

The Role of Data at the Carolinas Center for Medical Excellence

Mark W. Massing, MD, PhD, MPH; Anna P. Schenck, PhD, MSPH

Few organizations rely more heavily on data than The Carolinas Center for Medical Excellence (CCME). CCME is not a health care provider but rather a developer of data-driven services that enable providers to deliver the best possible care to their patients. CCME's existence depends on its ability to make complex data meaningful and relevant to the health care concerns of its customers. The CCME offices in Cary, North Carolina, and Columbia, South Carolina, house a diverse staff of more than 100 skilled health care and information technology professionals. Many of the physicians, nurses, health services researchers, epidemiologists, statistical analysts, quality improvement specialists, medical record abstractors, coding specialists, and information technology specialists employed at CCME were trained at and are affiliated with the major academic and medical centers of the Carolinas.

CCME uses data to influence health policy and health care delivery in hospitals, skilled nursing facilities, outpatient practices, home health agencies, and other medical settings. Data that are meaningfully summarized and reported can influence policy through their effects on clinical decision makers responsible for health care quality and costs. The internal organization of CCME is oriented around 4 major market areas: federal programs and services; state programs and services; physician and community services; and research. Below we describe the data assembled at CCME and how they have been used in these market areas to influence clinical decision makers and to improve care.

Federal Programs and Services

The primary activity of CCME's Federal Programs and Services Division is the Quality Improvement Organization (QIO) contract with the Centers for Medicare & Medicaid Services (CMS). As the QIO for both North and South

Carolina, CCME is responsible for assuring quality of care for nearly 2 million Medicare enrollees. The QIO program is the product of the federal government's evolving need to contain costs and provide appropriate care in the Medicare program. It developed from antecedent programs formed shortly after the creation of Medicare in 1965. These earlier programs focused on hospital-based utilization control and physician peer review. Data from administrative claims and medical records were used to identify physicians providing substandard or unnecessary care. The focus was on outliers with little emphasis on improvements in the general population of providers. In response to

“CCME’s existence depends on its ability to make complex data meaningful and relevant to the health care concerns of its customers.”

recommendations of the Institute of Medicine of the National Academies in 1990,¹ the emphasis of Medicare quality assurance changed from case-specific punitive and regulatory action toward a population-based approach focusing on clinical decision making, outcomes, and professional capacity building to improve care. Now the QIO works collaboratively with health care providers in virtually all settings to collect and use data describing health outcomes and overall patterns and processes of care. QIOs analyze and review complex data from many sources to create meaningful information that guides clinical decision makers.

The collection of data and the dissemination of information

Mark W. Massing, MD, PhD, MPH, is director of outpatient and community services at The Carolinas Center for Medical Excellence. He can be reached at mmassing@thecarolinascenter.org or 100 Regency Forest Drive, Suite 200, Cary, NC 27518.

Anna P. Schenck, PhD, MSPH, is director of research at The Carolinas Center for Medical Excellence.

derived from data to health care consumers and clinical decision makers is a major activity of CMS and QIOs. In 2000 Jencks and colleagues² described national- and state-level rates on a series of clinical performance indicators for care provided to Medicare enrollees in the hospital and outlined the intended expansion of a system to monitor care provided in nursing homes and home health agencies. In the two Carolinas, CCME has worked with 173 hospitals, 479 nursing homes,³ and 235 home health agencies⁴ to improve quality as measured though data collected and made publicly available on government websites. The data are publicly reported in an effort to produce incentives for increased quality and reduced costs by creating market pressure from informed consumers and increased competition among providers.

The publicly reported quality measures for Medicare patients in hospitals include 24 care processes and 2 outcome measures. (See Table 1.) Data sources for the hospital measures include clinical and administrative records. Nineteen quality measures are used to monitor nursing home care and 12 indicators are used to monitor home health care. (See Table 1.) Both the nursing home and home health quality measures are created from standardized patient level assessments.

The DOQ-IT (Doctor's Office Quality-Information Technology) program supports the adoption and effective use of information technology in the outpatient setting.⁵ Participating outpatient medical practices may voluntarily report patient-level health care data captured from electronic health records to a clinical data warehouse administered by CMS. The DOQ-IT program has assisted 104 medical practices in

North Carolina and 61 practices in South Carolina with selection, implementation, and use of electronic health systems. CMS is currently redirecting QIO physician support activities from implementation of electronic systems to effective use and central reporting of electronic data.

