

## Data and Health Policy: Do We Do Our Best?

Sandra B. Greene, DrPH

Health care policy has emerged among the general public as a priority issue for the November 2008 presidential election. Second only to the war in Iraq, health care and the economy are the domestic issues foremost on the minds of Republicans, Democrats, and Independents polled by the Kaiser Family Foundation.<sup>1</sup> Specific issues of greatest concern are the intertwined problems of cost and the availability of health insurance to provide financial access to care. While some candidates propose sweeping change to address the nation's health care ills,<sup>2</sup> historically the health care system has evolved incrementally through moderate policy reform.

Health care policy positions are formulated at the national, state, and local levels. In the state of North Carolina there are many stakeholders responsible for decision making, ranging from departments and divisions of state and local governments to public and private institutions. Collectively, health care policies impact who is eligible to receive health care, what types of care are available and provided, where facilities and services are located, and who pays the bill. In sum, health policy provides the direction, specifications, and building blocks that define our health care system.

### Sources of Data for Health Policy

Data useful for health policy decision making in North Carolina originate from numerous sources. This issue of the *North Carolina Medical Journal* describes what these data are and where they come from and explains how they are or can be used. While some data are collected in a one-time study or survey, the most commonly used sources are collected on an ongoing basis, either mandated by state or federal law or by voluntary submission. The range of data sources includes population-based surveys, patient registries focused on specific diseases or conditions, vital records of births

and deaths, workforce databases, electronic medical records, and insurance billing records.

The Behavioral Risk Factor Surveillance System (BRFSS), an example of a population-based survey, was originally developed by the Centers for Disease Control and Prevention to measure health behaviors and use of health care services.<sup>3</sup> It is now in use in all states and the District of Columbia and in this state is conducted by the North Carolina State Center for Health Statistics (SCHS). Paul Buescher discusses this survey and other data collection projects in an accompanying commentary. A sample of North Carolina households is randomly contacted by telephone, and adults in the household are interviewed. Questions cover topics including perceived health status, self-reported health care conditions, availability of health insurance, and respondent's use of health care services including screening.

*“Assuring that health policy decisions made for the citizens of our state are the best they can be calls for nothing less than data-driven decisions.”*

Results are reported on a statewide basis and for individual counties with large populations. Core questions are repeated each year, allowing analysis of trends. Additionally, selected questions are added annually as new policy interests emerge. While the BRFSS focuses on North Carolina adults, a companion survey was recently implemented to gather health characteristics of children. Data collection for the Child Health Assessment and Monitoring Program (CHAMP) began in January 2005.<sup>4</sup>

---

**Sandra B. Greene, DrPH**, is a senior research fellow and research associate professor of Health Policy and Administration at the Cecil G. Sheps Center for Health Services Research at the University of North Carolina at Chapel Hill. She can be reached at sandrab\_greene (at) unc.edu or 725 Martin Luther King Jr Blvd, Campus Box #7590, Chapel Hill, NC 27599.

The North Carolina State Center for Health Statistics also administers patient registries which focus on specific at-risk populations. The Birth Defects Monitoring Program (BDMP) collects and analyzes information on infants born with serious congenital anomalies.<sup>5</sup> These data are aggregated from multiple sources including hospital medical records, hospital billing data, and vital records. A second registry, described in a commentary by Karen Knight, Paul Buescher, and Walter Shepherd, tracks cancer cases in the state, reporting that is required by law. These data are gleaned from hospital records, death certificates, and in cases where the patient is not hospitalized, by physician report.<sup>6</sup> Another source of health care data collected by the National Center for Health Statistics (NCHS) is vital records. Also mandated by law, these databases include registrations of all births and deaths occurring in the state.<sup>7</sup>

The North Carolina Trauma Registry (NCTR) has collected data since 1987 from state EMS agencies, acute care hospitals, and other providers in an effort to provide quality care for injured patients throughout North Carolina. Michael Thomason writes about NCTR and its coordinated data system in his commentary.

