over 2,500 community hospitals.

In addition, AHRQ developed the Quality Indicators, which are measures of health care quality that make use of readily available hospital inpatient administrative data and available as public software to help analysts evaluate quality of care in hospitals and, indirectly, in ambulatory care settings. The AHRQ QIs are organized into three categories, the Prevention Quality Indicators, the Inpatient Quality indicators, and the Patient Safety Indicators. Additional information on HCUP data is available at: http://www.hcup-us.ahrq.gov/databases.jsp. Additional information on the AHRQ QIs is available at: http://www.qualityindicators.ahrq.gov/.

The NHQR and NHDR used selected Prevention Quality Indicators to examine hospital admissions that evidence suggests could have been avoided, at least I part, through high-quality outpatient care. Table C.4 shows rates of three of these indicators related to diabetes—hospital admissions for three complications of diabetes that should be avoidable—1) uncontrolled uncomplicated diabetes, 2) serious short-term complications, and 3) serious long-term complications. The rates are defined relative to 100,000 people in the population of the State. Results are presented by patient characteristics (age, sex, income, and location of patient residence) and by hospital characteristics (region of the country). The rate and its standard error are shown.

The main limitation of HCUP data (or any other administrative data source) is that the data are collected for one purpose and used for another. Many State-level discharge data systems use data from hospital billing data and are thus collected for reimbursement purposes. However, these data are so valuable that they are used for many other purposes, such as cost tracking, quality monitoring, or health policy evaluations. Reimbursement incentives affect what data are collected and how they are collected. Thus, while mining these data for clues to quality, analysts should constantly be on the alert for data problems—incomplete or inaccurate entries or lack of adequate clinical detail.

Table C.4. Hospital admission for adults over age 18 for specific diabetes complications (excluding obstetric and neonatal admissions and transfers from other institutions) per 100,000 population age 18 and older, Healthcare Cost and Utilization Project, United States, 2000

	For uncontrolled diabetes without complication a/		For diabetes with short-term complications b/		For diabetes with long-term complications c/	
Population group	**Estimate d/**	**Standard error**	**Estimate d/**	**Standard error**	**Estimate d/**	**Standard error**
Total	28.518	1.056	51.202	1.437	120.810	2.922
Patient characteristic						
Age groups						
18-44	14.698	0.658	54.179	1.749	33.484	1.203
45-64	35.765	1.570	48.693	1.560	158.036	4.663
65 and over	59.172	2.037	45.275	1.362	338.630	7.922
Age groups for elderly						
65-69	49.147	2.428	40.031	1.931	293.116	8.094
70-74	57.050	2.673	40.686	1.932	336.307	8.931
75-79	66.926	2.988	46.638	2.165	371.110	10.177
80-84	68.099	3.339	52.712	2.705	388.835	11.263
85 and over	66.566	3.643	55.424	3.290	339.067	11.185
Gender						
Male	28.542	1.072	53.180	1.746	135.980	3.215
Female	28.399	1.112	49.119	1.313	108.278	2.853
Median income of patient zip						
Less than $25,000	62.728	5.709	91.142	7.913	193.319	15.735
$25,000-$34,999	42.783	2.184	66.742	3.123	150.143	6.530
$35,000-$44,999	30.324	1.720	56.531	2.586	126.912	5.240
$45,000 or more	16.604	0.872	37.990	1.626	90.913	3.692
Location of patient residence						
MSA e/	25.126	1.180	51.353	1.714	116.966	3.349
Non-MSA e/	39.697	1.895	51.859	2.056	121.337	5.099
Hospital characteristic						
Location of inpatient treatment						
Northeast	30.106	3.489	48.082	2.826	135.812	8.645
Midwest	27.987	2.266	45.444	2.948	109.735	5.310
South	35.652	1.543	61.359	2.690	133.628	4.595
West	15.610	1.158	43.313	2.806	96.239	5.363

a/ Without short-term (ketoacidosis, hyperosmolarity, coma) or long-term (renal, eye, neurological, circulatory, other unspecified) complications.

b/ Ketoacidosis, hyperosmolarity, or coma.

c/ Renal, eye, neurological, circulatory, or other unspecified complications.

d/ Rates are adjusted by age and sex using the total U.S. as the standard population; when reporting is by age, the adjustment is by sex only; when reporting is by sex, the adjustment is by age only.

e/ Metropolitan Statistical Areas

Source: Agency for Healthcare Research and Quality, Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample (2000).

NHDS Data

Table C.5 shows the rate of lower extremity amputations for people with diabetes per 1,000 population, for two time periods—1997 through 1999 and 1998 through 2000. NHDS pools data over several years, which is why the tables reflect an overlap in years. The estimates are provided by national subgroups when the size of the database supports the subgroup estimate (i.e., for age, sex, and black-white subgroups). The rate and standard error of the rate are provided. Each State with discharge data can generate estimates for all of the subgroups reported.

Table C.5. Lower extremity amputations in persons with diabetes per 1,000 population (all ages), National Hospital Discharge Survey, United States, 1997-2000

Population group	1997-1999 Rate	1997-1999 Standard error	1998-2000 Rate	1998-2000 Standard error
Total	5.0	0.4	4.8	0.4
Age (not age adjusted)				
0-17	DSU	DSU	DSU	DSU
18-44	3.3	0.6	3.5	0.6
45-64	7.1	0.6	6.4	0.6
65 and over	10.4	0.7	9.8	0.7
Race a/				
American Indian or Alaska Native	DSU	DSU	DSU	DSU
Asian or Pacific Islander	DSU	DSU	DSU	DSU
Asian	DSU	DSU	DSU	DSU
Native Hawaiian or Other Pacific Islander	DSU	DSU	DSU	DSU
Black or African American	7.3	1.5	7.0	1.5
White	3.4	0.3	3.5	0.4
Ethnicity				
Hispanic	DSU	DSU	DSU	DSU
Non-Hispanic	DSU	DSU	DSU	DSU
Black or African American	DSU	DSU	DSU	DSU
White	DSU	DSU	DSU	DSU
Gender				
Female	2.9	0.3	3.2	0.3
Male	7.3	0.8	6.6	0.8
Expected payment source b/				
Medicaid	DSU	DSU	DSU	DSU
Medicare	DSU	DSU	DSU	DSU
Private/other insurance	DSU	DSU	DSU	DSU
Uninsured	DSU	DSU	DSU	DSU
Unknown (weighted count)	DSU	DSU	DSU	DSU

a/ Race categories changed in 2000. Data for 2000 may not be comparable to those used in previous years.
b/ Rates may be overestimated due to undercount in the denominators of some payment sources from the Current Population Survey.

DSU - Data do not meet the criteria for statistical reliability, data quality, or confidentiality.
Source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Hospital Discharge Survey.

Table C.6. CDC Three-year baseline: Percent of adults age 18 and over with diabetes who had recommended diabetes tests in the past year, pooled 1997-1999 a/

State	Hemoglobin A1c		Retinal eye exam		Foot examination	
	Percent	Standard error	Percent	Standard error	Percent	Standard error
Alabama	16.9	3.9	53.6	3.9	42.4	3.9
Alaska	37.7	5.8	76.8	5.8	59.9	5.8
Arizona	20.8	5.6	60.5	5.6	45.3	5.6
Arkansas	21.0	4.3	47.0	4.3	49.0	4.3
California	29.0	2.9	58.2	2.9	51.1	2.9
Colorado	40.8	5.1	56.0	5.1	59.6	5.1
Connecticut	31.3	4.4	72.5	4.4	65.2	4.4
Delaware	DNC	DNC	DNC	DNC	DNC	DNC
District of Columbia	20.7	6.9	68.1	6.9	57.9	6.9
Florida	18.8	3.2	53.5	3.2	51.7	3.2
Georgia	18.3	4.6	57.6	4.6	52.6	4.6
Hawaii	25.5	5.2	70.2	5.2	61.8	5.2
Idaho	27.8	4.3	59.6	4.3	51.4	4.3
Illinois	DNC	DNC	DNC	DNC	DNC	DNC
Indiana	DNC	DNC	DNC	DNC	DNC	DNC
Iowa	26.2	3.9	63.8	3.9	55.0	3.9
Kansas	17.1	5.4	57.4	5.4	49.8	5.4
Kentucky	24.1	2.9	58.6	2.9	60.1	2.9
Louisiana	DNC	5.7	66.9	5.7	52.7	5.7
Maine	42.4	5.2	76.0	5.2	69.4	5.2
Maryland	DNC	DNC	DNC	DNC	DNC	DNC
Massachusetts	27.9	4.1	81.0	4.1	65.4	4.1
Michigan	22.1	3.7	58.0	3.7	45.8	3.7
Minnesota	31.6	3.0	61.8	3.0	58.0	3.0
Mississippi	DNC	5.2	52.5	5.2	52.9	5.2
Missouri	DNC	DNC	DNC	DNC	DNC	DNC
Montana	39.9	5.2	66.4	5.2	63.3	5.2
Nebraska	38.2	4.2	55.9	4.2	58.4	4.2
Nevada	20.8	5.7	63.5	5.7	51.8	5.7
New Hampshire	31.1	6.2	60.5	6.2	53.6	6.2
New Jersey	25.6	4.6	63.6	4.6	58.6	4.6
New Mexico	25.1	3.6	62.3	3.6	59.3	3.6
New York	DNC	DNC	DNC	DNC	DNC	DNC
North Carolina	DNC	3.6	67.3	3.6	54.6	3.6
North Dakota	35.7	5.4	71.5	5.4	67.8	5.4
Ohio	21.7	4.7	61.7	4.7	62.1	4.7
Oklahoma	DNC	DNC	DNC	DNC	DNC	DNC
Oregon	DNC	DNC	DNC	DNC	DNC	DNC
Pennsylvania	27.8	3.2	62.4	3.2	58.3	3.2
Rhode Island	30.2	4.1	68.4	4.1	58.7	4.1
South Carolina	DNC	DNC	DNC	DNC	DNC	DNC
South Dakota	DNC	DNC	DNC	DNC	DNC	DNC
Tennessee	17.2	3.7	51.7	3.7	53.2	3.7
Texas	17.9	3.0	55.3	3.0	53.1	3.0
Utah	31.4	4.1	63.9	4.1	65.4	4.1
Vermont	35.8	5.9	71.9	5.9	50.8	5.9
Virginia	24.2	3.7	64.2	3.7	59.3	3.7
Washington	DNC	DNC	DNC	DNC	DNC	DNC
West Virginia	24.1	4.0	55.0	4.0	63.7	4.0
Wisconsin	27.7	5.3	64.6	5.3	62.9	5.3
Wyoming	30.2	4.4	56.5	4.4	48.0	4.4

a/ Measure is age adjusted. DNC = Does not collect data.

Source: Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System (http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4942a2.htm) (accessed March 8, 2004).

Table C.7. CDC annual trends: Percent who had a dilated-eye examination in the past year per 100 adults with diabetes, crude rates and age-adjusted rates, by State, 1995-2002

	Total Crude								Age-Adjusted							
States	1995	1996	1997	1998	1999	2000	2001	2002	1995	1996	1997	1998	1999	2000	2001	2002
Alabama	62.4	66.6	63.9	63.2	64.1	65.8	69.5	69.7	58.3	62.8	61.0	59.0	60.9	63.0	68.7	69.3
Alaska	52.9	63.2	69.6	76.7	77.2	72.8	73.6	69.0	52.2	62.8	69.7	77.7	78.0	72.7	72.8	66.5
Arizona	70.0	69.8	65.9	72.4	77.1	74.8	73.4	72.0	66.0	67.7	63.9	71.9	75.5	73.5	70.8	69.4
Arkansas	52.7	56.1	56.1	62.6	63.8	65.7	65.3	65.0	51.2	52.6	50.0	55.7	58.1	61.5	61.5	61.3
California	60.1	62.9	64.5	67.3	68.1	68.8	67.1	67.0	54.8	58.2	60.7	64.4	65.6	66.4	64.4	64.3
Colorado	69.5	70.3	65.5	65.5	68.7	70.6	68.1	65.9	65.9	66.1	61.8	60.9	63.5	65.2	63.2	61.9
Connecticut	--	--	--	80.6	79.5	78.7	79.2	79.8	--	--	--	79.8	78.7	77.4	76.9	76.9
Delaware	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dist. of Columbia	75.8	79.2	79.2	80.1	79.9	78.6	79.0	--	78.3	78.4	78.4	76.4	75.8	75.7	76.5	--
Florida	68.2	75.9	72.1	75.6	73.1	77.3	78.4	80.0	63.3	70.9	67.1	71.1	67.3	72.7	74.7	77.8
Georgia	--	58.1	62.4	63.4	64.3	66.1	66.8	67.5	--	57.4	59.9	61.1	61.7	63.4	64.4	65.6
Hawaii	--	74.1	80.2	79.2	82.9	81.0	81.8	81.3	--	73.8	78.0	76.6	79.6	77.3	78.2	77.7
Idaho	58.9	64.3	65.2	66.6	58.2	59.3	60.7	62.5	56.6	61.1	62.0	62.5	53.6	55.8	56.8	59.1
Illinois	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Indiana	60.7	59.8	58.5	--	--	--	67.4	--	57.3	55.9	55.4	--	--	--	63.8	--
Iowa	--	66.1	65.7	69.3	70.6	75.1	76.8	78.6	--	63.7	62.6	67.0	67.7	72.4	74.3	76.3
Kansas	62.9	61.6	62.3	63.8	67.5	68.1	69.1	69.4	52.7	48.1	51.4	56.4	62.1	64.1	65.6	67.0
Kentucky	58.1	63.4	66.4	66.1	68.3	70.1	73.8	73.0	55.6	61.2	64.1	63.8	66.3	68.4	72.7	72.2
Louisiana	--	--	--	63.3	66.1	66.1	69.8	--	--	--	--	63.6	64.5	64.5	68.3	--
Maine	66.7	67.7	72.0	76.6	74.2	72.1	71.8	73.2	63.2	65.3	67.7	74.3	69.4	69.8	69.2	72.6
Maryland	--	--	--	--	--	--	73.9	73.9	--	--	--	--	--	--	73.5	73.5
Massachusetts	72.3	78.6	80.1	81.3	76.8	77.2	77.1	76.9	70.6	76.1	78.3	79.8	75.1	74.2	73.8	74.1
Michigan	64.0	66.1	66.7	69.5	72.7	72.1	71.7	--	62.6	64.1	64.1	65.5	69.4	69.0	69.7	--
Minnesota	62.6	65.0	64.4	66.4	68.1	73.4	75.8	76.8	61.8	64.3	65.4	66.6	68.3	72.1	74.4	74.9
Mississippi	--	54.4	55.5	55.2	57.5	--	64.1	--	--	50.1	51.0	51.2	53.7	--	62.0	--
Missouri	65.2	71.7	71.7	--	--	--	--	--	60.8	68.3	68.3	--	--	--	--	--
Montana	70.9	71.1	69.5	71.2	74.1	72.4	68.6	63.8	64.5	64.9	64.6	66.7	69.6	67.9	65.0	61.0
Nebraska	64.4	65.0	63.7	65.8	70.2	75.7	78.0	77.6	64.1	63.8	62.2	62.3	69.4	76.3	77.6	75.8
Nevada	--	53.3	59.6	68.2	77.1	73.6	69.5	64.5	--	49.0	56.9	64.4	73.0	69.3	66.4	62.6
New Hampshire	71.6	72.3	71.9	71.2	76.4	78.4	80.5	77.9	68.4	68.7	69.1	69.1	76.5	78.5	79.9	76.3
New Jersey	65.3	68.9	71.4	74.3	74.7	75.3	75.6	74.7	60.2	63.4	64.7	68.9	71.8	73.4	73.2	71.9
New Mexico	--	67.2	70.6	68.9	68.8	70.3	72.1	73.1	--	64.5	64.9	65.6	67.6	69.1	69.7	70.1
New York	72.3	--	--	--	--	--	--	--	70.6	--	--	--	--	--	--	--
North Carolina	62.1	63.3	66.1	70.3	69.4	70.4	75.5	--	58.9	60.6	63.5	69.2	68.3	70.4	73.9	--
North Dakota	66.7	66.9	68.6	76.7	78.7	78.0	75.9	75.8	64.0	62.2	63.9	74.3	75.7	72.0	69.8	70.5
Ohio	62.3	64.9	66.6	67.7	70.0	71.5	69.8	67.8	59.7	60.2	63.1	63.1	65.3	68.4	67.1	65.7
Oklahoma	59.4	60.7	--	--	68.1	68.8	68.8	69.4	58.6	57.7	--	--	65.7	64.8	64.8	64.6
Oregon	66.8	67.2	67.0	--	--	--	--	--	62.5	63.0	63.3	--	--	--	--	--
Pennsylvania	65.5	68.1	70.9	71.7	73.3	74.3	76.3	--	63.0	64.8	66.6	69.0	72.2	73.3	75.1	--
Rhode Island	--	--		77.5	78.6	78.2	81.4	81.7	--	--	--	74.7	75.7	74.9	78.2	78.6
South Carolina	66.7	66.9	66.2	--	--	68.1	65.6	64.2	62.6	61.4	58.8	--	--	65.3	62.1	60.5
South Dakota	--	71.3	--	--	--	77.4	77.3	77.4	--	72.1	--	--	--	75.9	75.0	74.4
Tennessee	64.0	62.4	62.9	64.9	67.9	70.1	72.0	72.7	64.1	62.2	62.6	64.4	67.5	68.8	70.6	70.7
Texas	62.4	63.4	63.4	61.8	61.9	63.3	63.9	64.8	60.5	62.1	62.2	59.5	60.0	61.4	62.8	63.4
Utah	63.1	66.2	63.3	66.8	68.8	72.2	73.1	72.1	61.6	64.7	61.0	61.4	65.6	68.3	71.2	68.8
Vermont	--	73.2	75.3	77.0	78.3	76.9	76.2	74.7	--	73.5	75.2	75.2	74.8	71.9	72.5	70.7
Virginia	53.1	57.9	61.3	69.2	67.6	68.2	66.4	67.2	50.4	55.2	59.3	66.9	64.4	64.2	62.2	63.4
Washington	--	--	--	--	--	71.5	70.8	71.7	--	--	--	--	--	69.7	68.9	70.0
West Virginia	57.6	58.7	64.7	62.8	63.5	64.9	68.5	69.7	54.3	53.3	60.6	58.6	59.9	61.0	64.9	66.2
Wisconsin	73.2	68.4	69.6	69.6	75.6	76.2	76.3	75.8	65.8	64.2	65.1	67.7	72.9	73.3	74.4	74.1
Wyoming	58.2	58.2	59.9	63.6	64.8	63.9	65.0	65.6	53.7	54.4	52.5	58.6	60.9	61.6	62.1	61.7