As a Quality Improvement Organization, CCME uses a data-driven approach to assist with Medicare-related activities, making use of enrollment databases, Medicare service claims, selected clinical information from medical record abstractions, and setting-specific quality measure data. With the capacity to link data for patients across settings and across files, CCME can create population-based maps showing variation in care by geographic location and can assess quality of care by demographic characteristics. Data can be aggregated to the county, facility, or single provider to assess quality of care. CCME uses Medicare data to identify the need for policy or clinical interventions at the local or state level.

This approach is illustrated by the trend reports CCME sends to nursing homes in the Carolinas every quarter. (See Figure 1.) The example shows almost 3 years of trended data and provides the facility the ability to compare its progress in improving care (in this case, reducing the number of residents in restraints) with that of the state, the nation, and the target level the facility has set as a goal. CCME creates thousands of facility level data reports every year to share with North and South Carolina health care providers.

Clinical data will grow in importance and volume as medical practices implement electronic systems. These systems will provide the raw data needed to support public reporting and

Table 1.
Measures Assessing Quality of Care for Medicare Enrollees

Patient Population	Beneficiaries	Source(s) of Data
Hospitalized Heart Attack Patients	■ Percentage of patients with aspirin within 24 hours of arrival ■ Percentage of patients with aspirin prescribed on discharge ■ Percentage of patients with beta blockers prescribed on discharge ■ Percentage of eligible patients with ACE inhibitor prescribed at discharge ■ Percentage of smokers offered cessation counseling at discharge ■ Percentage of patients with fibrinolytic medication within 30 minutes of arrival ■ Percentage of patients with percutaneous coronary intervention (PCI) within 90 minutes of arrival ■ 30-day risk adjusted mortality rates among enrollees hospitalized for heart attack	Hospitals submit specific data elements to clinical data warehouse about care provided to heart attack patients using the patient record as the data source Medicare claims and enrollment informations
Hospitalized Heart Failure Patients	■ Percentage of patients with evaluation of left ventricular systolic function ■ Percentage of patients with left ventricular systolic dysfunction who are prescribed ACE inhibitor or ARB ■ Percentage of patients provided with discharge instructions ■ Percentage of smokers offered cessation counseling at discharge ■ 30-day risk adjusted mortality rates among enrollees hospitalized for heart failure	Hospitals submit specific data elements to clinical data warehouse about care provided to heart failure patients using the patient record as the data source Medicare claims and enrollment information

Patient Population	Beneficiaries	Source(s) of Data
Hospitalized Pneumonia Patients	■ Oxygenation assessment ■ Initial antibiotic timing ■ Pneumococcal vaccination ■ Influenza vaccination ■ Blood culture performed in the emergency department prior to initial antibiotic received in hospital ■ Appropriate initial antibiotic selection ■ Smoking cessation advice/counseling	Hospitals submit specific data elements to clinical data warehouse about care provided to patients with pneumonia using the patient record as the data source
Hospitalized patients receiving selected surgical procedures	■ Percentage of patients who receive prophylactic antibiotic within 1 hour prior to surgical incision ■ Percentage of patients who have prophylactic antibiotics discontinued within 24 hours after surgery ends ■ Percentage of patients who receive a prophylactic antibiotic that is recommended ■ Percentage of patients who have an order for recommended venous thromboembolism prophylaxis ■ Percentage of patients who receive appropriate treatment to prevent blood clots within 24 hours prior to or 24 hours after surgery	Hospitals submit specific data elements to clinical data warehouse about care provided to patients undergoing selected surgical procedures using the patient record as the data source
Nursing home residents in home for extended stay	■ Percentage of residents given influenza vaccination during the flu season ■ Percentage of residents who were assessed and given pneumococcal vaccination ■ Percentage of residents whose need for help with daily activities has increased ■ Percentage of residents who have moderate to severe pain in past week ■ Percentage of high-risk residents who have pressure sores in the past week ■ Percentage of low-risk residents who have pressure sores in the past week ■ Percentage of residents who were physically restrained in the past week ■ Percentage of residents who are more depressed or anxious in the past month ■ Percentage of low-risk residents who lost control of their bowels or bladder in the past 2 weeks ■ Percentage of residents who had a catheter inserted and left in their bladder in the past 2 weeks ■ Percentage of residents who spent most of their time in bed or in a chair in the past week ■ Percentage of residents whose ability to move about in and around their room got worse in the past week ■ Percentage of residents with a urinary tract infection in the past month ■ Percentage of residents who lost too much weight in the past month	Minimum Data Set (MDS) Repository The MDS is a patient level assessment conducted by nursing homes on residents at regular, specified intervals.
Nursing home residents in home for short period of time	■ Percentage of residents given influenza vaccination during the flu season ■ Percentage of residents who were assessed and given pneumococcal vaccination ■ Percentage of residents with delirium in the past week ■ Percentage of residents who had moderate to severe pain in the past week ■ Percentage of residents with pressure sores in the past week	Minimum Data Set (MDS) Repository The MDS is a patient level assessment conducted by nursing homes on residents at regular, specified intervals.