Data on the state's healthcare workforce can be found in the North Carolina Health Professions Data System (HPDS), housed at the Cecil G. Sheps Center for Health Services Research.<sup>8</sup> This system is a collaborative effort with the Area Health Education Centers Program and the independent licensing boards of each participating health profession. Included in the database are over 2 decades of demographic and employment history on physicians, nurses, dentists, chiropractors, and other types of health care professionals. Jennifer King and Mark Holmes speak to the importance of these databases and their uses.

Insurance billing records, also referred to as administrative records, provide a rich source of data for use in health policy decisions. These data originate from 2 primary billing forms: the Uniform Billing-92 (UB-04 after June 1, 2007) used for billing institutional charges and the Health Care Financing Administration (HCFA) 1500 used for billing professional charges.<sup>9,10</sup> Information from these records contain patient-level detail on health care services provided to a covered population including physician and clinic visits, emergency room care, hospitalizations, outpatient prescription drugs, and the charges and payments for those services. These databases also contain information on patients' diagnoses, tests, and procedures. Grouping an individual's claims into episodes illuminates patterns of care that when aggregated across population groups provides a picture of how illnesses are treated and how health care services are utilized.

Insurance billing records are maintained by insurance companies or, in the case of publicly funded programs such as Medicaid and Health Choice, a system administrator. The largest database of this type in North Carolina is maintained by Blue Cross and Blue Shield of North Carolina. The Division of Medical Assistance maintains the second largest insurance billing database which contains claims on all Medicaid eligible recipients. Databases such as these housed by private and

public insurers are proprietary, and data from them are generally only available for analysis and use in health policy considerations on an ad hoc basis.

The most detailed information documenting patient care is contained in medical records. These are patient-specific files kept in every health care facility. They contain information on all care provided to the patient including patient symptoms and presenting complaints, information that is not contained on billing records. Medical records also contain results from laboratory tests, screening, and outcomes of treatments and procedures. While medical records have traditionally been handwritten, limiting their usefulness for analysis across population groups, the electronic medical record affords significant opportunities for data aggregation and population-based study. Xiaoming Zeng addresses this potential in his commentary.

The articles in this issue of the *Journal* focus on some specific data sets and their policy context. One data set in particular, the hospital discharge and ambulatory surgery data set, has a history that illustrates how policy can be shaped both by the information extracted from the data and by the data themselves, and how the data used can be shaped by the policy process.

## History of the Medical Database Commission

As medical costs rose rapidly in the early 1980s, many legislators, employers, and health policy analysts recognized a need for public information on cost and utilization of health care services. Insurance billing records were viewed as a valuable potential data source. In 1985 the General Assembly created the North Carolina Medical Database Commission with the charge "to establish an information base to be used to improve the appropriate and efficient usage of medical care services, while at the same time maintaining an acceptable quality of health care services in this State. This is to be accomplished by compiling a uniform set of data and disseminating aggregate data, including but not limited to price and utilization data."<sup>11</sup> The Commission began its work in 1986, and 3 years later the first data reports, based on electronic copies of UB-92 records, were released. The reports contained summary information on all discharges from North Carolina acute care hospitals. For the first time, North Carolina had information on hospital discharge diagnoses, procedures, and associated facility charges for the entire population.

Through the early 1990s the North Carolina Medical Database Commission continued to expand its efforts to make health care data available to the public. In addition to enhanced hospital discharge data reports with comparisons of charges among providers and analyses of where patients travel to receive care, it also expanded into ambulatory surgery reporting. All licensed free standing ambulatory surgery centers submitted copies of UB-92 billing forms to the Commission's data processor. Annual reports were developed and released. By 1995 both hospital and ambulatory surgery utilization and charge information were available and widely disseminated.

Not all stakeholders were comfortable with the public availability of the Commission's data. In the 1995 session of the

General Assembly, the North Carolina Medical Database Commission was abruptly eliminated. In its place, the Medical Care Data Act was passed establishing the authority of a state data processor, with oversight of the Division of Facility Services [now the Division of Health Service Regulation (DHSR)], to assume responsibility for the collection and reporting of data.<sup>12</sup> The state data processor chosen for this role was Solucient (now Thomson Solucient). Under the direction of DHSR, a copy of the state databases is housed at SCHS for use by the state medical director, and a second copy is maintained at the Cecil G. Sheps Center for Health Services Research for use in state health planning. During the transition from the Medical Database Commission to the state data processor, 1995 data were not collected. Data collection resumed in 1996 and continues today with ongoing reporting by hospitals and freestanding ambulatory surgery centers. However, the public reporting function that existed under the Medical Database Commission no longer exists.