Source: Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Diabetes Translation (http://www.cdc.gov/diabetes/statistics/preventive/eyemenu.htm) (accessed March 8, 2004)

Table C.8. CDC annual trends: Percent who had a foot examination in the past year per 100 adults with diabetes, crude rates and age-adjusted rates, by State, 1995-2002

	Total Crude								Age Adjusted							
States	1995	1996	1997	1998	1999	2000	2001	2002	1995	1996	1997	1998	1999	2000	2001	2002
Alabama	41.2	40.5	50.9	52.9	60.6	63.4	67.1	67.1	42.1	40.6	52.7	52.8	61.5	63.2	67.6	67.1
Alaska	63.0	62.6	64.3	68.7	76.9	76.4	69.8	62.1	62.4	60.9	63.9	67.6	76.9	76.0	69.4	61.0
Arizona	48.2	48.9	46.1	57.3	66.8	70.1	69.0	68.1	46.7	48.5	46.5	60.4	67.5	70.6	67.7	66.8
Arkansas	52.9	54.5	58.3	56.5	54.1	52.1	55.0	56.9	52.6	52.7	59.6	57.8	55.7	52.3	54.9	57.4
California	54.3	53.0	55.5	57.5	62.5	61.6	62.3	61.2	53.3	52.6	55.0	57.4	61.3	60.0	60.7	60.0
Colorado	56.0	54.2	59.1	63.6	60.5	58.0	60.2	65.8	54.0	54.4	61.1	65.1	62.3	59.8	62.0	66.5
Connecticut	--	--	--	65.7	67.0	72.2	73.3	75.1	--	--	--	67.9	68.8	71.8	72.1	73.0
Delaware	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dist. of Columbia	65.3	61.0	61.0	68.0	70.9	74.0	76.1	--	68.1	59.2	59.2	64.5	68.8	71.6	73.6	--
Florida	52.1	61.9	61.7	63.0	62.3	63.2	67.0	67.6	51.9	60.6	60.2	61.5	59.4	61.3	65.8	67.8
Georgia	--	60.7	60.5	60.0	62.8	63.2	65.9	65.8	--	57.5	60.3	59.7	62.9	62.8	65.1	64.9
Hawaii	--	71.1	72.1	68.9	70.8	75.7	83.2	85.4	--	72.1	73.0	69.2	69.4	74.4	81.8	84.7
Idaho	52.1	55.3	57.1	57.3	56.8	62.3	60.7	61.5	55.0	56.0	57.8	56.8	55.8	60.5	59.3	60.7
Illinois	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Indiana	52.8	52.7	51.9	--	--	--	62.7	--	53.2	52.4	50.6	--	--	--	63.7	--
Iowa	--	59.3	53.5	56.9	56.7	66.9	68.1	71.7	--	60.5	55.7	58.3	58.3	65.9	67.0	69.4
Kansas	55.1	52.9	53.4	57.6	62.1	61.1	62.8	63.4	48.8	45.3	48.8	55.6	63.4	64.1	65.2	66.2
Kentucky	50.9	51.0	56.8	60.0	61.7	62.5	62.9	62.9	49.2	48.6	57.3	62.2	63.7	62.6	62.6	62.1
Louisiana	--	--	--	60.0	69.3	69.3	72.3	--	--	--	--	59.3	68.5	68.5	71.6	--
Maine	57.8	64.5	65.0	67.8	72.3	71.9	76.1	74.1	59.4	70.1	68.5	73.9	76.5	76.6	78.6	76.2
Maryland	--	--	--	--	--	--	76.0	76.0	--	--	--	--	--	--	75.5	75.5
Massachusetts	61.2	69.2	68.4	71.1	65.1	66.4	69.9	71.5	62.1	69.4	67.3	69.0	65.0	65.9	70.0	70.4
Michigan	52.6	54.3	52.7	51.5	51.5	59.3	62.9	--	53.4	54.6	52.5	51.3	51.9	60.1	63.0	--
Minnesota	64.0	65.1	59.3	60.5	64.7	73.4	79.7	80.7	57.2	61.7	59.4	61.5	66.5	75.2	82.5	82.8
Mississippi	--	47.4	48.8	52.9	59.4	--	69.1	--	--	49.4	50.0	53.7	60.5	--	70.3	--
Missouri	58.3	63.0	63.0	--	--	--	--	--	53.8	61.2	61.2	--	--	--	--	--
Montana	52.3	59.3	58.9	65.4	66.9	74.2	77.5	78.7	51.3	58.1	55.1	62.5	65.2	73.7	78.9	78.7
Nebraska	57.6	57.5	57.1	57.6	61.9	68.4	69.3	69.0	54.6	55.1	56.1	56.8	63.2	71.6	72.3	71.6
Nevada	--	52.0	51.0	59.9	72.0	76.6	74.2	69.4	--	51.4	51.9	56.9	68.9	72.0	72.1	68.0
New Hampshire	54.7	56.7	60.3	60.2	65.5	70.5	77.7	78.6	55.8	56.2	61.6	62.8	68.2	69.8	76.7	77.9
New Jersey	60.5	65.9	65.8	68.3	65.2	63.5	62.7	64.4	58.6	65.0	63.7	67.4	63.0	61.7	60.7	62.4
New Mexico	--	59.1	61.7	62.6	66.3	69.6	73.3	74.4	--	61.1	61.8	63.0	66.2	69.3	72.6	73.7
New York	63.8	--	--	--	--	--	--	--	62.6	--	--	--	--	--	--	--
North Carolina	59.9	60.4	61.2	64.1	68.0	71.3	73.9	--	58.1	60.5	62.1	65.5	69.1	72.1	73.8	--
North Dakota	68.0	65.9	69.1	68.5	74.1	75.8	80.6	81.0	65.3	61.5	65.3	67.2	76.0	75.4	80.9	80.9
Ohio	49.6	57.6	62.3	65.4	64.7	65.3	67.7	68.6	48.2	56.9	60.6	62.1	61.5	63.6	67.6	68.7
Oklahoma	66.0	74.7	--	--	62.7	67.0	70.0	71.3	65.1	74.1	--	--	60.2	65.0	68.7	70.9
Oregon	54.0	56.2	56.7	--	--	--	--	--	51.8	54.5	55.9	--	--	--	--	--
Pennsylvania	56.7	56.2	56.8	60.5	65.9	70.0	72.0	--	56.3	56.7	57.2	61.0	65.6	70.1	72.4	--
Rhode Island	--	--	--	66.4	70.2	74.5	76.0	75.5	--	--	--	64.7	68.1	72.7	74.2	74.4
South Carolina	50.2	54.9	64.5	--	--	71.5	73.2	74.8	47.5	53.6	63.1	--	--	72.4	73.9	74.6
South Dakota	--	55.8	--	--	--	73.9	76.1	77.1	--	52.2	--	--	--	75.2	77.7	78.6
Tennessee	57.5	60.0	59.3	58.6	57.7	60.5	64.1	66.1	58.5	60.5	59.7	59.4	58.5	61.9	65.3	67.3
Texas	57.4	60.8	63.3	61.7	59.3	62.0	63.8	65.8	54.2	59.2	62.4	61.4	59.2	61.3	63.2	65.3
Utah	58.2	58.9	57.3	62.2	65.1	72.7	72.8	76.6	59.5	60.7	59.4	64.3	66.5	72.8	72.5	76.3
Vermont	--	60.3	59.6	59.5	63.5	69.3	71.4	72.1	--	60.1	59.7	58.4	62.9	69.2	72.6	74.2
Virginia	76.4	70.0	68.5	59.0	59.1	61.4	64.3	67.6	76.2	70.1	69.3	61.6	59.0	61.6	62.5	67.8
Washington	--	--	--	--	--	72.6	73.0	74.6	--	--	--	--	--	73.9	74.3	74.9
West Virginia	43.3	52.1	62.9	65.4	69.4	67.6	67.8	66.5	42.8	50.7	63.0	64.9	70.7	68.5	68.8	66.5
Wisconsin	59.1	59.4	58.3	60.2	63.2	70.8	73.6	76.7	62.8	61.7	58.3	60.0	61.6	68.9	72.3	76.8
Wyoming	49.5	53.7	56.4	54.6	54.4	56.3	60.6	61.0	50.4	53.0	55.6	52.2	54.4	56.0	60.9	60.6

Source: Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Diabetes Translation, Available at: http://www.cdc.gov/diabetes/statistics/preventive/FootMenu.htm (accessed March 8, 2004)

Table C.9. CDC annual trends: Percent who had an influenza vaccination in the past year per 100 adults with diabetes, crude rates and age-adjusted rates, by State, 1995-2002

	Total Crude					Age Adjusted				
States	1993	1995	1997	1999	2001	1993	1995	1997	1999	2001
Alabama	30.0	41.8	47.2	55.8	54.4	26.2	38.9	39.4	47.4	46.2
Alaska	29.9	48.5	37.7	59.2	60.0	28.2	38.2	36.9	61.2	59.2
Arizona	39.8	56.7	70.6	64.0	43.4	27.8	52.6	70.6	64.2	32.7
Arkansas	42.3	46.3	44.0	59.7	55.4	34.6	36.4	31.3	51.0	50.9
California	39.0	49.0	48.9	58.0	56.5	31.6	45.9	42.0	52.4	51.5
Colorado	52.6	65.1	61.4	58.3	55.1	46.8	48.6	54.2	51.5	45.4
Connecticut	51.2	54.8	49.1	55.5	60.1	46.8	42.0	39.5	50.2	53.4
Delaware	46.2	43.9	56.1	55.4	47.3	35.7	36.3	49.1	49.5	40.0
Dist. of Columbia	27.6	--	52.5	51.6	54.7	25.5	--	50.8	47.4	47.2
Florida	38.3	47.6	53.4	47.0	47.8	23.8	35.2	46.5	35.7	39.3
Georgia	29.6	32.2	48.4	40.7	45.4	24.8	28.1	40.1	36.1	40.5
Hawaii	49.5	46.9	47.1	56.4	77.9	47.8	38.2	42.0	48.8	73.2
Idaho	54.1	58.1	70.2	59.1	60.1	45.5	47.3	60.9	46.9	52.1
Illinois	43.9	45.3	51.4	54.4	48.8	38.7	27.4	45.3	45.2	44.4
Indiana	28.9	48.7	48.9	54.0	53.3	21.3	40.4	38.6	42.0	45.1
Iowa	52.5	50.3	66.0	56.3	67.2	38.9	39.0	53.5	51.9	61.5
Kansas	43.8	43.3	54.2	60.4	61.0	23.7	30.3	45.9	53.7	52.1
Kentucky	32.9	54.3	52.4	57.3	51.8	30.2	50.3	42.8	50.1	46.4
Louisiana	18.8	36.3	53.5	56.5	42.2	20.1	29.8	39.9	49.5	36.1
Maine	45.7	62.4	79.9	59.8	62.5	33.8	53.5	75.8	51.2	57.7
Maryland	39.8	41.8	48.7	55.0	56.0	36.1	34.7	46.9	48.0	51.2
Massachusetts	37.2	44.8	59.2	66.6	60.6	31.1	26.2	55.7	57.0	53.7
Michigan	34.8	46.8	51.9	61.7	46.1	30.2	40.6	39.8	51.7	40.1
Minnesota	49.9	58.8	56.7	47.0	62.5	37.8	47.1	52.8	43.2	56.5
Mississippi	30.4	37.1	46.7	48.0	41.4	23.9	32.9	43.0	40.1	35.4
Missouri	35.1	39.7	48.6	57.6	55.6	28.4	36.5	42.7	51.8	52.2
Montana	57.8	57.0	65.8	67.8	66.4	51.4	50.9	58.2	63.6	59.9
Nebraska	47.1	57.2	61.6	57.7	71.4	39.4	50.8	57.4	46.3	68.2
Nevada	39.0	38.0	49.5	57.5	51.0	34.3	35.5	31.6	45.0	44.3
New Hampshire	35.1	47.2	46.4	55.5	61.6	27.5	44.4	40.2	52.9	55.9
New Jersey	39.7	48.4	56.9	49.7	50.3	33.6	48.4	49.1	34.9	43.0
New Mexico	51.2	61.9	67.4	62.4	57.1	39.6	56.3	57.8	54.6	51.2
New York	43.7	48.1	49.0	53.2	51.5	37.7	39.1	43.5	48.9	45.5
North Carolina	57.4	34.4	56.7	44.2	56.0	55.3	28.2	50.0	39.0	52.5
North Dakota	38.7	53.0	54.6	65.2	66.2	33.3	43.9	42.4	61.2	60.5
Ohio	48.6	43.7	62.2	52.3	48.7	48.9	37.2	57.5	43.6	43.0
Oklahoma	42.4	66.6	49.0	60.3	65.2	35.8	68.0	40.7	54.4	60.7
Oregon	44.1	63.0	56.7	62.0	64.3	36.2	50.4	51.5	62.5	55.6
Pennsylvania	43.4	56.2	55.3	63.5	57.4	37.0	45.2	47.1	58.0	52.4
Rhode Island	44.3	59.5	57.5	69.4	65.3	36.5	44.7	47.2	62.9	59.3
South Carolina	32.6	40.7	49.8	55.8	50.3	27.6	33.6	42.5	48.2	47.0
South Dakota	44.8	52.3	62.5	70.6	68.7	36.9	34.1	51.8	64.4	61.4
Tennessee	35.5	48.3	49.8	53.0	61.5	32.0	42.5	45.6	48.4	56.1
Texas	37.5	50.0	50.2	52.8	53.3	35.1	44.7	46.5	46.4	48.4
Utah	47.1	47.6	56.4	70.5	56.4	46.0	38.1	43.5	62.3	50.7
Vermont	56.6	53.9	54.2	63.5	66.1	48.6	48.7	49.6	47.2	61.5
Virginia	27.4	40.0	44.4	58.7	59.0	22.5	33.4	41.2	53.5	53.6
Washington	50.6	54.6	63.0	65.4	61.8	36.6	47.5	57.6	60.7	55.2
West Virginia	38.3	41.2	56.6	59.3	47.6	30.8	34.9	53.1	51.2	39.9
Wisconsin	47.9	59.4	56.6	56.4	60.7	38.8	58.1	52.3	45.4	57.2
Wyoming	--	43.7	61.3	50.8	57.5	--	40.0	58.7	48.2	53.5