Patient Population	Beneficiaries	Source(s) of Data
Medicare enrollees receiving home health care	■ Percentage of patients who get better at walking or moving around ■ Percentage of patients who get better at getting in and out of bed ■ Percentage of patients who have less pain when moving around ■ Percentage of patients whose bladder control improves ■ Percentage of patients who get better at bathing ■ Percentage of patients who get better at taking their medicines correctly (by mouth) ■ Percentage of patients who are short of breath less often ■ Percentage of patients who stay at home after an episode of home health care ends ■ Percentage of patients whose wounds improved or healed after an operation ■ Percentage of patients who had to be admitted to the hospital ■ Percentage of patients who need urgent, unplanned medical care ■ Percentage of patients who need unplanned medical care related to a wound that is new, is worse, or has become infected	Outcome and Assessment Information Set (OASIS) The data come from comprehensive patient assessments conducted by home health agencies at regular, specified intervals

pay-for-performance initiatives. Considering that as many as 75% of physician practices do not use electronic medical records,⁶ it is clear that most clinical data currently reside on paper where they are difficult to access and use. A major policy challenge involves the removal of barriers and the creation of incentives for physicians to adopt electronic systems, to undertake the expensive migration of data to these systems, and to fully integrate electronic systems into practice and care management.

State Programs and Services

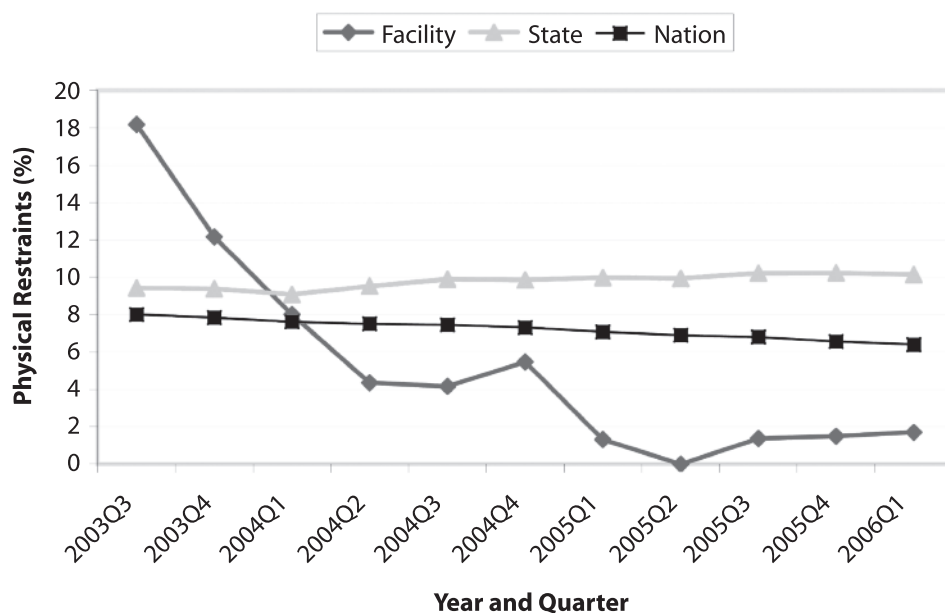
Programs conducted by states are another important source of health data used by policy makers to reduce costs and improve health outcomes. The Medicaid program administered in North Carolina by the Division of Medical Assistance (DMA) of the state Department of Health and Human Services rivals the federal Medicare program in terms of population and costs. About 1 out of every 5 North Carolina residents were served by the Medicaid Program in 2006 (1.7 million persons in total) at costs exceeding \$11 billion.⁷

Data available through state programs include sociodemographic information for eligibility and enrollment, administrative claims for reimbursement of services,

and limited, but growing, clinical information used for quality improvement and disease management. State health data are typically collected and maintained by a variety of agencies and contractors. Identifying, linking, and fully utilizing these fragmented data sources constitute a major challenge. But the rewards are great because these data are a rich and often underutilized source of information.