In 2004 statewide collection of health care data expanded with the collection of data from hospital emergency departments. Mandated by law, all emergency departments are required to report an electronic record of each visit.<sup>13</sup> Reporting is to occur daily. The purpose of this data collection effort is to provide data for public health surveillance and to enable an early warning system of bioterrorism or other public health crisis resulting in patients presenting for emergency care. The North Carolina Hospital Surveillance System, a collaborative project between the North Carolina Division of Public Health, the North Carolina Hospital Association, and the University of North Carolina at Chapel Hill School of Medicine, collects and processes the data from all North Carolina hospitals.<sup>14</sup>

## How Do We Use Data for Health Policy?

The policy relevant data sources available in this state are used in a multitude of ways to identify new policy directions, support or change existing policy, or to illuminate health problems that if addressed would improve the public's health. Dianne Enright writes about how data provided by geographic information systems help determine allocation of limited public health resources. David Murday and Elizabeth Corley discuss how philanthropic foundations use health data to identify communities whose needs are aligned with a philanthropy's priorities. Christopher Manfield and James Wilson explore how data are used at the local level by citizens, providers, organizations, and policy makers to improve community health. Mark Massing and Anna Schenck discuss how data are used at The Carolinas Center for Medical Excellence to inform consumers, assist providers, and develop information to improve health policy at the federal and state levels.

BRFSS survey results provide relevant examples of how data sources are used to develop and direct policy. General population prevalence estimates of chronic conditions such as arthritis, asthma, and diabetes are calculated from the survey results. The North Carolina Division of Public Health develops programs to provide technical assistance, resources, and care management

tips to reduce illness burden for these conditions.<sup>15-17</sup> Behavioral Risk Factor Surveillance System estimates also are used to measure levels of personal behavior that negatively impact health including smoking, alcohol use, and seatbelt use. Programs are then developed to address these behaviors.<sup>18,19</sup> The continuous data gathering of the BRFSS allows program administrators to evaluate their success in reducing negative behaviors by reviewing subsequent survey results.

In a similar fashion to the population estimates from the BRFSS survey, data from the state's vital records and condition-specific registries are used to develop and monitor health care programs. Infant death rates, for example, are closely monitored as a key indicator of the quality of our health care system. North Carolina's high rate of 8.5 infant deaths per 1000 live births in 2004,<sup>20</sup> compared to 6.8 in the US,<sup>21</sup> directs attention to programs that improve access to and use of prenatal care. Overall population death rates also provide rich opportunities to identify and address health care challenges. County and regional death rates, along with disease specific rates, illuminate program opportunities to reduce disease risk and improve the provision of care for those impacted by disease. An advantage of the ongoing availability of these data sources is that it allows continued monitoring and evaluation of program effectiveness.

Information from the state's workforce database, the Health Professions Data System, is used in a wide array of program and policy development activities. These data show where health professionals are employed and the relative availability of the workforce by county and region. It helps track trends in workforce use and identifies shortages in supply. It also enables determination of the age distribution of those working, allowing estimates of how retirements will impact future workforce availability. All of this information is essential for understanding employment needs and drives policy decisions on training programs required to assure a continued supply of the right discipline and number of health care professionals.<sup>22</sup>

The health planning process in this state is largely data driven as reflected in the annual state medical facilities plan developed by the Division of Health Service Regulation (DHSR) under the direction of the North Carolina State Health Coordinating Council.<sup>23</sup> This plan provides need projections for health care facilities and services as specified in GS § 131E-177 including hospital beds, rehabilitation beds, skilled nursing beds, operating rooms, technology, and medical equipment. Much of the data used in health planning are derived from the annual license renewal application form. These forms are required by DHSR for a facility to renew its operating license. Facilities currently complete a handwritten copy and submit it by mail to DHSR. Plans for electronic submission are underway. The form asks for counts of services provided at the institution with instruction on how services should be defined and counted. It is a lengthy form requiring considerable time and effort to complete. Facilities are generally diligent and conscientious in completing these forms. However, there is no audit function to determine the accuracy of the data submitted, and reporting categories are subject to individual interpretation by the facility completing the form.