Source: Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Diabetes Translation (http://www.cdc.gov/diabetes/statistics/preventive/FluMenu.htm) (accessed March 8, 2004)

Estimation Steps for Medicaid Spending on Diabetes Care by State

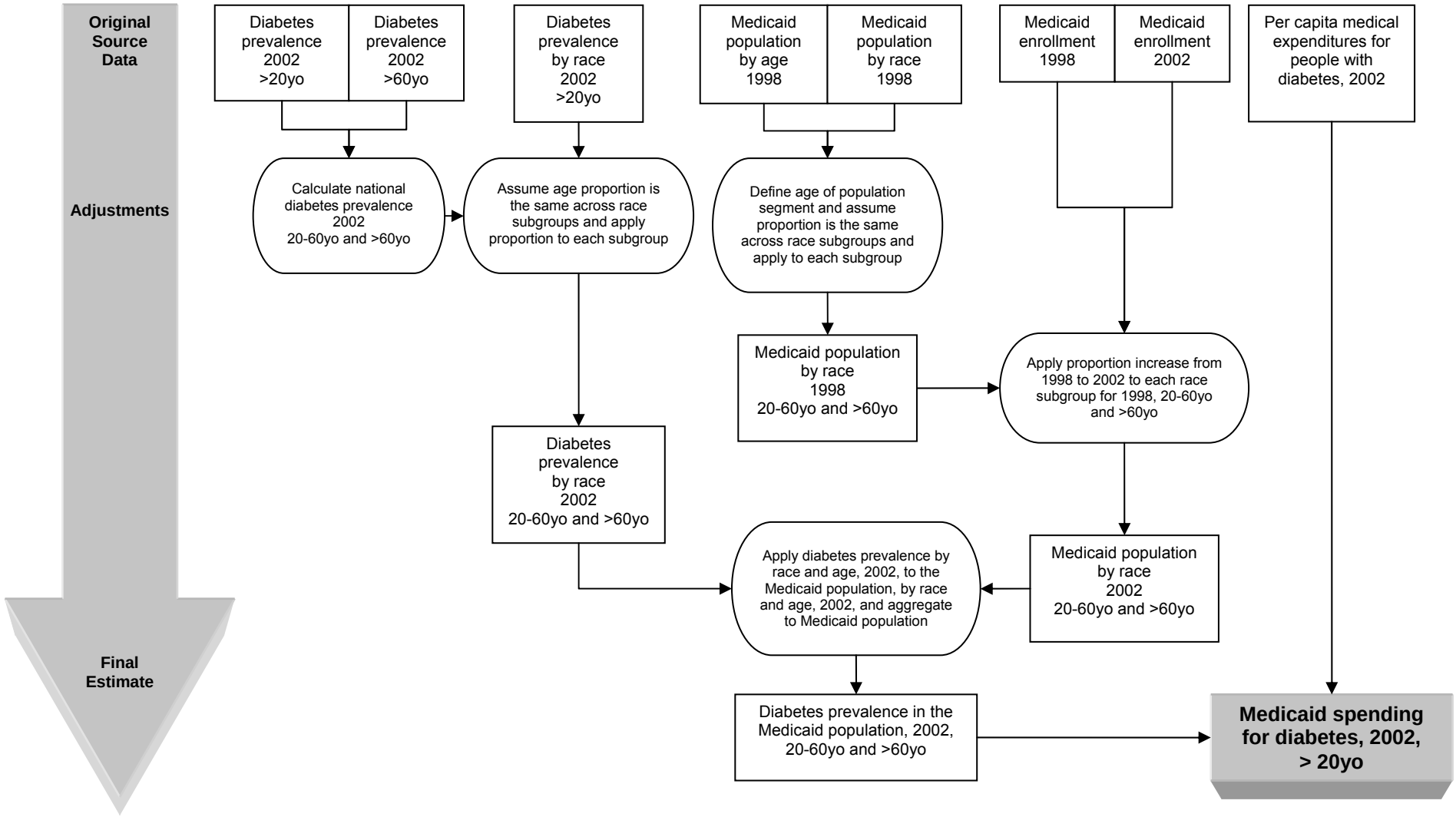
This section describes methods for estimating Medicaid spending on medical care for people with diabetes by State.

Estimates for Medicaid spending on diabetes care had to be constructed from multiple public data sources, as described in Module 2: Data. Because the estimation involved many assumptions, the method used is described in a flow chart (Figure C.1). The top level of the flow chart represents the original data sources; the middle levels show assumptions, adjustments, and calculations made with the original data; and the final level (at the bottom) of the flow sheet is the result. The adjustments were necessary to make different sources compatible with respect to population and time frame. This method was applied to data on Medicaid eligibles to get an estimate of the potential cost for Medicaid of medical care for diabetes patients.

These are only "ball-park" estimates because of the assumptions that had to be made to work with available data. Obvious limitations in these estimates include omission of spending for children and the institutionalized population. Furthermore spending on medical care unrelated to diabetes is included when it should be excluded. Although spending for children and youth under age 20 is omitted, only 0.25 percent of this population has diabetes and the effect is likely to be small. The omission of the institutionalized population is a more serious downward bias on spending estimates because people with advanced stages of diabetes are more likely to be hospitalized or to reside in nursing homes, and their care is costly. The inclusion of spending for *all* medical care for people with diabetes 20 years of age and over is included in these estimates (rather than only the spending related to diabetes) because medical expenditures by type and age could not be identified readily. This overestimates expenditures related to diabetes only.

The resulting ball-park estimates are shown in Table 2.2 of the *Resource Guide*. Clearly, a better approach to deriving State Medicaid costs for diabetes care would be to use Medicaid claims, if they were readily available for all States.

Figure C.1. Estimation steps for Medicaid spending on diabetes care



Appendix D: Benchmarks From The NHQR

More Details on Benchmarks

The NHQR provides a national set of estimates and often State estimates that can be used as benchmarks for quality improvement. A benchmark can be a baseline or point from which you start, not necessarily representing a goal or target. Or it can be the best current rate, something achievable, or a consensus of what should be achieved. It is a basis for making comparisons.

Benchmarks, Key Messages:

A benchmark:
- Is a point for comparison.
- Is a place to start.
- May be inadequate or impractical from different vantage points.

Methods matter:
They can have a large impact on comparisons.

Several types of benchmarks can be derived from the NHQR:

- **Theoretic limit benchmark*:*** The theoretic limit refers to the maximum or minimum level that a measure can take on; for example, 100 percent for positive outcomes or 0 percent for negative, avoidable events. In an ideal world, these would be achievable, but in a world where so many factors are involved in achieving a maximum result, those benchmarks may be unrealistic. Also, some concepts might feasibly come closer to the theoretic limit than others.

- **Best-in-class benchmark:** The rate for the top State or top tier of States can be used for what manufacturers call a "best in class" benchmark. (The top tier can be defined as the top 5 or 10 percent of States averaged together.) Using influenza vaccination as an example, the highest rate of flu vaccination for people with diabetes across the States (64 percent) may be assumed to be a feasible goal for States to achieve. However, some may view the top State rate as an impractical target given their population and circumstances. Others may view that goal as inadequate, depending on the value of the rate and the state of medical knowledge and practice, and they may view the 100-percent goal as their target. These judgments will vary across States because States face different circumstances and environments. This *Resource Guide* uses the top 10 percent of States, combined in a simple average, to derive the best-in-class estimate. A simple average, rather than weighted average, was used because the denominators from the BRFSS estimates were not available in the NHQR.

Healthy People 2010
Diabetes Care Topics
- Education
- New cases of diabetes
- Overall cases diagnosed
- Diagnosis
- Diabetes deaths
- Cardiovascular deaths
- Gestational diabetes
- Foot ulcers
- Lower extremity amputations
- Annual urinary microalbumin test
- Annual glycosylated hemoglobin test
- Annual dilated eye exams
- Annual foot exams
- Annual dental exams
- Aspirin therapy
- Self-blood-glucose-monitoring
- Admissions & uncontrolled diabetes

- **A national consensus-based goal:** Some organizations propose targets that should be achieved to improve the health status of the overall population and vulnerable subgroups. For example, two decades ago, the National Center for Health Statistics of the Centers for Disease Control and Prevention developed diabetes-related goals for a healthier U.S. population. Each decade those goals are reviewed and reestablished. The current goals (see inset of diabetes-related topics for Healthy People goals), now called Healthy People 2010

(HP2010, U.S. Department of Health and Human Services, 2000), also are included in the NHQR when relevant.

- **The national average:** The overall average indicates where the average member of a group stands. For example, the average of influenza vaccination rates for people with diabetes in States (37 percent according to the BRFSS data source) is the "norm" for States or is the rate for the "average" State. States with rates below the average would prefer to be at or above the average. But the average may not be an indicator of quality health care.

- **The regional norm:** States may prefer a regional estimate for comparison because they want to see how they perform compared to medical practice within the region. Given the wide regional variation in U.S. medical practice (Wennberg and Cooper, 1999), regional estimates may be weak goals for regions where practice should change to enhance the health care quality for people with diabetes. For this *Resource Guide*, the regional averages are calculated for the four Census regions: Northeast, Midwest, South, and West. The averages are simple averages because the denominators for BRFSS estimates were not available from the NHQR.

- **The State rate:** As noted in the Module 3: Information, the State's own rate may serve as a benchmark for various purposes—tracking changes over time, evaluating the effect of a statewide intervention to improve quality, or reporting the norm for local communities and providers to compare to their own performance. Concerns noted above about using national or regional averages as goals also apply to State rates. For provider-level estimates, the best-in-class providers may be a better indication of what is achievable and should be used as a goal rather than the State average rate. Severity adjustments are an important issue at the provider level, where populations of patients with varying severity and comorbidity levels are unlikely to be distributed evenly across providers.

The Best Benchmarks

Best-in-class estimates are the best way to view the opportunities for a State to improve. Basing a best-in-class measure on a group of best States (rather than the single top State) mitigates the effects of an extreme that other States might find unreasonable to emulate.

Table D.1 shows values for the best-in-class benchmarks (as simple averages of the top 10 percent of States) and for other benchmarks. The other benchmarks include Healthy People 2010 goals (when available for a measure), the national norm, regional average benchmarks, and State rates for the four example States used in this *Resource Guide*. These benchmarks are provided for all of the diabetes-related measures in the NHQR. Four of the measures—HbA1c test, eye exam, foot exam, and flu vaccinations in the past year (in addition to HbA1c test two times in the past year)—are displayed graphically in the Module 3: Information.

Benchmarks related to diabetes care for different socioeconomic groups are available from the NHDR. Those benchmarks are national averages and are not available by State. However, individual States may have data that can be analyzed by socioeconomic group (e.g., avoidable hospitalizations by racial, educational, or income group). Table D.2 shows values for the national averages for diabetes process and outcome measures by socioeconomic characteristics of the national population.

Methods Matter

Methods of measurement and data quality can have a large impact on the value of a benchmark. For this reason, it is crucial that the methods and data used to derive various benchmarks are similar. For example, when comparing the State to the Nation, the same methods and data sources should be used to

calculate the estimates. That is why this *Resource Guide* presents only the BRFSS estimates to compare States and the Nation. Other sources (for example MEPS) were used for national estimates of the same measures in the NHQR. However, MEPS and BRFSS use different survey methods and present different measures; the impact of the former is apparent in the HbA1c rates—90 percent (MEPS) versus 79 percent (BRFSS)—and the impact of the latter is seen in the influenza vaccination rates for people with diabetes—55 percent for those age 18 and over (MEPS) versus 37 percent for those age 18 to 64 (BRFSS).

Table D.1. Benchmarks available in or derivable from the NHQR by the measure set for diabetes care quality, including four sample States

Measure	Benchmarks											
	Theoretic Limit	Best-in-class State average /a	National consensus-based goal (HP2010, Target/ Baseline)	National average	Regional average /b				State average for four example States (Fill in for your State)			
					Northeast	Midwest	South	West	GA	MA	MI	WA
Percent of adults with diabetes who had a hemoglobin A1c measurement at least *once* in the past year (BRFSS)	100	95.6	n/a	79.4	85.5	85.2	80.2	83.2	85.9	85.4	74.5	88.5
Percent of adults with diabetes who had a hemoglobin A1c measurement at least *twice* in the past year (BRFSS)	100	83.0	TBD/59 (BRFSS 2000)	61.1	69.2	68.1	62.2	61.5	70.5	69.0	55.8	65.8
Percent of patients with diabetes who had a lipid profile in past two years (MEPS)	100	n/a	n/a	94.3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Percent of adults with diabetes who had a retinal eye examination in past year (BRFSS)	100	79.6	75/47 (NHIS 2000)	66.7	71.1	72.5	65.2	63.4	70.4	69.0	62.3	69.7
Percent of adults with diabetes who had a foot examination in past year (BRFSS)	100	81.3	75/55 (BRFSS 1998)	64.6	68.6	68.9	63.9	67.9	63.3	61.5	65.2	69.0
Percent of adults with diabetes who had an influenza immunization in past year (BRFSS)	100	59.0	n/a	37.4	42.6	46.1	39.2	40.7	30.4	44.8	26.6	49.6
Hospital admissions for uncontrolled diabetes per 100,000 population (HCUP)	0	n/a	54/72 (HCUP 1996)	28.5	30.1	28.0	35.7	15.6	n/a	n/a	n/a	n/a
Hospital admissions for short-term complications of diabetes per 100,000 population (HCUP)	0	n/a	n/a	51.2	48.1	45.4	61.4	43.3	n/a	n/a	n/a	n/a
Hospital admissions for long term complications of diabetes per 100,000 population (HCUP)	0	n/a	n/a	120.8	135.8	109.7	133.6	96.2	n/a	n/a	n/a	n/a
Hospital admissions for lower extremity amputations in patients with diabetes per 1,000 population (NHDS)	0	n/a	1.8/4.1 (NHDS 1997)	4.8	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

n/a = State estimates not available.
a/ Best in class estimate is the top 10 percent of State rates taken together as a simple average.
b/ Regional averages from BRFSS are simple averages because population estimates were not available to derive weighted averages; regional estimates from HCUP are reported in the NHQR and are based on weighted averages.
Source: National Healthcare Quality Report, 2003.