CCME has extensive experience in the use of state health data through its contracts and collaborations with a number of state agencies. A good example of how CCME has worked with DMA to expand the use of state health data relates to the

Figure 1.
Example of Trend Report for Residents in Restraints Sent to a North Carolina Nursing Home



Community Alternatives Program for Disabled Adults (CAP/DA).⁸ This program reimburses eligible disabled adults for home-based care as an alternative to more expensive nursing facility care. CCME collaborated with CAP/DA consultants to create its Automated Quality and Utilization Improvement Program (AQUIP) that allows the state to assess the health status of its home-based clients in a manner similar to the way they would be assessed at nursing facilities. AQUIP captures client information and assessment data from the state and from county case managers and uses their data to assess the need for services and to examine variations in quality and costs. It also allows for the comparison of this population with institutionalized patients. AQUIP offers an example of how existing state health data can be used for multiple purposes.

About 1 in 5 North Carolina Medicare beneficiaries is enrolled in Medicaid. These dually eligible persons qualify for Medicaid due to disability or extreme medical or financial need. As a group, they are more likely to have complex health conditions that are difficult and expensive to treat.⁹ Improving health outcomes and reducing costs is challenging in this population. Contributing to the challenge is the fragmentation of their health data between the federal Medicare system and the state Medicaid administrative agencies.

Evaluating the cost and quality of pharmacologic therapy in the treatment of chronic diseases such as diabetes and heart failure is especially problematic in the dually eligible population. Prior to the implementation of the Medicare Part D pharmacy benefit in 2006, state Medicaid agencies administered pharmacy benefits for dually eligible clients. Thereafter, the pharmacy benefit for the dually eligible was federalized and rolled into the Medicare Part D program.^{10,11} Due to limitations imposed by the Medicare Modernization Act, Part D administrative claims data have been generally unavailable to Medicare contractors, state agencies, and health services researchers. Efforts to contain costs, reduce errors, and improve outcomes associated with pharmacotherapy have been limited by restricted access to these data.

Despite these data challenges, CCME has collaborated with DMA in projects that combine Medicare and Medicaid data to better understand and improve health care outcomes in their client populations. Medicaid data were used to evaluate the effectiveness of a CCME quality improvement project to reduce the use of antibiotics for nonbacterial respiratory tract infections.^{12,13} CCME data abstractors collected clinical care information from outpatient medical records in a statewide heart failure quality improvement project involving Medicaid and private managed care.¹⁴ In this project, clinical data from the medical records were linked to administrative claims data. In an ongoing project, CCME has linked Medicare and Medicaid administrative claims data for the dually-eligible population with heart failure in North Carolina and South Carolina to better understand and improve heart failure care in this high-risk population.

Billings and Mijanovich in a recent Medicaid study¹⁵ demonstrated that given sufficient data it is possible to identify populations at high risk for future adverse health outcomes.

The same data can be used to focus prevention efforts on persons most likely to benefit and to enable administrators to predict costs and make the business case for prevention. Medicare and Medicaid offer 2 of the few comprehensive data sources to capture the complete health experiences of large populations as they transition through the medical system. Combining and linking these data offers even greater opportunities to understand and improve health care effectiveness while containing costs.

Physician and Community Services

CCME provides a number of data-intensive services to support physicians and other health care providers in clinical decision making and quality improvement. Each addresses a fundamental need to get the right data, understand what the data mean, and act appropriately on the data.

Community Health Care Coordination

The impact of fragmentation of the health care system and its data on patient care, costs, and quality is substantial. Patients with complex medical conditions frequently obtain care from multiple settings and from different providers within settings. The task of identifying and linking patient data in different formats across diverse settings and providers can be daunting. Legislation designed to protect patient privacy creates further barriers to data sharing. This makes cross-setting data use difficult if not impossible. The failure of data to travel with patients as they transition through health care settings contributes to inefficient and uncoordinated health care. This can lead to increased costs, lower quality, and poorer health. CCME recognizes that effective health care requires a community approach to care coordination. To that end, it is developing community-based projects to promote cross-setting care coordination through information exchange and patient-centered care.