Other sources of data used to support health planning are the hospital and ambulatory surgery databases collected by Thomson Solucient under the Medical Care Data Act. The State Health Coordinating Council committees that oversee the development and refinement of methodologies for determining needed facilities and services use these databases to understand how services are currently utilized and to project future use. As an illustration, to determine when additional acute care hospital beds are needed, 4 years of historical hospital discharge data are analyzed. An average annual historical rate of change is calculated for those 4 years. Using this rate of change, coupled with a projection of population growth or decline, a calculation is made to determine how many beds will be needed in a service area 6 years into the future. A comparison of the number of existing beds to the number projected to be needed determines if additional beds should be built. Starting with data on current utilization rates and reflecting recent changes in those rates provides a sound basis for future planning. The advantage of using the Thomson Solucient databases to determine utilization rates, rather than a self-reported number of cases from the provider, is more assurance that each facility is treated fairly by counting past utilization consistently.

Emergency room data collected by the North Carolina Hospital Surveillance System are used by the public health community for surveillance and planning. These data are submitted to the North Carolina Disease Event Tracking and Epidemiologic Collection Tool (NC DETECT) which is a tool for categorizing, analyzing, and reporting the data.<sup>24</sup> These data on nearly 3.5 million emergency department visits annually are available to approved users for population-based studies.<sup>25</sup>

## What Additional Data Do We Need?

While there is always the desire for more and better data for policy and decision making, collecting additional data has significant ramifications, particularly if it is new information that would place administrative burden on providers to report. While expanding data collection is a worthy goal, we should carefully choose areas of expansion where the expense and effort can be justified. William Kalsbeek's commentary describes an effort underway at the University of North Carolina to identify gaps in public health information. We should also seek opportunities to make optimal use of the data we have. In this spirit the State Health Coordinating Council recently acted to transition to the use of the Thomson Solucient databases for determining operating room need in North Carolina. The current methodology utilizes self-reported aggregated data on the license renewal application form. Using administrative data will enable counts of individual procedures that are consistent for each provider. This change in methodology will take a number of years to accomplish but will improve the accuracy of the need projections and advance the credibility of the process.

Another initiative designed to make better use of the data we have is the North Carolina Comprehensive Assessment for Tracking Community Health (NC-CATCH). James

Studnicki, John Fisher, and Christopher Eichelberger describe the development of this Web-based portal for community surveillance in their commentary.

The Thomson Solucient hospital discharge databases provide comprehensive data for care provided in the state's inpatient facilities. However, the Thomson Solucient ambulatory surgery database contains some gaps, with not all freestanding ambulatory surgery centers reporting as required. There has also been a void in data and information on services provided in hospital emergency departments. The new North Carolina Hospital Surveillance System data may serve to fill this gap if the data are made available to planners and policy analysts.

The biggest gap in available data, however, is in records for care provided in physician offices, clinics, and hospital outpatient departments. While approximately 12 in every 100 persons experience a hospitalization during the year and discharge records are available for these events, each person averages between 3 and 4 outpatient visits per year, and we have no database chronicling these events.<sup>26</sup> Outpatient settings are where most contacts with the health care system occur. If we are to adequately understand what care is provided, where it is provided, to whom it is provided, and for what conditions, there is a need to have data on these visits contained in publicly available databases that can be used for a wide range of planning and policy functions.

Another significant gap in publicly available data is information contained in medical records. To fully understand the care process, it is important to know more than diagnoses and procedures. It is necessary to understand patients' presenting complaints, signs, symptoms, and test results. These data are critical for determining the quality and appropriateness of provided care, for assessing patient outcomes, and for measuring and reducing racial and ethnic disparities in treatment patterns. As more medical records are converted to an electronic status, access to these data will become feasible. However, the challenges to the use of electronic medical records are significant. First, there is no standard acceptable format for a medical record like the standard UB-04 and CMS 1500 forms. Combining multiple formats can be difficult and costly. The second major challenge is finding a vehicle for pulling together medical records from multiple sites including physician offices, clinics, and hospitals. Yet this is necessary to aggregate data for population groups. Overcoming these obstacles would provide rich data for surveillance, research, and health policy.