Table D.2. National averages for diabetes care measures, available in the NHDR by race/ethnicity and income

Measure	National Total[a] (All races/ ethnicities)		Racial/ethnic group average[a]						Income group average								National consensus-based goal (HP2010, Target/ Baseline)
			White		Black Non-Hispanic		Hispanic		Negative or poor (MEPS)		Poor or low (MEPS) $25k-$35k (HCUP)		Middle (MEPS) $35k-45k (HCUP)		High (MEPS) >$45k (HCUP)		
	Rate	SE	Rate	SE	Rate	SE	Rate	SE	Rate	SE	Rate	SE	Rate	SE	Rate	SE	
Percent of adults with diabetes who had a hemoglobin A1c measurement at least once in the past year (MEPS)	89.8	1.3	91.1	1.4	86.0	3.7	85.7	3.2	86.8	3.4	88.8	2.8	90.1	2.1	91.4	2.2	TBD/59 (BRFSS 2000)
Percent of patients with diabetes who had a lipid profile in past two years (MEPS)	94.3	0.9	94.6	1.0	94.8	1.7	91.2	2.1	86.7	2.9	94.0	1.6	94.1	1.4	94.1	1.4	n/a
Percent of adults with diabetes who had a retinal eye examination in past year (MEPS)	66.5	1.8	67.8	2.2	65.8	4.7	58.3	4.3	63.4	3.4	64.4	3.5	60.9	3.7	74.5	2.6	75/47 (NHIS 2000)
Percent of adults with diabetes who had a foot examination in past year (MEPS)	66.4	1.7	67.9	2.4	60.4	4.4	66.2	4.1	60.3	4.3	68.2	3.2	65.4	2.8	68.7	3.0	75/55 (BRFSS 1998)
Percent of adults with diabetes who had an influenza immunization in past year (MEPS)	54.8	2.2	59.2	2.5	43.4	4.9	46.6	3.6	48.1	5.3	57.6	3.7	51.3	3.8	58.7	3.2	n/a
Hospital admissions for uncontrolled uncomplicated diabetes per 100,000 population (HCUP)	26.9	0.2	16.7	0.2	83.6	0.9	41.6	0.7	69.9	1.2	42.7	0.5	29.6	0.3	15.8	0.2	54/72 (HCUP 1996)
Hospital admissions for short-term complications of diabetes per 100,000 population (HCUP)	48.1	0.2	38.8	0.2	129.1	1.1	40.2	0.6	96.7	1.4	68.1	0.6	53.6	0.5	33.9	0.2	n/a
Hospital admissions for long term complications of diabetes per 100,000 population (HCUP)	117.4	0.3	88.1	0.3	291.0	1.7	176.2	1.4	235.8	2.2	158.1	0.9	127.9	0.7	86.9	0.4	n/a
Hospital admissions for lower extremity amputations in patients with diabetes per 1,000 population (NHDS)	4.8	0.4	3.5	0.4	7.0	1.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.8/4.1 (NHDS 1997)

[a] Total and racial/ethnic estimates are from MEPS or HCUP, expect the last measure which is from NHDS.

[b] Income group values for HCUP (and BRFSS) are based on median income of the patient's ZIP Code

Source: National Healthcare Disparities Report, 2003.

Appendix E: Information on Statistical Significance

This section is provided for data analysts who want to generate other statistics and/or perform statistical tests for other comparisons than those that are provided in the NHQR and NHDR.

Comparing State and Average Estimates Using P-Values

When comparing an individual State estimate to another estimate, such as the all-State average or the average for the top tier of States, every measure has error associated with it. The error is associated with sampling (size of the sample or sampling methods), accuracy of respondents' recall and responses, data entry processes, and many other factors. When comparing estimates it is important to take this error (which can be estimated with statistical assumptions) into account.

P-Values

A common statistic for comparing two rates to determine whether they differ is the t-test based on a normal distribution. The t-test can be compared to a normal distribution with a pre-specified level of significance or acceptable error in conclusions about whether or not two statistics come from the same distribution or population. The p-value, a statistic for a normal distribution, can be calculated to determine whether two measures are likely from the same or from different distributions.

Judgments About Comparisons

Statistical significance and magnitude of the difference should be considered together when comparing two estimates. The first check should be: Is the difference statistically different? The second check should be: Are the differences large enough to be meaningful for policy purposes?

- **Is the difference statistically different?** Are the p-values less than 0.05? If so, you can assume that the underlying distributions come from different populations or experiences. But there are some other considerations. The statistical test of differences is affected by the number of observations from which the measures were generated. For example, if the measures were generated from hundreds of thousands of records then summary measures (such as averages) have less variance and lower p-values, which imply "statistical significance" even when the magnitude of the differences might be tiny. Alternatively, when differences are large and the number of observations is few, the absence of statistical significance might simply mean that the data set does not have enough observations for a powerful test. This happens frequently with the BRFSS measures because the annual sample sizes of the State surveys are small—from about 2,000 to 8,500 observations.

- **Are the differences large enough to be meaningful for policy purposes?** Because of the relationship between the statistical test and the number of observations, some judgment must be used to assess the meaning of the differences between State estimates. Thus, in addition to statistical significance, it is important to ask the second question: Is the State-to-benchmark difference large enough to warrant efforts to rectify it? A 1- or 2-percentage-point difference in a measure may not be worth the effort to improve it. A 5- or 10-percentage-point difference may mean that a substantial number of State residents are affected by poor health care quality in the State. These are judgments that local experts and stakeholders who understand the environment of a State can help make.

How To Calculate P-Values

P-values are used in this *Resource Guide* to determine whether the estimate of a given State is statistically different—above or below a given average (e.g., the national average or the average of the top decile States). Calculating the p-value is straightforward when the standard errors (SEs) of the estimates are provided, as in the case of the national rate and individual State rates in the first formula and example below. However, when the standard error has not been provided, as is the case for the mean of the top decile of States, then the calculation is more complicated and may require additional data, such as sample sizes. The method for the p-value calculation for the top-decile States is also provided (see second formula and example).

Calculating P-Value To Compare States to the National Average

For an individual State estimate compared to the national average, the following formula shows how to derive a t-test statistic, which is a statistical test for whether the State average is likely to come from a distribution different from the national average. From the t-test, a p-value can be derived; and if the p value is less than 0.05, it can be concluded with 95-percent confidence that the mean from the State distribution is statistically different from the mean from the national distribution (see example for one State). Rates and standard errors are provided for most measures in the NHQR tables.

Two-sided t-test:

$$t = \frac{R_1 - R_2}{\sqrt{SE_1^2 + SE_2^2}}$$

$$p = 2 * \text{Prob}(Z > |t|)$$

where:

R_1 = a State rate
R_2 = national rate
SE^2_1 = square of the standard error of the State rate (or its variance)
SE^2_2 = square of the standard error of the national rate (or its variance)

This formula is more conveniently calculated using SAS or EXCEL with the following commands:

SAS: p = 2 * (1 - PROBNORM(ABS(t)))

EXCEL: p = 2*(1 - NORMDIST(ABS(t),0,1,TRUE))

Example: How does Georgia compare to the national average for annual retinal exams for adults with diabetes? The national rate and standard error for adults with diabetes receiving annual retinal exams are 66.7 and 1.2, respectively. Georgia's rate and standard error for annual retinal exams are 70.4 and 3.7, respectively. Following is the EXCEL statement for the p-value, which encompasses the t-test formula with the Georgia and national values.

p = 2*(1-NORMDIST(ABS(70.4-66.7)/SQRT((3.7*3.7)+(1.2*1.2)),0,1,TRUE))
p = 0.34

Because the p-value is greater than 0.05, we cannot conclude that Georgia is statistically different from the national average. Our confidence is that this would be true 95 percent of the time in repeated tests.

Calculating P-Value To Compare States to the Top Decile Average

To compare individual States to the top decile average, both the top decile rate and its standard error must be estimated, which is done using the fundamental equation of analysis of variance and weighting individual State values by their respective samples sizes. (The NHQR tables do not provide sample sizes; but this information is available from the CDC Web site.)

Let us assume that the top decile is comprised of three States. Using the three top States, the formula determines the three-State sample size, the weighted mean for the three States, and the total sum of squares about the three-State mean. The latter is the sum of the within-State sum of squared deviations from the State mean and the between-State sum of squared deviations from the three-State mean. The within-State sum of squares (SS) is obtained by squaring the State's SE and multiplying by the sample size times the sample size minus one. The between-State sum of squares is obtained by summing the sample-weighted squared difference between the State mean and the overall three-State mean. Here is the formula (note: sqrt(x) = square root of x):

Let n1, n2, and n3 be the sample sizes for each State.
Let m1, m2, and m3 be the means for each State.
Let s1, s2, and s3 be the standard errors for each State.
N = n1 + n2 + n3, is the overall three-State sample size.
M = (n1*m1 + n2*m2 + n3*m3) / N, is the overall three-State mean.
Within State SS = $n1*(n1-1)*s1^2 + n2*(n2-1)*s2^2 + n3*(n3-1)*s3^2$, represents the simplified sum of squared deviations of values within the State from its mean.
Between State SS = $n1*(m1-M)^2 + n2*(m2-M)^2 + n3*(m3-M)^2$, is the sum of squared deviations of means between the three States weighted by sample size.
Total SS= Within State SS + Between State SS
VAR = SS/(N-1), is the estimated variance for the three-State mean
SE = sqrt(VAR/N), is the estimated standard error for the three-State mean.

Using the estimated standard error and weighted mean for the top decile of States, a p-value can be calculated that reflects how a State compares to the average of top decile States.

Example: How does Georgia compare to the top decile of States for rates of annual retinal exams for adults with diabetes? First, determine the number of States in the top decile. If all States are considered, then the top decile would be the top five States, however, not all States report for all data sources. In the case of BRFSS data for diabetes, 41 States and the District of Columbia reported; therefore, the top decile is the top four States.

The four States with the highest rates for retinal eye exams are Wisconsin with a rate of 82.5, SE=3.1, and sample size of 201; Maine with a rate of 82.3, SE=3.5, and a sample size of 172; Nebraska with a rate of 80.4, SE=5.6, and a sample size of 214; and Connecticut with a rate of 77.1, SE=4.3, and a sample size of 492. The overall sample size is 1,079 and the overall weighted average is 79.6. The within State SS=6,642,737, the between State SS=6,156, and the total SS=6,648,893. From the total SS, the weighted SE can be determined for the top decile average and the calculation for p-values can be used to compare States to that top decile average.

The p-value for Georgia compared to the top decile average is 0.03. Because the p-value is less than 0.05, it can be concluded that Georgia, which is below the top-decile average, is significantly different from the top decile and, thus, there is opportunity for improvement in annual retinal exams.

Appendix F: NHQR Quality Measures for All Conditions by State

This appendix lists quality measures for all conditions and topics in the NHQR. It includes the national estimate and then an indicator for whether or not the State estimate (not shown due to space limitation) is statistically greater, lower, or no different from the national average. The measures for which State-level data are not reported in the NHQR are noted as not available (n/a). This resource can help States identify which diseases and treatments, including and outside of diabetes, may be in need of attention. Many of the same data issues described in Module 2: Data and Module 3: Information are applicable to other disease topics, although different data sources and limitations may apply to them.

Table F.1. NHQR quality measures for all conditions when available by State, alphabetically Alabama through Missouri

National Healthcare Quality Report (2003) Measures, National Estimate, and State Significance Test (Sig.)[1] for Difference from the National Average

MEASURE TITLE	Year	Metric	U.S. Est.	AL Sig.	AK Sig.	AZ Sig.	AR Sig.	CA Sig.	CO Sig.	CT Sig.	DE Sig.	DC Sig.	FL Sig.	GA Sig.	HI Sig.	ID Sig.	IL Sig.	IN Sig.	IA Sig.	KS Sig.	KY Sig.	LA Sig.	ME Sig.	MD Sig.	MA Sig.	MI Sig.	MN Sig.	MS Sig.	MO Sig.	Source	NHQR Table
1. EFFECTIVENESS OF CARE																															
CANCER																															
Screening for breast cancer:																															
Process: Percent of women (age 40 and over) who report they had a mammogram within the past 2 years	2001	Percent	76.00	n/a	n/a	ns	-	n/a	ns	n/a	n/a	n/a	n/a	+	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	n/a	BRFSS	1.1b
	2000	Percent	76.70	ns	ns	+	-	ns	ns	+	+	+	ns	ns	ns	-	ns	-	ns	ns	ns	ns	ns	+	+	+	-	-	ns	BRFSS	1.1c
Screening for cervical cancer:																															
Process: Percent of women (age 18 and over) who report that they had a Pap smear within the past 3 years	2001	Percent	84.80	n/a	n/a	ns	-	n/a	ns	n/a	n/a	n/a	n/a	+	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ns	n/a	BRFSS	1.3b
	2000	Percent	83.70	ns	+	ns	-	ns	ns	+	+	+	ns	+	+	-	-	ns	ns	ns	ns	ns	ns	+	+	ns	ns	ns	ns	BRFSS	1.3c
Screening for colorectal cancer:																															
Process: Percent of men and women (age 50 and over) who report they ever had a flexible sigmoidoscopy/ colonoscopy	2001	Percent	47.60	ns	ns	ns	-	ns	ns	+	+	+	ns	ns	ns	-	-	ns	ns	-	-	-	ns	+	+	+	+	-	-	BRFSS	1.5b
Process: Percent of men and women (age 50 and over) who report they had a fecal occult blood test (FOBT) within the past 2 years	2001	Percent	35.30	-	-	ns	-	ns	ns	+	-	+	+	ns	+	-	+	-	ns	ns	-	-	+	+	+	ns	ns	-	-	BRFSS	1.6b
CHRONIC KIDNEY DISEASE																															
Management of End Stage Renal Disease:																															
Process: Percent of dialysis patients registered on waiting list for transplantation d/	2000	Percent	21	ns	ns	-	-	+	+	ns	+	-	-	-	ns	ns	+	-	+	ns	-	-	ns	+	+	+	+	-	ns	USRDS	1.15b
Process: Percent of patients with treated chronic kidney failure who receive a transplant within three years of renal failure e/-h/	1997	Percent	20	ns	ns	ns	ns	-	+	ns	ns	-	ns	-	ns	+	+	ns	+	ns	+	-	ns	+	+	ns	+	-	+	USRDS	1.16b
DIABETES																															
Management of Diabetes::																															
Percent of adults with diabetes who had a hemoglobin A1c measurement at least once in the past year	2001	Percent	79.4	ns	n/a	ns	ns	ns	ns	+	n/a	ns	ns	ns	+	+	n/a	n/a	ns	ns	+	n/a	ns	n/a	ns	ns	+	n/a	n/a	BRFSS	1.20c