Care Management Support

Although the widespread adoption and implementation of electronic systems is an issue of central concern, there is a growing realization that the next major challenge will be the use of electronic health data to support effective care management and public health. CCME has found that the full capabilities of electronic health information systems and the data they generate are greatly underutilized. The availability of electronic data is the prerequisite to transformational system change, but it does not guarantee it. The lack of expertise and resources to understand and act on electronic data are a major barrier to achieving the substantial improvements in health outcomes and efficiencies that they promise. CCME is addressing this need through support services that enable providers to translate data into actions that measurably improve patient outcomes, enhance satisfaction, and demonstrate savings and revenues consistent with a business case for quality.

Physician Leadership and Education

The volume of data is growing much faster than the ability of physicians to understand and act on it. Recent advances in information technology provide data at levels not conceived of when most physicians were receiving medical training. Health care providers now have additional requirements to understand and use these data in routine patient care. There is a great need to enhance the skills of health care providers in the use and interpretation of data. There is also a need to develop data-driven physician leaders who are comfortable with a rapidly evolving data environment that guides clinical decision making and informs health policy. A major objective of CCME's Physician Leadership Institute is to enhance skills in the use of data to inform and support physician leadership.¹⁶

Research

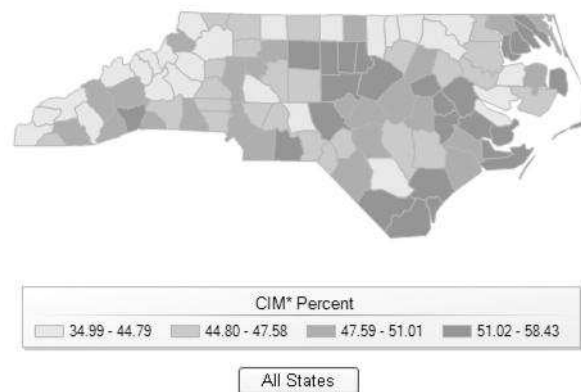
The Research Division of CCME has 3 areas of focus: developing improved ways to measure quality and effectiveness of care, monitoring quality of care, and evaluating approaches to improve quality of care. The development of improved measures is crucial to the improvement in quality. Quality measures not only need to be scientifically sound (eg, valid and reliable), they must also be feasible and responsive to changes in care. CCME research focuses on the development of measures that meet these criteria. It has become an accepted tenet of quality improvement professionals that "if you don't measure something, you can't improve it!" Thus, monitoring care is a vital function of any quality organization. CCME routinely monitors the quality of care for Medicare enrollees as part of the QIO contract. It extends the power of quality monitoring to state and local organizations by hosting a Web-based surveillance report on Medicare which includes enrollment information, utilization statistics, and quality of care measures.¹⁷ Monitoring care undoubtedly leads to identification of opportunities to improve care. CCME research in this area focuses on assessing the effects of policy or system changes and evaluating interventions to change provider or consumer behaviors.

The Palliative Care Quality Measurement Project provides an example of measurement development research conducted by CCME. Under contract from CMS, CCME was asked to identify and develop new quality measures for hospice and palliative care. CCME researched existing quality measures and identified a subset of measures for further consideration. We gathered data on 140 potential measures from other organizations and directly from care providers for measures that had not previously been tested. The project resulted in a set of 34 quality measures that technical experts agreed were appropriate for hospices to use in internal quality improvement. The results of this project were shared with CMS and made available to providers on the MedQIC website.¹⁸

Our Web-based report on colorectal cancer screening in the Medicare population illustrates the type of research CCME conducts to monitor care.¹⁹ Figure 2 displays geographic

Figure 2.
Current with Colorectal Cancer Testing in
Medicare in 2005 (Rates per 100 Medicare
Enrollees)

Test Rates for Current Medicare (CIM)



variation in the proportion of Medicare enrollees in North Carolina who have had the recommended colorectal cancer testing. Lighter areas of the map represent the areas of the state with lower levels of adequate colorectal cancer testing—areas where interventions to increase screening are needed. Since 2000 CCME has, under contract with CMS, monitored test use rates for the national Medicare population. The data in the Web-based report have been instrumental in the inclusion of colorectal cancer screening in the next QIO contract, which will require QIOs in all states to work towards improving colorectal cancer testing.

Conclusion

It is only when data are turned into information that the full power of data-driven solutions can be leveraged. At CCME we are working to develop the information that will help improve health policy at the federal and state levels; inform consumers so they can take a more active role in both selecting their own care and improving the care in their communities; assist providers in improving their care delivery systems; and educate physicians and providers on the patterns, problems, and opportunities to improve the health and health care of the population as a whole. We invite readers to join us in these efforts. **NCMJ**

Acknowledgements:

These analyses were performed at the Carolinas Center for Medical Excellence, the Medicare Quality Improvement Organization for the state of North Carolina, under contract number HHSM-500-2006-NC03C, sponsored by the Centers for Medicare and Medicaid Services, Department of Health and Human Services. The content presented here does not necessarily reflect the views or policies of the Department of Health and Human Services or the Centers for Medicare and Medicaid Services.