What prevents us from collecting more expansive data and making it available for use in health planning and policy? Cost is perhaps the most significant deterrent, though there must also be the political will. It is costly to collect large amounts of new data. Extracting data that has already been collected for another purpose is less costly, as electronic processing and data storage costs have declined. Expansion of data collection is not viable, however, on a voluntary basis. Mandated reporting by providers, achieved through legislation, is critical to assure complete reporting.

## Where Do We Go From Here?

To improve our ability to make data driven decisions in health policy, we should continually look for additional data sources and make publicly accessible those data sources that already exist for other purposes. In this spirit, the Carolina Cost and Quality Initiative (CCQI) was created. The Carolina Cost and Quality Initiative is a collaborative partnership between the University of North Carolina School of Public Health and the Sheps Center to build, maintain, and oversee the use of administrative databases on health care services provided to North Carolina population groups.<sup>27</sup> The purpose of this project is to promote population-based research on the incidence and prevalence of disease in insured populations, to study patterns of health care utilization and cost of care, and to provide information for informed policy decisions on issues impacting our population's health.

Owners of administrative databases in North Carolina have been invited to partner with the University of North Carolina in this project and to share their data. Two are currently participating, and we expect more to join. The Carolina Cost and Quality Initiative project now houses databases contributed by the North Carolina State Employees Health Plan (SEHP) and the North Carolina Division of Medical Assistance (DMA). As the data owners, SEHP and DMA share data through contractual agreements with the university. Each database contains 5 years of historical claims data, and the data owners have agreed to provide periodic updates to keep the databases as current as possible. University faculty and research staffs are invited to submit project proposals for use of the data. Each project request is reviewed by an oversight committee consisting of representatives of the data owner and of the university; upon approval, data are prepared by CCQI staff for the researcher's use.

The Carolina Cost and Quality Initiative databases include insurance claims for hospitalizations, doctor visits, outpatient surgery and treatments, emergency room use, and outpatient prescription drugs. Patient identifiers are encrypted to protect patient confidentiality and to allow the researcher to track all treatments provided to the same individual. The 2 databases combined represent all health care services provided to approximately 1.5 million persons who are geographically

dispersed throughout the state. Such a rich set of data for this large population group provides a significant opportunity for research that can favorably impact health policy decisions in the state. We invite project requests and encourage these databases to be used in this way.

Administrative databases, as useful as they are, do not contain information on the results of tests and procedures. To add this additional level of detail, we must also strive to find ways to use electronic medical records for large population groups. Such an undertaking will require combining files of medical records across providers and facilities and encrypting identifying information to protect confidentiality in the process. Holt Anderson and Gary Bowers discuss health care information exchange across provider groups in their commentary. The resulting databases will be extremely large for a population group, but the advantages from this type of data aggregation in informing policy makers and researchers would be significant.

The potential rewards from increasing data collection and availability will be diminished if we do not simultaneously prepare researchers, planners, and policy makers to use available data sources. Elizabeth Layman, and Debbie Travers and Lawrence Mandelkehr, address these issues in their respective commentaries. We must put a greater focus on data and analytics in university curriculum in the courses and programs that are training our next generation of health care leaders. Health care researchers should be trained in the use of claims data analysis and electronic medical records. Those who are preparing for leadership roles should be trained in data literacy to ask for and expect quantitative assessment of health policy issues in their workplace.