National Healthcare Quality Report (2003) Measures, National Estimate, and State Significance Test (Sig.)[1] for Difference from the National Average																														
MEASURE TITLE	**Year**	**Metric**	**U.S. Est.**	**AL Sig.**	**AK Sig.**	**AZ Sig.**	**AR Sig.**	**CA Sig.**	**CO Sig.**	**CT Sig.**	**DE Sig.**	**DC Sig.**	**FL Sig.**	**GA Sig.**	**HI Sig.**	**ID Sig.**	**IL Sig.**	**IN Sig.**	**IA Sig.**	**KS Sig.**	**KY Sig.**	**LA Sig.**	**ME Sig.**	**MD Sig.**	**MA Sig.**	**MI Sig.**	**MN Sig.**	**MS Sig.**	**MO Sig.**	**Source**	**NHQR Table**
Management of Diabetes::																														
Percent of adults with diabetes who had a retinal eye examination in past year	2001	Percent	66.7	ns	n/a	ns	ns	ns	ns	+	n/a	ns	ns	ns	ns	-	n/a	n/a	+	ns	ns	n/a	+	n/a	ns	ns	ns	n/a	n/a	BRFSS	1.22b
Percent of adults with diabetes who had a foot examination in past year	2001	Percent	64.6	ns	n/a	ns	-	ns	-	ns	n/a	ns	ns	ns	+	ns	n/a	n/a	ns	ns	ns	n/a	ns	n/a	ns	ns	+	n/a	n/a	BRFSS	1.23b
Percent of adults with diabetes who had an influenza immunization in past year	2001	Percent	37.4	ns	n/a	-	ns	ns	-	ns	ns	ns	ns	ns	+	ns	ns	ns	+	ns	ns	-	ns	ns	ns	-	ns	-	ns	BRFSS	1.24b
HEART DISEASE																														
Screening for high cholesterol:																														
Process: Percent of adults 18 and over receiving cholesterol measurement within 5 years	2001	Percent	73	ns	-	ns	-	-	ns	+	+	+	+	+	+	-	-	ns	-	-	ns	ns	+	+	+	ns	+	-	-	BRFSS	1.32b
Counseling on risk factors:																														
Process: Percent of smokers (ager 18 and over) receiving advice to quit smoking	2001	Percent	71	n/a	ns	ns	ns	n/a	n/a	-	ns	n/a	n/a	n/a	n/a	n/a	n/a	ns	n/a	n/a	ns	+	+	n/a	n/a	n/a	n/a	ns	ns	BRFSS	1.33b
Treatment of AMI:																														
Process: Percent of AMI patients administered aspirin within 24 hours of admission j/	2000-2001	Percent	85	-	ns	ns	-	ns	+	ns	ns	ns	-	-	+	+	ns	ns	ns	ns	ns	ns	+	ns	ns	ns	ns	-	ns	QIO	1.34b jj/
Process: Percent of AMI patients with aspirin prescribed at discharge j/	2000-2001	Percent	86	ns	ns	ns	ns	ns	+	ns	+	+	-	ns	ns	ns	-	ns	ns	ns	ns	-	+	ns	ns	ns	ns	ns	ns	QIO	1.35b jj/
Process: Percent of AMI patients administered beta blocker within 24 hours of admission j/	2000-2001	Percent	69	-	ns	ns	-	ns	ns	+	ns	ns	ns	-	ns	ns	ns	ns	+	ns	ns	ns	+	ns	+	ns	+	-	ns	QIO	1.36b jj/
Process: Percent of AMI patients with beta blocker prescribed at discharge j/	2000-2001	Percent	79	ns	ns	ns	-	-	+	ns	ns	ns	ns	ns	ns	ns	ns	ns	+	ns	ns	ns	+	ns	+	+	ns	-	ns	QIO	1.37b jj/
Process: Percent of AMI patients with left ventricular systolic dysfunction prescribed ACE inhibitor at discharge j/	2000-2001	Percent	74	ns	+	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	+	ns	ns	ns	QIO	1.38b jj/
Process: Percent of AMI patients given smoking cessation counseling while hospitalized j/	2000-2001	Percent	43	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns	ns	+	ns	ns	ns	-	ns	-	ns	ns	ns	ns	+	QIO	1.39b jj/

National Healthcare Quality Report (2003) Measures, National Estimate, and State Significance Test (Sig.)[1] for Difference from the National Average																															
MEASURE TITLE	**Year**	**Metric**	**U.S. Est.**	**AL Sig.**	**AK Sig.**	**AZ Sig.**	**AR Sig.**	**CA Sig.**	**CO Sig.**	**CT Sig.**	**DE Sig.**	**DC Sig.**	**FL Sig.**	**GA Sig.**	**HI Sig.**	**ID Sig.**	**IL Sig.**	**IN Sig.**	**IA Sig.**	**KS Sig.**	**KY Sig.**	**LA Sig.**	**ME Sig.**	**MD Sig.**	**MA Sig.**	**MI Sig.**	**MN Sig.**	**MS Sig.**	**MO Sig.**	**Source**	**NHQR Table**
Treatment of AMI:																															
Process: Median Time to thrombolysis. Time from arrival to initiation of a thrombolytic agent in patients with ST segment elevation or left bundle branch block (LBBB) on the electrocardiogram (ECG) performed closest to hospital arrival time j/,k/	1999-2000	Median	62	-	ns	ns	ns	ns	ns	ns	+	n/a	ns	ns	ns	+	ns	ns	ns	ns	+	ns	ns	+	ns	ns	+	ns	ns	QIO	1.40b jj/
Process: Median time to PTCA. Median time from arrival to percutaneous transluminal angioplasty (PTCA) in patients with ST segment elevation or left bundle branch block (LBBB) on the electrocardiogram (ECG) performed closest to hospital arrival time. j/, l/	1999-2000	Median	186	ns	+	+	+	ns	ns	+	+	ns	ns	n/a	+	+	ns	ns	+	ns	n/a	ns	n/a	ns	ns	+	ns	ns	ns	QIO	1.41b jj/
Treatment of acute heart failure:																															
Process: Percent of heart failure patients having evaluation of left ventricular ejection fraction j/	2000-2001	Percent	69	ns	ns	+	-	ns	ns	+	+	ns	+	ns	+	-	ns	ns	ns	-	-	ns	ns	+	+	ns	ns	-	ns	QIO	1.42b jj/
Process: Percent of heart failure patients with left ventricular systolic dysfunction prescribed ACE inhibitor at discharge j/	2000-2001	Percent	66	ns	ns	ns	-	ns	ns	ns	+	ns	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	-	ns	QIO	1.43b jj/
MATERNAL AND CHILD HEALTH																															
Immunization, childhood:																															
Process: Percent of children 19-35 months who received all recommended vaccines n/	2001	Percent	74	+	ns	-	ns	ns	ns	ns	ns	ns	ns	+	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	+	ns	NIS	1.52e
	2000	Percent	73	ns	ns	-	ns	ns	ns	+	ns	-	ns	+	ns	ns	ns	ns	+	ns	ns	ns	ns	ns	+	ns	+	ns	ns	NIS	1.52f
Process: Percent of children 19-35 months who received 4 doses of DPaT vaccine	2001	Percent	82	+	ns	-	-	ns	ns	+	+	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	-	+	ns	ns	ns	ns	+	ns	NIS	1.53e
	2000	Percent	82	ns	ns	ns	-	ns	ns	+	ns	ns	ns	ns	ns	ns	ns	ns	+	ns	ns	ns	+	ns	+	ns	+	+	ns	NIS	1.53f
Process: Percent of children 19-35 months who received 3 doses of polio vaccine	2001	Percent	89	+	ns	-	ns	ns	ns	+	ns	ns	ns	+	ns	ns	-	ns	ns	ns	ns	-	+	ns	+	ns	ns	ns	ns	NIS	1.54e
	2000	Percent	90	ns	ns	ns	ns	ns	ns	+	ns	ns	ns	ns	ns	ns	ns	ns	+	ns	ns	ns	ns	ns	+	ns	+	ns	ns	NIS	1.54f
Process: Percent of children 19-35 months who received 1 dose of MMR vaccine	2001	Percent	91	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	NIS	1.55e
	2000	Percent	91	ns	ns	ns	ns	ns	ns	+	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	+	ns	+	ns	ns	ns	ns	NIS	1.55f

National Healthcare Quality Report (2003) Measures, National Estimate, and State Significance Test (Sig.)[1] for Difference from the National Average

MEASURE TITLE	Year	Metric	U.S. Est.	AL Sig.	AK Sig.	AZ Sig.	AR Sig.	CA Sig.	CO Sig.	CT Sig.	DE Sig.	DC Sig.	FL Sig.	GA Sig.	HI Sig.	ID Sig.	IL Sig.	IN Sig.	IA Sig.	KS Sig.	KY Sig.	LA Sig.	ME Sig.	MD Sig.	MA Sig.	MI Sig.	MN Sig.	MS Sig.	MO Sig.	Source	NHQR Table
Immunization, childhood:																															
Process: Percent of children 19-35 months who received 3 doses of Hib vaccine	2001	Percent	93	+	-	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	+	ns	ns	ns	ns	NIS	1.56e
	2000	Percent	93	ns	ns	-	ns	ns	ns	+	ns	-	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	+	ns	+	ns	ns	NIS	1.56f
Process: Percent of children 19-35 months who received 3 doses of hepatitis B vaccine	2001	Percent	89	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	+	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	+	ns	+	ns	ns	NIS	1.57e
	2000	Percent	90	ns	-	-	-	ns	ns	+	ns	ns	ns	ns	ns	ns	ns	ns	+	ns	ns	ns	-	ns	+	+	ns	ns	ns	NIS	1.57f
Process: Percent of children 19-35 months who received 1 dose of varicella vaccine	2001	Percent	76	+	-	ns	+	+	ns	+	ns	+	ns	+	ns	-	-	-	-	-	ns	ns	-	+	+	ns	ns	-	-	NIS	1.58e
	2000	Percent	68	+	-	ns	+	+	-	+	ns	+	-	+	+	-	-	-	-	-	ns	ns	-	+	+	ns	-	-	-	NIS	1.58f
RESPIRATORY DISEASES																															
Immunization, influenza:																															
Process: Percent of high risk persons (e.g. Chronic Pulmonary Obstructive Disease) age 18-64 who received an influenza vaccination in the past 12 months	2001	Percent	28.60	ns	n/a	n/a	ns	n/a	ns	n/a	n/a	ns	n/a	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ns	ns	ns	BRFSS	1.69b
Process: Percent of persons age 65 and over who received an influenza vaccination in the past 12 months	2001	Percent	65.40	ns	ns	ns	ns	ns	+	+	ns	-	-	ns	+	ns	ns	ns	+	+	ns	-	+	ns	+	-	+	ns	ns	BRFSS	1.70b
Immunization, pneumonia:																															
Process: Percent of high risk persons (e.g. Chronic Pulmonary Obstructive Disease) age 18-64 who ever received a pneumococcol vaccination	2001	Percent	18.40	ns	n/a	n/a	ns	n/a	ns	n/a	n/a	ns	n/a	n/a	n/a	n/a	n/a	n/a	ns	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ns	ns	ns	BRFSS	1.73b
Process: Percent of persons age 65 and over who ever received a pneumococcol vaccination	2001	Percent	60.80	ns	ns	+	ns	ns	+	ns	+	-	ns	ns	ns	ns	ns	ns	+	ns	-	-	+	ns	+	ns	ns	ns	ns	BRFSS	1.74b
Treatment of pneumonia:																															
Process: Percent of patients with pneumonia who have blood cultures collected before antibiotics are administered	2000-2001	Percent	81.21	-	+	ns	ns	ns	ns	ns	ns	-	ns	ns	+	ns	ns	ns	+	ns	ns	ns	ns	-	-	ns	ns	ns	ns	CMS	1.76b jj/

National Healthcare Quality Report (2003) Measures, National Estimate, and State Significance Test (Sig.)[1] for Difference from the National Average																															
MEASURE TITLE	**Year**	**Metric**	**U.S. Est.**	**AL Sig.**	**AK Sig.**	**AZ Sig.**	**AR Sig.**	**CA Sig.**	**CO Sig.**	**CT Sig.**	**DE Sig.**	**DC Sig.**	**FL Sig.**	**GA Sig.**	**HI Sig.**	**ID Sig.**	**IL Sig.**	**IN Sig.**	**IA Sig.**	**KS Sig.**	**KY Sig.**	**LA Sig.**	**ME Sig.**	**MD Sig.**	**MA Sig.**	**MI Sig.**	**MN Sig.**	**MS Sig.**	**MO Sig.**	**Source**	**NHQR Table**
Treatment of pneumonia:																															
Process: Percent of patients with pneumonia who receive the initial antibiotic dose within 8 hours of hospital arrival	2000-2001	Percent	85.80	ns	+	ns	ns	ns	ns	+	ns	ns	-	ns	+	+	ns	ns	+	+	ns	ns	+	ns	ns	ns	ns	ns	ns	CMS	1.77b jj/
Process: Percent of patients with pneumonia who receive the initial antibiotic consistent with current recommendations	2000-2001	Percent	84.45	ns	ns	+	ns	ns	ns	ns	+	ns	ns	ns	-	+	ns	ns	+	ns	ns	-	ns	+	ns	ns	ns	ns	ns	CMS	1.78b jj/
Process: Percent of patients with pneumonia who receive influenza screening or vaccination	2000-2001	Percent	26.22	ns	ns	+	-	-	ns	+	ns	ns	-	-	ns	ns	-	+	+	ns	ns	-	+	ns	-	ns	+	-	ns	CMS	1.79b jj/
Process: Percent of patients with pneumonia who receive pneumococcal screening or vaccination	2000-2001	Percent	24.76	+	ns	+	-	-	+	ns	-	ns	-	-	ns	ns	-	+	+	ns	ns	-	ns	ns	-	ns	ns	-	ns	CMS	1.80b jj/
LONG-TERM CARE																															
Nursing facility care:																															
Chronic care: Percent of residents with pain o/-q/	2002	Percent	10.66	ns	n/a	-	ns	+	-	+	ns	n/a	ns	ns	ns	-	+	ns	-	-	ns	+	+	+	+	ns	-	+	-	MDS	1.87 jj/ kk/ ll/
Chronic care: Late-loss ability in basic daily tasks worsening p/-r/	2002	Percent	15.44	ns	n/a	ns	ns	+	ns	-	ns	n/a	ns	+	n/a	-	+	-	+	ns	-	+	-	ns	-	+	ns	ns	+	MDS	1.88 jj/ kk/ ll/
Chronic care: Infections prevalence: urinary tract infections p/, s/, t/, u/	2002	Percent	16.06	-	n/a	n/a	n/a	ns	n/a	+	ns	n/a	n/a	n/a	ns	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ns	-	ns	n/a	n/a	n/a	MDS	1.89a
Chronic care: Infections prevalence: multiple types of infections p/, t/, u/, kk/	2002	Percent	14.11	n/a	n/a	-	ns	n/a	+	n/a	n/a	n/a	-	+	n/a	-	+	-	+	-	-	+	+	n/a	n/a	n/a	+	+	ns	MDS	1.89b
Chronic care: Stage 1-4 pressure ulcer prevalence t/, v/	2002	Percent	8.50	ns	n/a	ns	ns	ns	ns	ns	ns	n/a	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	MDS	1.90a jj/ kk/ ll/
Chronic care: Stage 1-4 pressure ulcer prevalence (with adjustment for facility admission profile over past year) t/, v/	2002	Percent	8.61	+	n/a	ns	ns	+	+	+	ns	n/a	-	-	+	+	ns	-	+	+	-	-	ns	-	ns	+	+	ns	+	MDS	1.90b
Chronic care: Physical restraint use t/, v/	2002	Percent	9.73	+	n/a	-	-	-	+	-	+	n/a	+	-	ns	+	+	+	+	+	+	-	+	ns	+	+	+	-	+	MDS	1.91 jj/ kk/ ll/
Post acute care: Failure to improve/manage delirium symptoms t/, v/	2002	Percent	3.82	+	n/a	ns	ns	+	ns	ns	n/a	n/a	+	ns	n/a	-	ns	ns	-	ns	+	-	ns	ns	ns	ns	ns	ns	-	MDS	1.92a jj/ kk/ ll/
Post acute care: Failure to improve/manage delirium symptoms (with adjustment for facility admission profile over past year) t/, v/	2002	Percent	3.72	+	n/a	ns	ns	+	ns	ns	n/a	n/a	+	ns	n/a	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns	ns	-	MDS	1.92b jj/ kk/ ll/