REFERENCES

- 1 Lohr KN. Medicare: a strategy for quality assurance. *J Qual Assur.* 1991;13(1):10-13.
- 2 Jencks SF, Cuerdon T, Burwen DR, et al. Quality of medical care delivered to Medicare beneficiaries: a profile at state and national levels. *JAMA.* 2000;284(13):1670-1676.
- 3 Nursing home compare. Centers for Medicare & Medicaid Services Web site. <http://www.medicare.gov/NHCompare/Include/DataSection/Questions/SearchCriteria.asp?version=default&browser=IE%7C6%7CWinXP&language=English&defaultstatus=0&pagelist=Home&CookiesEnabledStatus=True>. Updated January 16, 2008. Accessed January 18, 2008.
- 4 Home health compare. Centers for Medicare & Medicaid Services Web site. <http://www.medicare.gov/HHCompare/Home.asp?version=default&browser=IE%7C6%7CWinXP&language=English&defaultstatus=0&pagelist=Home&CookiesEnabledStatus=True>. Updated April 10, 2007. Accessed January 19, 2008.
- 5 CCME DOQ-IT program overview. The Carolinas Center for Medical Excellence Web site. <http://www.mrnc.org/doqit/default.aspx?ID=overview>. Accessed January 25, 2008.
- 6 Jha AK, Ferris TG, Donelan K, et al. How common are electronic health records in the United States? A summary of the evidence. *Health Aff.* 2006;25(6):w496-w507.
- 7 Division of Medical Assistance. North Carolina Department of Health and Human Services Web site. <http://www.dhhs.state.nc.us/dma/>. Updated April 18, 2008. Accessed January 24, 2008.
- 8 Community Alternatives Program. NC Division of Medical Assistance Web site. <http://www.dhhs.state.nc.us/dma/commaltprog.htm>. Updated January 11, 2007. Accessed January 24, 2008.
- 9 Lied TR, Haffer SC. Health status of dually eligible beneficiaries in managed care plans. *Health Care Financ Rev.* 2004;25(4):59-74.
- 10 Hall JP, Kurth NK, Moore JM. Transition to Medicare Part D: an early snapshot of barriers experienced by younger dual eligibles with disabilities. *Am J Manag Care.* 2007;13(1):14-18.
- 11 Deshpande M. The implications of the Medicare Modernization Act for dual eligibles. *Am J Geriatr Cardiol.* 2005;14(6):298-300.
- 12 Brown DW, Taylor R, Rogers A, Weiser R, Kelley M. Antibiotic prescriptions associated with outpatient visits for acute upper respiratory tract infections among adult Medicaid recipients in North Carolina. *N C Med J.* 2003;64(4):148-156.
- 13 Kelley M, Massing MW, Young J, et al. Feasibility of a primary care intervention to decrease oral antibiotics for acute upper respiratory tract infections: a pilot study. *N C Med J.* 2006;67(4):249-254.
- 14 Goff DC, Jr., Massing MW, Bertoni AG, et al. Enhancing quality of heart failure care in managed Medicare and Medicaid in North Carolina: results of the North Carolina Achieving Cardiac Excellence (NC ACE) Project. *Am Heart J.* 2005;150(4):717-724.
- 15 Billings J, Mijanovich T. Improving the management of care for high-cost Medicaid patients. *Health Aff.* 2007;26(6):1643-1654.
- 16 Physician Leadership Institute. The Carolinas Center for Medical Excellence Web site. <http://www.physicianleaders.org/>. Accessed January 24, 2008.
- 17 CMED: Carolina Medicare Epidemiological Data. The Carolinas Center for Medical Excellence Web site. www.mrnc.org/cmed. Accessed January 24, 2008.
- 18 Medicare Quality Improvement Community. Centers for Medicare & Medicaid Services Web site. www.medicare.gov. Accessed January 24, 2008.
- 19 Colorectal cancer testing in the Medicare population for 1998-2005. The Carolinas Center for Medical Excellence Web site. www.thecarolinascenter.org/crcreport. Updated November 11, 2007. Accessed January 24, 2008.