National Healthcare Quality Report (2003) Measures, National Estimate, and State Significance Test (Sig.)[1] for Difference from the National Average																														
MEASURE TITLE	**Year**	**Metric**	**U.S. Est.**	**AL Sig.**	**AK Sig.**	**AZ Sig.**	**AR Sig.**	**CA Sig.**	**CO Sig.**	**CT Sig.**	**DE Sig.**	**DC Sig.**	**FL Sig.**	**GA Sig.**	**HI Sig.**	**ID Sig.**	**IL Sig.**	**IN Sig.**	**IA Sig.**	**KS Sig.**	**KY Sig.**	**LA Sig.**	**ME Sig.**	**MD Sig.**	**MA Sig.**	**MI Sig.**	**MN Sig.**	**MS Sig.**	**MO Sig.**	**Source**	**NHQR Table**
Nursing facility care:																														
Post acute care: Percent of residents with pain t/, v/	2002	Percent	25.44	+	n/a	-	+	-	-	ns	n/a	n/a	ns	ns	n/a	-	+	+	-	-	+	+	ns	+	ns	-	-	+	-	MDS	1.93 jj/ kk/ ll/
Post acute care: Improvement in walking t/, v/	2002	Percent	30.31	ns	n/a	ns	-	+	ns	+	n/a	n/a	+	ns	n/a	ns	ns	-	ns	ns	-	-	+	ns	-	+	+	-	ns	MDS	1.94 jj/ kk/ ll/
Home health care:																														
Outcome: Improvement in upper body dressing w/	2002	Risk-adj'd percent	61.29	-	ns	+	-	ns	+	-	ns	ns	ns	ns	+	+	+	ns	-	ns	-	-	ns	+	-	+	ns	-	+	OASIS	1.95 jj/ kk/
Outcome: Improvement in management of oral medications x/	2002	Risk-adj'd percent	35.02	-	-	+	ns	+	-	-	ns	+	+	-	-	-	+	-	-	-	-	+	-	ns	-	+	-	+	-	OASIS	1.96 jj/ kk/
Outcome: Improvement in bathing y/	2002	Risk-adj'd percent	56.76	-	ns	+	ns	+	+	-	-	ns	+	-	+	+	-	-	-	-	-	+	-	-	-	+	-	-	ns	OASIS	1.97 jj/ kk/
Outcome: Stabilization in bathing z/	2002	Risk-adj'd percent	90.76	ns	+	ns	+	+	+	ns	-	-	+	-	+	+	-	-	+	+	-	+	-	-	-	ns	-	-	-	OASIS	1.98 jj/ kk/
Outcome: Improvement in transferring aa/	2002	Risk-adj'd percent	48.49	+	ns	+	-	-	ns	-	ns	+	+	+	ns	ns	ns	+	-	-	+	-	+	+	-	+	-	ns	+	OASIS	1.99 jj/ kk/
Outcome: Improvement in ambulation/locomotion bb/	2002	Risk-adj'd percent	33.86	ns	-	+	ns	+	-	-	ns	ns	+	ns	ns	-	ns	ns	-	-	ns	ns	-	+	-	ns	-	+	-	OASIS	1.100 jj/ kk/
Outcome: Improvement in toileting cc/	2002	Risk-adj'd percent	59.27	ns	ns	+	ns	-	+	ns	ns	ns	ns	ns	ns	ns	ns	+	ns	ns	ns	-	ns	+	ns	+	ns	ns	+	OASIS	1.101 jj/ kk/
Outcome: Improvement in pain interfering with activity dd/	2002	Risk-adj'd percent	56.82	-	-	ns	-	+	-	+	+	+	+	-	-	-	+	-	-	-	-	-	-	+	ns	+	-	-	-	OASIS	1.102 jj/ kk/
Outcome: Improvement in dyspnea ee/	2002	Risk-adj'd percent	53.23	-	ns	+	-	+	+	+	+	+	-	-	+	ns	+	-	-	-	-	-	ns	+	ns	+	ns	-	+	OASIS	1.103 jj/ kk/
Outcome: Improvement in urinary incontinence ff/	2002	Risk-adj'd percent	47.14	-	-	+	-	+	ns	+	+	+	+	+	+	-	+	-	-	-	-	-	ns	+	+	+	-	-	ns	OASIS	1.104 jj/ kk/
Outcome: Improvement in confusion frequency gg/	2002	Risk-adj'd percent	39.89	-	-	+	-	+	-	ns	+	ns	+	+	ns	-	+	-	-	-	-	-	-	+	ns	+	-	ns	+	OASIS	1.105 jj/ kk/
Outcome: Acute care hospitalization hh/	2002	Risk-adj'd percent	27.77	ns	+	+	-	+	+	-	-	ns	+	-	+	+	ns	ns	-	ns	-	-	-	+	-	+	-	-	+	OASIS	1.106 jj/ kk/

See Footnotes at the end of Table F.2.

Table F.2. NHQR quality measures for all conditions when available by State, alphabetically Montana through Wyoming

National Healthcare Quality Report (2003) Measures, National Estimate, and State Significance Test (Sig.)[1] for Difference from the National Average

MEASURE TITLE	Year	Metric	U.S. Est.	MT Sig.	NESig.	NV Sig.	NH Sig.	NJ Sig.	NM Sig.	NY Sig.	NC Sig.	ND Sig.	OH Sig.	OK Sig.	OR Sig.	PA Sig.	RI Sig.	SC Sig.	SD Sig.	TN Sig.	TX Sig.	UT Sig.	VT Sig.	VA Sig.	WA Sig.	WV Sig.	WI Sig.	WY Sig.	Source	NHQR Table
1. EFFECTIVENESS OF CARE																														
CANCER																														
Screening for breast cancer:																														
Process: Percent of women (age 40 and over) who report they had a mammogram within the past 2 years	2001	Percent	76.00	n/a	n/a	n/a	n/a	ns	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	+	n/a	ns	ns	n/a	n/a	n/a	n/a	n/a	n/a	+	-	BRFSS	1.1b
	2000	Percent	76.70	ns	ns	ns	+	ns	ns	+	ns	ns	ns	-	ns	ns	+	ns	ns	ns	-	-	ns	ns	ns	ns	ns	-	BRFSS	1.1c
Screening for cervical cancer:																														
Process: Percent of women (age 18 and over) who report that they had a Pap smear within the past 3 years	2001	Percent	84.80	n/a	n/a	n/a	n/a	ns	n/a	n/a	n/a	n/a	n/a	-	n/a	n/a	+	n/a	ns	ns	n/a	n/a	n/a	n/a	n/a	n/a	ns	-	BRFSS	1.3b
	2000	Percent	83.70	ns	ns	-	+	-	ns	ns	+	-	ns	ns	ns	ns	+	+	+	ns	-	-	+	ns	ns	-	ns	-	BRFSS	1.3c
Screening for colorectal cancer:																														
Process: Percent of men and women (age 50 and over) who report they ever had a flexible sigmoidoscopy/ colonoscopy	2001	Percent	47.60	-	-	ns	+	ns	ns	ns	ns	ns	ns	-	+	ns	+	ns	-	-	-	ns	ns	+	+	-	+	ns	BRFSS	1.5b
Process: Percent of men and women (age 50 and over) who report they had a fecal occult blood test (FOBT) within the past 2 years	2001	Percent	35.30	-	ns	ns	+	ns	-	ns	+	-	ns	-	+	-	ns	ns	-	-	-	-	+	ns	+	-	ns	-	BRFSS	1.6b
CHRONIC KIDNEY DISEASE																														
Management of End Stage Renal Disease:																														
Process: Percent of dialysis patients registered on waiting list for transplantation d/	2000	Percent	21	+	ns	+	ns	+	-	ns	-	+	ns	-	ns	+	+	-	ns	-	-	+	ns	ns	ns	ns	+	-	USRDS	1.15b
Process: Percent of patients with treated chronic kidney failure who receive a transplant within three years of renal failure e/-h/	1997	Percent	20	ns	+	+	ns	ns	-	-	-	+	+	ns	+	+	ns	-	ns	ns	-	+	ns	ns	+	+	+	ns	USRDS	1.16b
DIABETES																														
Management of Diabetes::																														
Percent of adults with diabetes who had a hemoglobin A1c measurement at least once in the past year	2001	Percent	79.4	ns	ns	+	ns	ns	ns	ns	n/a	+	ns	ns	n/a	+	ns	ns	+	ns	ns	ns	+	ns	+	ns	+	-	BRFSS	1.20c

National Healthcare Quality Report (2003) Measures, National Estimate, and State Significance Test (Sig.)[1] for Difference from the National Average																													
MEASURE TITLE	**Year**	**Metric**	**U.S. Est.**	**MT Sig.**	**NESig.**	**NV Sig.**	**NH Sig.**	**NJ Sig.**	**NM Sig.**	**NY Sig.**	**NC Sig.**	**ND Sig.**	**OH Sig.**	**OK Sig.**	**OR Sig.**	**PA Sig.**	**RI Sig.**	**SC Sig.**	**SD Sig.**	**TN Sig.**	**TX Sig.**	**UT Sig.**	**VT Sig.**	**VA Sig.**	**WA Sig.**	**WV Sig.**	**WI Sig.**	**WY Sig.**	**Source**	**NHQR Table**
Management of Diabetes::																														
Percent of adults with diabetes who had a retinal eye examination in past year	2001	Percent	66.7	-	+	-	ns	ns	ns	ns	n/a	ns	ns	ns	n/a	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	-	+	ns	BRFSS	1.22b
Percent of adults with diabetes who had a foot examination in past year	2001	Percent	64.6	ns	ns	ns	ns	ns	+	ns	n/a	ns	ns	ns	n/a	+	+	ns	ns	ns	ns	ns	ns	ns	ns	ns	+	-	BRFSS	1.23b
Percent of adults with diabetes who had an influenza immunization in past year	2001	Percent	37.4	+	+	-	ns	ns	ns	ns	ns	+	ns	+	ns	ns	+	ns	+	ns	ns	ns	ns	ns	+	ns	ns	ns	BRFSS	1.24b
HEART DISEASE																														
Screening for high cholesterol:																														
Process: Percent of adults 18 and over receiving cholesterol measurement within 5 years	2001	Percent	73	-	-	ns	+	+	-	+	ns	-	-	-	-	ns	n/a	+	-	-	-	-	+	+	-	ns	-	ns	BRFSS	1.32b
Counseling on risk factors:																														
Process: Percent of smokers (ager 18 and over) receiving advice to quit smoking	2001	Percent	71	ns	ns	n/a	+	+	n/a	n/a	n/a	n/a	n/a	ns	n/a	ns	n/a	ns	ns	n/a	-	n/a	n/a	+	n/a	+	-	ns	BRFSS	1.33b
Treatment of AMI:																														
Process: Percent of AMI patients administered aspirin within 24 hours of admission j/	2000-2001	Percent	85	ns	ns	ns	+	-	ns	ns	ns	+	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	+	ns	+	ns	ns	+	QIO	1.34b jj/
Process: Percent of AMI patients with aspirin prescribed at discharge j/	2000-2001	Percent	86	ns	ns	ns	+	-	ns	ns	+	+	ns	ns	ns	ns	ns	ns	+	ns	-	+	ns	ns	ns	ns	ns	ns	QIO	1.35b jj/
Process: Percent of AMI patients administered beta blocker within 24 hours of admission j/	2000-2001	Percent	69	ns	ns	-	+	ns	ns	+	ns	ns	ns	-	+	ns	+	ns	ns	ns	ns	ns	+	ns	ns	ns	ns	ns	QIO	1.36b jj/
Process: Percent of AMI patients with beta blocker prescribed at discharge j/	2000-2001	Percent	79	ns	ns	ns	+	ns	ns	ns	ns	ns	ns	ns	ns	ns	+	ns	ns	ns	ns	+	ns	+	ns	ns	ns	ns	QIO	1.37b jj/
Process: Percent of AMI patients with left ventricular systolic dysfunction prescribed ACE inhibitor at discharge j/	2000-2001	Percent	74	ns	ns	ns	+	ns	ns	ns	ns	ns	ns	ns	ns	-	+	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	QIO	1.38b jj/
Process: Percent of AMI patients given smoking cessation counseling while hospitalized j/	2000-2001	Percent	43	ns	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	-	-	ns	ns	ns	ns	+	+	ns	ns	ns	+	ns	QIO	1.39b jj/

National Healthcare Quality Report (2003) Measures, National Estimate, and State Significance Test (Sig.)[1] for Difference from the National Average																													
MEASURE TITLE	**Year**	**Metric**	**U.S. Est.**	**MT Sig.**	**NESig.**	**NV Sig.**	**NH Sig.**	**NJ Sig.**	**NM Sig.**	**NY Sig.**	**NC Sig.**	**ND Sig.**	**OH Sig.**	**OK Sig.**	**OR Sig.**	**PA Sig.**	**RI Sig.**	**SC Sig.**	**SD Sig.**	**TN Sig.**	**TX Sig.**	**UT Sig.**	**VT Sig.**	**VA Sig.**	**WA Sig.**	**WV Sig.**	**WI Sig.**	**WY Sig.**	**Source**	**NHQR Table**
Treatment of AMI:																														
Process: Median Time to thrombolysis. Time from arrival to initiation of a thrombolytic agent in patients with ST segment elevation or left bundle branch block (LBBB) on the electrocardiogram (ECG) performed closest to hospital arrival time j/,k/	1999-2000	Median	62	+	ns	ns	+	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	n/a	+	ns	+	+	ns	ns	ns	ns	+	QIO	1.40b jj/
Process: Median time to PTCA. Median time from arrival to percutaneous transluminal angioplasty (PTCA) in patients with ST segment elevation or left bundle branch block (LBBB) on the electrocardiogram (ECG) performed closest to hospital arrival time. j/, l/	1999-2000	Median	186	+	ns	ns	ns	ns	ns	ns	+	+	+	+	ns	+	n/a	ns	ns	ns	+	ns	ns	ns	ns	n/a	+	+	QIO	1.41b jj/
Treatment of acute heart failure:																														
Process: Percent of heart failure patients having evaluation of left ventricular ejection fraction j/	2000-2001	Percent	69	-	ns	+	+	ns	-	+	ns	-	+	-	ns	+	+	ns	-	ns	ns	ns	+	+	ns	-	ns	-	QIO	1.42b jj/
Process: Percent of heart failure patients with left ventricular systolic dysfunction prescribed ACE inhibitor at discharge j/	2000-2001	Percent	66	+	ns	ns	+	ns	ns	+	ns	ns	ns	ns	+	ns	ns	ns	ns	ns	ns	ns	+	ns	ns	-	ns	ns	QIO	1.43b jj/
HIV/AIDS																														
MATERNAL AND CHILD HEALTH																														
Immunization, childhood:																														
Process: Percent of children 19-35 months who received all recommended vaccines n/	2001	Percent	74	ns	+	ns	ns	ns	-	ns	+	+	ns	ns	ns	+	+	ns	ns	+	ns	-	+	ns	ns	ns	+	ns	NIS	1.52e
	2000	Percent	73	ns	ns	ns	+	ns	-	ns	+	+	ns	ns	ns	+	+	+	ns	ns	-	ns	ns	ns	ns	ns	ns	+	NIS	1.52f
Process: Percent of children 19-35 months who received 4 doses of DPaT vaccine	2001	Percent	82	ns	ns	-	+	ns	-	+	+	ns	ns	ns	ns	+	+	ns	ns	+	ns	ns	+	ns	ns	+	+	ns	NIS	1.53e
	2000	Percent	82	ns	ns	ns	+	ns	ns	ns	+	+	ns	-	ns	ns	+	ns	ns	+	-	ns	+	ns	ns	ns	ns	ns	NIS	1.53f
Process: Percent of children 19-35 months who received 3 doses of polio vaccine	2001	Percent	89	ns	ns	ns	+	ns	-	ns	+	ns	ns	ns	ns	ns	+	ns	ns	+	ns	ns	+	ns	ns	ns	ns	ns	NIS	1.54e
	2000	Percent	90	ns	ns	ns	+	ns	ns	ns	+	ns	ns	-	ns	+	+	+	ns	ns	-	ns	+	ns	ns	ns	ns	ns	NIS	1.54f
Process: Percent of children 19-35 months who received 1 dose of MMR vaccine	2001	Percent	91	+	ns	-	+	ns	ns	ns	+	ns	ns	ns	ns	+	+	+	ns	+	ns	ns	+	ns	ns	ns	ns	ns	NIS	1.55e
	2000	Percent	91	ns	ns	ns	+	ns	-	+	+	ns	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	NIS	1.55f

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Immunization, childhood:																														
Process: Percent of children 19-35 months who received 3 doses of Hib vaccine	2001	Percent	93	ns	ns	ns	+	ns	ns	ns	ns	ns	ns	ns	ns	ns	+	+	ns	+	ns	ns	+	ns	ns	+	ns	ns	NIS	1.56e
	2000	Percent	93	ns	ns	ns	ns	+	-	ns	+	+	ns	ns	ns	ns	+	+	ns	+	-	ns	+	ns	ns	ns	ns	+	NIS	1.56f
Process: Percent of children 19-35 months who received 3 doses of hepatitis B vaccine	2001	Percent	89	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	+	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	NIS	1.57e
	2000	Percent	90	ns	ns	-	ns	ns	ns	ns	ns	+	ns	ns	ns	+	+	+	ns	ns	-	-	ns	ns	ns	ns	ns	+	NIS	1.57f
Process: Percent of children 19-35 months who received 1 dose of varicella vaccine	2001	Percent	76	-	-	-	ns	ns	ns	ns	+	-	-	+	ns	ns	+	ns	-	+	+	-	-	+	-	ns	-	-	NIS	1.58e
	2000	Percent	68	-	ns	-	ns	ns	ns	ns	+	-	-	ns	+	+	+	ns	-	ns	+	-	-	+	-	-	-	-	NIS	1.58f
RESPIRATORY DISEASES																														
Immunization, influenza:																														
Process: Percent of high risk persons (e.g. Chronic Pulmonary Obstructive Disease) age 18-64 who received an influenza vaccination in the past 12 months	2001	Percent	28.60	ns	n/a	n/a	n/a	n/a	n/a	ns	n/a	ns	ns	+	n/a	n/a	n/a	ns	n/a	ns	n/a	ns	n/a	ns	ns	ns	n/a	ns	BRFSS	1.69b
Process: Percent of persons age 65 and over who received an influenza vaccination in the past 12 months	2001	Percent	65.40	+	+	ns	+	ns	+	ns	ns	+	ns	+	+	ns	+	ns	+	ns	ns	ns	+	ns	+	ns	+	+	BRFSS	1.70b
Immunization, pneumonia:																														
Process: Percent of high risk persons (e.g. Chronic Pulmonary Obstructive Disease) age 18-64 who ever received a pneumococcol vaccination	2001	Percent	18.40	ns	n/a	n/a	n/a	n/a	n/a	ns	n/a	ns	ns	ns	n/a	n/a	n/a	ns	n/a	ns	n/a	+	n/a	ns	ns	ns	n/a	+	BRFSS	1.73b
Process: Percent of persons age 65 and over who ever received a pneumococcol vaccination	2001	Percent	60.80	+	ns	+	ns	ns	ns	ns	+	ns	ns	+	+	ns	+	ns	ns	ns	ns	+	+	ns	+	ns	+	+	BRFSS	1.74b
Treatment of pneumonia:																														
Process: Percent of patients with pneumonia who have blood cultures collected before antibiotics are administered	2000-2001	Percent	81.21	+	ns	-	+	ns	ns	ns	ns	ns	ns	ns	+	+	-	ns	ns	ns	ns	ns	+	ns	ns	ns	+	+	CMS	1.76b jj/

National Healthcare Quality Report (2003) Measures, National Estimate, and State Significance Test (Sig.)[1] for Difference from the National Average																														
MEASURE TITLE	**Year**	**Metric**	**U.S. Est.**	**MT Sig.**	**NESig.**	**NV Sig.**	**NH Sig.**	**NJ Sig.**	**NM Sig.**	**NY Sig.**	**NC Sig.**	**ND Sig.**	**OH Sig.**	**OK Sig.**	**OR Sig.**	**PA Sig.**	**RI Sig.**	**SC Sig.**	**SD Sig.**	**TN Sig.**	**TX Sig.**	**UT Sig.**	**VT Sig.**	**VA Sig.**	**WA Sig.**	**WV Sig.**	**WI Sig.**	**WY Sig.**	**Source**	**NHQR Table**
Treatment of pneumonia:																														
Process: Percent of patients with pneumonia who receive the initial antibiotic dose within 8 hours of hospital arrival	2000-2001	Percent	85.80	+	+	ns	+	ns	ns	-	ns	+	ns	ns	+	ns	ns	-	+	ns	ns	+	ns	ns	+	ns	ns	+	CMS	1.77b jj/
Process: Percent of patients with pneumonia who receive the initial antibiotic consistent with current recommendations	2000-2001	Percent	84.45	+	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	-	+	ns	ns	ns	ns	ns	ns	+	-	ns	+	ns	CMS	1.78b jj/
Process: Percent of patients with pneumonia who receive influenza screening or vaccination	2000-2001	Percent	26.22	ns	ns	ns	ns	+	ns	+	-	+	ns	ns	+	ns	ns	-	ns	ns	-	+	+	ns	ns	+	ns	-	CMS	1.79b jj/
Process: Percent of patients with pneumonia who receive pneumococcal screening or vaccination	2000-2001	Percent	24.76	ns	+	+	ns	+	ns	+	-	+	-	+	-	-	ns	-	ns	ns	-	+	-	ns	ns	ns	ns	-	CMS	1.80b jj/
LONG-TERM CARE																														
Nursing facility care:																														
Chronic care: Percent of residents with pain o/-q/	2002	Percent	10.66	-	-	-	ns	+	ns	+	ns	ns	-	-	ns	+	+	ns	-	-	+	-	-	ns	-	ns	ns	n/a	MDS	1.87 jj/ kk/ ll/
Chronic care: Late-loss ability in basic daily tasks worsening p/-r/	2002	Percent	15.44	ns	-	ns	-	ns	-	+	ns	-	+	+	+	-	ns	+	-	ns	ns	ns	-	ns	ns	-	ns	n/a	MDS	1.88 jj/ kk/ ll/
Chronic care: Infections prevalence: urinary tract infections p/, s/, t/, u/	2002	Percent	16.06	n/a	n/a	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a	ns	-	n/a	ns	ns	n/a	-	n/a	n/a	n/a	n/a	n/a	n/a	+	ns	MDS	1.89a
Chronic care: Infections prevalence: multiple types of infections p/, t/, u/, kk/	2002	Percent	14.11	ns	ns	ns	+	+	n/a	+	-	ns	-	n/a	n/a	-	n/a	n/a	ns	n/a	+	ns	ns	-	-	-	n/a	n/a	MDS	1.89b
Chronic care: Stage 1-4 pressure ulcer prevalence t/, v/	2002	Percent	8.50	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	n/a	MDS	1.90a jj/ kk/ ll/
Chronic care: Stage 1-4 pressure ulcer prevalence (with adjustment for facility admission profile over past year) t/, v/	2002	Percent	8.61	+	+	ns	ns	-	+	ns	-	+	-	ns	+	-	ns	-	ns	+	ns	+	ns	-	-	-	+	n/a	MDS	1.90b
Chronic care: Physical restraint use t/, v/	2002	Percent	9.73	+	+	-	+	+	ns	+	ns	+	ns	-	-	+	+	ns	+	-	-	ns	+	+	ns	+	+	n/a	MDS	1.91 jj/ kk/
Post acute care: Failure to improve/manage delirium symptoms t/, v/	2002	Percent	3.82	ns	ns	n/a	-	+	ns	+	+	n/a	-	ns	-	ns	ns	ns	ns	-	ns	-	n/a	ns	-	ns	ns	n/a	MDS	1.92a jj/ kk/ ll/
Post acute care: Failure to improve/manage delirium symptoms (with adjustment for facility admission profile over past year) t/, v/	2002	Percent	3.72	ns	ns	n/a	ns	+	ns	+	ns	n/a	ns	ns	-	ns	ns	ns	+	ns	ns	-	n/a	-	ns	ns	ns	n/a	MDS	1.92b jj/ kk/ ll/

National Healthcare Quality Report (2003) Measures, National Estimate, and State Significance Test (Sig.)[1] for Difference from the National Average																													
MEASURE TITLE	**Year**	**Metric**	**U.S. Est.**	**MT Sig.**	**NESig.**	**NV Sig.**	**NH Sig.**	**NJ Sig.**	**NM Sig.**	**NY Sig.**	**NC Sig.**	**ND Sig.**	**OH Sig.**	**OK Sig.**	**OR Sig.**	**PA Sig.**	**RI Sig.**	**SC Sig.**	**SD Sig.**	**TN Sig.**	**TX Sig.**	**UT Sig.**	**VT Sig.**	**VA Sig.**	**WA Sig.**	**WV Sig.**	**WI Sig.**	**WY Sig.**	**Source**	**NHQR Table**
Nursing facility care:																														
Post acute care: Percent of residents with pain t/, v/	2002	Percent	25.44	-	-	n/a	ns	+	-	+	ns	n/a	ns	ns	-	+	ns	+	-	ns	+	-	n/a	ns	-	ns	-	n/a	MDS	1.93 jj/ kk/ ll/
Post acute care: Improvement in walking t/, v/	2002	Percent	30.31	ns	ns	n/a	ns	+	ns	-	ns	n/a	-	-	+	-	ns	-	n/a	ns	-	ns	n/a	ns	+	-	+	n/a	MDS	1.94 jj/ kk/ ll/
Home health care:																														
Outcome: Improvement in upper body dressing w/	2002	Risk-adj'd percent	61.29	-	ns	ns	ns	+	+	-	ns	ns	-	-	+	-	ns	+	ns	+	-	+	ns	+	+	-	ns	ns	OASIS	1.95 jj/ kk/
Outcome: Improvement in management of oral medications x/	2002	Risk-adj'd percent	35.02	-	-	+	ns	+	+	+	-	-	-	ns	-	-	ns	-	-	ns	-	+	ns	-	-	-	-	-	OASIS	1.96 jj/ kk/
Outcome: Improvement in bathing y/	2002	Risk-adj'd percent	56.76	-	ns	+	ns	+	+	+	-	-	-	+	+	-	ns	ns	-	-	-	+	ns	-	ns	-	-	ns	OASIS	1.97 jj/ kk/
Outcome: Stabilization in bathing z/	2002	Risk-adj'd percent	90.76	+	ns	+	ns	-	+	-	-	+	-	+	-	-	-	-	+	+	+	+	ns	-	ns	ns	-	+	OASIS	1.98 jj/ kk/
Outcome: Improvement in transferring aa/	2002	Risk-adj'd percent	48.49	-	-	ns	-	+	+	+	+	-	+	-	ns	-	-	+	-	+	-	+	ns	+	-	ns	-	ns	OASIS	1.99 jj/ kk/
Outcome: Improvement in ambulation/locomotion bb/	2002	Risk-adj'd percent	33.86	-	-	ns	-	+	+	+	+	-	+	-	-	-	ns	+	-	+	-	+	ns	+	-	ns	-	-	OASIS	1.100 jj/ kk/
Outcome: Improvement in toileting cc/	2002	Risk-adj'd percent	59.27	ns	ns	ns	ns	+	+	ns	ns	ns	ns	-	+	-	+	ns	ns	+	-	ns	ns	+	+	ns	ns	+	OASIS	1.101 jj/ kk/
Outcome: Improvement in pain interfering with activity dd/	2002	Risk-adj'd percent	56.82	-	-	ns	ns	+	+	+	-	-	-	-	-	ns	+	ns	-	-	-	-	+	-	-	-	-	-	OASIS	1.102 jj/ kk/
Outcome: Improvement in dyspnea ee/	2002	Risk-adj'd percent	53.23	-	-	+	ns	+	+	+	+	-	+	-	+	ns	+	+	-	-	-	+	+	+	+	-	+	ns	OASIS	1.103 jj/ kk/
Outcome: Improvement in urinary incontinence ff/	2002	Risk-adj'd percent	47.14	-	-	+	ns	+	+	+	ns	-	ns	-	+	+	+	+	-	-	-	ns	+	-	ns	-	-	-	OASIS	1.104 jj/ kk/
Outcome: Improvement in confusion frequency gg/	2002	Risk-adj'd percent	39.89	-	-	ns	ns	+	ns	+	ns	-	+	-	ns	+	+	+	-	-	-	ns	-	ns	-	-	ns	-	OASIS	1.105 jj/ kk/
Outcome: Acute care hospitalization hh/	2002	Risk-adj'd percent	27.77	+	+	+	-	-	+	-	-	+	-	-	+	+	+	-	+	-	-	+	-	+	+	ns	ns	ns	OASIS	1.106 jj/ kk/

a/ Symbols for significance test are:

- **+** = greater than national average and statistically significant at the $p<0.05$ level
- **-** = less than national average and statistically significant at the $p<0.05$ level
- **ns** = not significant (i.e., not statistically different than the national average)
- **n/a** = either the national or State rate or standard error was not available

b/ Measure is age adjusted to the 2000 standard population.

c/ 1990-based postcensal population estimates were used to calculate death rates; future reports will present rates based on intercensal population estimates for 1998 and 1999 and bridged-race population estimates for 2000 and subsequent years

d/ Population includes males only

e/ Population includes females only

f/ Prevalent dialysis patients on list on 12/31/YR divided by prevalent dialysis patients on 12/31/YR

g/ All Medicare dialysis patients who initiated therapy in the given year were included

h/ Patients with prior kidney transplants and patients over the age of 69 were excluded from the measure

i/ Percents are estimated using the Kaplan-Meier methodology

j/ Follow-up is censored at removal from the list, death, or the end of the three year period

k/ Patient survival rate is measured as standardized mortality ratio (SMR) by source of the data

l/ Population is Medicare patients only.

m/ Time in minutes from arrival to initiation of a thrombolytic agent in patients with ST segment elevation or left bundle branch block (LBBB) on the electrocardiogram (ECG) performed closest to hospital arrival time.

n/ Median time in minutes from arrival to percutaneous transluminal angioplasty (PTCA) in patients with ST segment elevation or left bundle branch block (LBBB) on the electrocardiogram (ECG) performed closest to hospital arrival time.

o/ Includes only those with liveborn infants

p/ Percent of children, age 19 to 35 months, receiving at least four doses of diphtheria-tetanus-acellular pertussis (DTaP), at least three doses of polio, at least one dose of measles-mumps-rubella (MMR), at least three doses of Haemophilus influenzae B (Hib), and at least three doses of hepatitis B antigens.

q/ Pain during a 7 day period that was excruciating at any time or moderate, among residents experiencing daily pain.

r/ For period 4/1/02 to 6/30/02.

s/ A facility had to have at least 20 residents in the denominator for a post-acute measure to be calculated and 30 residents in the denominator for a chronic care measure to be calculated. Therefore the number of facilities may vary for each measure reported in a State.

t/ At least 1 of 4 late-loss ADLs (bed mobility, transfers, toilet use and eating).

u/ This percentage is composite of data from the quarterly and annual MDS assessment forms completed for residents. The annual MDS form contains data on multiple types of infections.

v/ U.S. estimate reflects the average of the States with measures.

w/ For period 1/1/02 to 6/30/02.

x/ Consumer language used on the Home Health Compare Web site for this measure is: Percentage of patients who get better at getting dressed.

y/ Consumer language used on the Home Health Compare Web site for this measure is: Percentage of patients who get better at taking their medicines correctly (by mouth).

z/ Consumer language used on the Home Health Compare Web site for this measure is: Percentage of patients who get better at bathing.

aa/ Consumer language used on the Home Health Compare Web site for this measure is: Percentage of patients who stay the same or don't get worse at bathing.

bb/ Consumer language used on the Home Health Compare Web site for this measure is: Percentage of patients who get better at getting in and out of bed.

cc/ Consumer language used on the Home Health Compare Web site for this measure is: Percentage of patients who get better at walking or moving around.

dd/ Consumer language used on the Home Health Compare Web site for this measure is: Percentage of patients who get better at getting to and from the toilet.

ee/ Consumer language used on the Home Health Compare Web site for this measure is: Percentage of patients who have less pain when moving around.

ff/ Consumer language for this measure is: Percentage of patients who are short of breath less often. The CMS report results of testing this language is available at http://www.cms.hhs.gov/quality/hhqi/OASISPhaseI.pdf.

gg/ Consumer language for this measure is: Percentage of patients who are having less of a problem with urinary incontinence or wetting themselves. The CMS report results of testing this language is available at http://www.cms.hhs.gov/quality/hhqi/OASISPhaseI.pdf.

hh/ Consumer language used on the Home Health Compare Web site for this measure is: Percentage of patients who are confused less often.

ii/ Consumer language used on the CMS Home Health Compare Web site for this measure is: Percentage of patients who had to be admitted to the hospital.

jj/ The national average includes Puerto Rico.

kk/ The national average includes the Virgin Islands.

ll/ The national average includes Guam

Appendix G: Index of Diabetes Quality Improvement Initiatives

Listed below are a number of national and Federal quality improvement programs related to diabetes that State leaders may find useful as templates for State initiatives or for additional resources.

Public/Private Quality Improvement Initiatives

There are a wide range of public and private quality improvement initiatives active at different stages of quality improvement. While there are numerous components of quality improvement, the examples given below illustrate the quality improvement activities aimed at measurement and incentives. While the list is by no means exhaustive of public/private quality improvement initiatives, it provides examples of what organizations are doing specific to diabetes.

Measurement

National Committee for Quality Assurance and HEDIS® Measures

The National Committee for Quality Assurance is a national, nonprofit organization founded in 1991 that is dedicated to improving the quality of health care. NCQA is well known for its accreditation of managed care organizations and performance measurement initiatives. NCQA's Health Plan Employer Data and Information Set (or HEDIS®) is used by more than 90 percent of health plans in the United States to report performance on a wide variety of quality of care indicators, ranging from child immunization rates to waiting time for appointments to member satisfaction measures. HEDIS® also includes measures for diabetes care quality. NCQA reports on health plan performance in its annual publication, the *State of Health Care Quality* (NCQA, 2003). In addition, NCQA's Quality Compass, a national database of HEDIS® and accreditation information from health plans, is a resource for health plans, employers, and governments to assess and compare health care quality. NCQA in collaboration with the American Diabetes Association also has a program called the Diabetes Physician Recognition Program that recognizes physicians based on the quality of diabetes care they provide using its diabetes measures. Consumers can check online for a listing of physicians who are recognized for the quality of the diabetes care they provide. More information about NCQA and its programs is available at http://www.ncqa.org/.

National Diabetes Quality Improvement Alliance

Organized by leading diabetes stakeholder groups in 1998, the Diabetes Quality Improvement Project was a voluntary coalition of public and private organizations that have cooperated to develop a national set of diabetes-specific performance and outcome measures. In 2001, the DQIP partners joined other leading organizations to form the National Diabetes Quality Improvement Alliance. The Alliance agreed to work on developing one national performance measurement set for diabetes accepted by all major stakeholders. In October 2002, the newly formed Alliance developed national, uniform consensus standards from purchaser, provider, and consumer groups. Further information is available on the Alliance Web site at http://www.nationaldiabetesalliance.org/.

Incentives

Bridges to Excellence Project

Pay-for-performance initiatives have gained momentum in recent years as health care analysts have recognized that a disincentive for quality improvement exists in the U.S. health care system because all providers receive the same reimbursement regardless of the quality of their product (Leatherman, Berwick, Iles, et al., 2003). In its report, *Crossing the Quality Chasm*, the IOM recommended that payments for care should be redesigned to encourage providers to make positive changes to their care processes. Ideally, this shift will begin with purchasers and insurers and filter down through the delivery system to help encourage improvements at all levels.

In response to this challenge, a group of employers, physicians, health plans and patients has come together to create Bridges to Excellence focused on realigning incentives around higher quality. The program has created incentives through two programs, Diabetes Care Link and Physicians Office Link. The Diabetes Care Link requires certification or recognition under NCQA's Diabetes Physician Recognition Program and then grants 1- or 3-year recognition through a cash bonus system for participating physicians delivering quality diabetes care. The Diabetes Care Link program also focuses on helping people with diabetes engage in their own care and achieve better outcomes. The program estimates a savings of $350 and a cost of $175 per patient per year (Bridges to Excellence, 2004). More information on the Bridges to Excellence project is available at http://www.bridgestoexcellence.com/bte.

JCAHO Codman Award

The Joint Commission on Accreditation of Healthcare Organizations is the Nation's leading accreditor of hospitals and other health care facilities. JCAHO has established the Ernest A. Codman Award to recognize health care organizations that use process and outcomes measures to improve organization performance and, ultimately, the quality of care provided to the public. The Codman Award was created in 1996 to showcase the effective use of performance measures, and enhance knowledge and encourage the use of performance measurement to improve the quality of health care. Information on this program is available at http://www.jcaho.org/accredited+organizations/codman+award/codman_overview.htm.

Federal Programs and Resources for Diabetes Quality Improvement

In addition to public/private quality improvement efforts, State leaders can also use Federal quality improvement programs and resources for State efforts. There are a variety of programs at the Federal level that address diabetes and quality improvement, some of which are partnering with States, and others that have useful resources for State efforts.

Quality Interagency Coordination Task Force

In addition to preparing the first annual NHQR and subsequent reports, AHRQ is also involved in diabetes care by overseeing the day-to-day operations of the Federal Quality Interagency Coordination Task Force (QuIC). The purpose of the QuIC is to ensure that all Federal agencies involved in purchasing, providing, studying, or regulating health care services are working in a coordinated manner toward the common goal of improving quality care. This group has selected diabetes and depression as the first two areas for which it will mount an effort to improve clinical quality of care. For diabetes, the work group is focusing its efforts on having all Federal programs agree to use the DQIP measures of care and then to

improve health care provider performance based on these indicators. More information on this task force is available at http://www.quic.gov/.

CDC Diabetes Prevention and Control Program

The Centers for Disease Control and Prevention currently funds the Diabetes Prevention and Control Program in every State. This program is discussed extensively in Module 4: Action; for further information, see this section of the *Resource Guide*.

National Public Health Initiative on Diabetes and Women's Health

CDC, the American Diabetes Association, the American Public Health Association (APHA), and the Association of State and Territorial Health Officials (ASTHO)cosponsor the National Public Health Initiative on Diabetes and Women's Health. Part of a comprehensive program to improve women's health, the CDC-lead initiative has three phases. In Phase I, the CDC prepared *Diabetes & Women's Health Across the Life Stages: A Public Health Perspective*. Published in 2001, this report examined why diabetes is a serious public health problem for women and analyzed the various factors that affect diabetes in women. This report also explored the impact of diabetes on women's lives using the various life stages as a framework—adolescence, reproductive years, middle age, and elder years. A copy of this publication is available on CDC's Web site at http://www.cdc.gov/diabetes/projects/women.htm.

In 2001 during Phase II, CDC joined the ADA, APHA, and ASTHO to turn the report into action. The four groups convened a task force in November 2001, with representatives of over 40 organizations from the public, private, and nonprofit sectors. Proposed recommendations that emerged from this meeting were published as the *Interim Report: Proposed Recommendations for Action* and are also available on CDC's Web site at http://www.cdc.gov/diabetes/pubs/interim/index.htm. In Phase III, currently ongoing, multidisciplinary agencies—including government, academic, voluntary, business, community-based, and professional organizations—selected recommendations of highest priority and identified appropriate strategies for implementation. This national agenda represents the result of their deliberations for action. Additional information is available at http://www.cdc.gov/diabetes/pubs/action/index.htm.

Healthy People 2010

Healthy People 2010 is a national prevention program lead by the U.S. Department of Health and Human Services in partnership with other Federal agencies, States, businesses, communities, and consumers. HP2010 outlines a broad range of objectives in health care with the goal of increasing the quality and length of life and eliminating health disparities in the United States. Diabetes is one of the focus areas of HP2010.

State leaders can use HP2010 objectives to assess health care quality. Some NHQR measures that relate to the HP2010 objectives still show room for improvement. Further information on HP2010 goals related to diabetes is available at http://www.healthypeople.gov/document/HTML/Volume1/05Diabetes.htm.

HRSA's Health Disparities Collaboratives

HRSA's Bureau of Primary Heath Care and the CDC's Diabetes Prevention and Control Program sponsor Health Disparities Collaboratives, a unique partnership with community health centers across the country aimed at improving chronic illness care for underserved and minority communities. This program is discussed in Module 4: Action; for further information, see this section of the *Resource Guide*.

National Diabetes Program of the Indian Health Service

The National Diabetes Program of the Indian Health Service (IHS) is a public health effort to improve the prevention and treatment of diabetes among American Indian and Alaska Native populations. This segment of the U.S. population suffers disproportionately from high rates of type 2 diabetes. The IHS uses the following to track and improve diabetes care quality among American Indian and Alaska Native populations:

- Quality measures from the Indian Health Diabetes Care and Outcomes Audit, which are similar to national (DQIP measures.
- Case management to coordinate care and provide followup.
- Information management to identify patients and assure timely and appropriate care.
- Practice teams to deliver multidisciplinary care and education.
- Systems of care that are clearly defined and close gaps in care.
- Patient education to assist patients with managing their diabetes.
- Provider training to assure continuing education and competency.
- Protocol-based practice to ensure that evidence-based guidelines are followed.
- Provision of specialty exams and services to ensure access to necessary specialist services.
- Staging of populations to manage differing needs of various ages and stages of disease progression.

More information is available at http://www.ihs.gov/MedicalPrograms/Diabetes/index.asp.

National Diabetes Education Program

The National Diabetes Education Program is a national collaboration sponsored jointly by the NIH and the CDC. This program is discussed in Module 4: Action; for further information, see this section of the *Resource Guide*.

CMS' Quality Improvement Organizations

Quality Improvement Organizations are designated as the guardians of quality, cost-effective care for both Medicare and Medicaid. This program is discussed in Module 4: Action; for further information, see this section of the *Resource Guide*.

Appendix H: CDC Funding for States' Diabetes Programs, 2003-2004

Table H.1 CDC Diabetes Prevention and Control Program Funding, by State, 2003-2004

State	Year Began	CDC Funding a/	State General Fund	State In-Kind	Total State	Total Funds
Alabama	1986	300,000	65,000		65,000	$365,000
Alaska	1986	*450,000*		112,500	112,500	$562,500
Arizona	1994	243,927		48,785	48,785	$292,712
Arkansas	1996	306,133	55,000		55,000	$361,133
California	1981	*990,320*		918,887	918,887	$1,909,207
Colorado	1977	*500,000*		100,000	100,000	$600,000
Connecticut	1994	261,921		52,384	52,384	$314,305
Delaware	1997	*410,000*		549,435	549,435	$959,435
District of Columbia	1996	250,000	40,000	10,000	50,000	$300,000
Florida	1997	*647,183*	86,143	85,653	171,796	$818,979
Georgia	1977	350,000		70,000	70,000	$420,000
Hawaii	1987	355,414		72,830	72,830	$428,244
Idaho	1994	350,000		80,000	80,000	$430,000
Illinois	1983	*837,825*		209,456	209,456	$1,047,281
Indiana	1994	317,581		63,516	63,516	$381,097
Iowa	1996	243,170		87,632	87,632	$330,802
Kansas	1994	328,917		65,783	65,783	$394,700
Kentucky	1981	*639,820*	1,300,000		1,300,000	$1,939,820
Louisiana	1996	107,000	43,144		43,144	$150,144
Maine	1977	360,000		72,000	72,000	$432,000
Maryland	1985	291,386		58,277	58,277	$349,663
Massachusetts	1985	*859,266*		224,000	224,000	$1,083,266
Michigan	1982	*864,960*	1,778,927		1,778,927	$2,643,887
Minnesota	1980	*900,000*	315,700		315,700	$1,215,700
Mississippi	1995	300,000		80,000	80,000	$380,000
Missouri	1981	*450,000*		225,000	225,000	$675,000
Montana	1996	*616,997*		123,399	123,399	$740,396
Nebraska	1977	297,181		59,436	59,436	$356,617
Nevada	1996	350,000		70,000	70,000	$420,000
New Hampshire	1994	325,000		65,000	65,000	$390,000
New Jersey	1993	311,548	62,310		62,310	$373,858
New Mexico	1994	*450,000*	1,429,900		1,429,900	$1,879,900
New York	1977	*900,000*	581,900		581,900	$1,481,900
North Carolina	1986	*876,127*	218,180	1,000	219,180	$1,095,307
North Dakota	1987	269,500		53,900	53,900	$323,400
Ohio	1979	*696,521*		174,130	174,130	$870,651
Oklahoma	1993	248,580		49,716	49,716	$298,296
Oregon	1994	*809,770*		202,443	202,443	$1,012,213
Pennsylvania	1981	*557,967*		139,492	139,492	$697,459
Rhode Island	1978	*787,398*		196,850	196,850	$984,248
South Carolina	1994	*650,000*	127,973		127,973	$777,973
South Dakota	1986	300,000		60,000	60,000	$360,000
Tennessee	1994	300,000		62,823	62,823	$362,823
Texas	1983	*891,384*	6,088,418		6,088,418	$6,979,802
Utah	1980	*881,520*		220,380	220,380	$1,101,900
Vermont	1996	529,220		51,844	51,844	$581,064
Virginia	1994	350,000		70,000	70,000	$420,000
Washington	1979	*898,905*	75,000	149,726	224,726	$1,123,631
West Virginia	1990	*859,872*		253,220	253,220	$1,113,092
Wisconsin	1994	765,727	87,526	87,903	175,429	$941,156
Wyoming	1994	275,000		55,000	55,000	$330,000

a/ The list includes both Capacity Building and Basic Implementation grants. The Basic Implementation grants are in italics.

Source: Centers for Disease Control and Prevention