All of us in the health care field must look for ways to work collaboratively towards increased availability and use of appropriate data. Assuring that health policy decisions made for the citizens of our state are the best they can be calls for nothing less than data-driven decisions. And as Marcus Plescia and Jeffrey Engel point out in their commentary, future public health data needs must reflect the foreseen and unforeseen changes in our state. Wherever health policy is determined and by whomever it is made, the goal is to strive for policy decisions that are based on sound North Carolina data because these policies will have greater credence and acceptability. **NCMJ**

---

## REFERENCES

- 1 Kaiser Health Tracking Poll: Election 2008. The Henry J. Kaiser Family Foundation Web site. <http://www.kff.org/kaiserpolls/elections2008.cfm>. Published August 30, 2007. Accessed December 17, 2007.
- 2 New Leadership on Health Care: A Presidential Forum. Center for American Progress Action Fund Web site. <http://www.americanprogressaction.org/events/healthforum/>. Accessed December 19, 2007.
- 3 NC Behavioral Risk Factor Surveillance System (BRFSS). North Carolina State Center for Health Statistics Web site. <http://www.schs.state.nc.us/SCHS/brfss/>. Updated December 16, 2007. Accessed December 10, 2007.
- 4 NC Child Health Assessment and Monitoring Program (CHAMP). North Carolina State Center for Health Statistics Web site. <http://www.schs.state.nc.us/SCHS/champ/>. Updated July 19, 2007. Accessed December 10, 2007.
- 5 North Carolina Birth Defects Monitoring Program (BMP). North Carolina State Center for Health Statistics Web site. <http://www.schs.state.nc.us/SCHS/bdmp/>. Updated May 11, 2007. Accessed December 10, 2007.
- 6 North Carolina Central Cancer Registry (CCR). North Carolina State Center for Health Statistics Web site. <http://www.schs.state.nc.us/SCHS/CCR/>. Updated August 9, 2007. Accessed December 10, 2007.

- 7 North Carolina Vital Records. North Carolina Department of Health and Human Services Web site. <http://vitalrecords.dhhs.state.nc.us/vr/index.html>. Updated August 22, 2006. Accessed December 12, 2007.
- 8 North Carolina Health Professions Data System. The Cecil G. Sheps Center for Health Services Research Web site. Published 2007. <http://www.shepscenter.unc.edu/hp/about.htm>. Accessed December 11, 2007.
- 9 UB92 Claim Form. <http://www.valueoptions.com/newmexico/provider/forms/UB92ClaimForm.pdf>. Accessed December 14, 2007.
- 10 Outpatient Hospital Services – HCFA 1500 Claim Form. Rhode Island Department of Human Services. <http://www.dhs.state.ri.us/dhs/heacre/provsvcs/manuals/hospital/ouhc1500.htm>. Accessed December 14, 2007.
- 11 NC Gen Stat § 131E-210.
- 12 NC Gen Stat § 58-2-131(f).
- 13 NC Gen Stat. § 130A-480.
- 14 State health department unveils new public health surveillance system: North Carolina is first state in nation with new system to save lives [press release]. November 16, 2005. North Carolina Department of Health and Human Services Web site. <http://www.ncdhhs.gov/pressrel/11-16-05.htm>. Accessed December 14, 2007.
- 15 NC Arthritis Program. <http://www.ncarthritis.com>. Accessed December 14, 2007.
- 16 North Carolina Asthma Program. <http://www.asthma.ncdhhs.gov/>. North Carolina Department of Health and Human Services Web site. Accessed December 14, 2007.
- 17 North Carolina Diabetes Prevention and Control Branch. <http://www.ncdiabetes.org/>. Accessed December 14, 2007.
- 18 North Carolina Tobacco Prevention and Control Branch. North Carolina Department of Health and Human Services Web site. <http://www.tobaccopreventionandcontrol.ncdhhs.gov/data/index.htm>. Updated December 14, 2007. Accessed December 14, 2007.
- 19 *North Carolina 2010 Health Objectives: Healthy Carolinians 2005 Midcourse Review*. [http://www.healthycarolinians.org/pdfs/114\\_Amend\\_Eo91\\_Healthy\\_Carolinians.pdf](http://www.healthycarolinians.org/pdfs/114_Amend_Eo91_Healthy_Carolinians.pdf). Accessed December 14, 2007.
- 20 Selected Vital Statistics for 2004 and 2000-2004: North Carolina. North Carolina State Center for Health Statistics Web site. <http://www.schs.state.nc.us/SCHS/vitalstats/volume1/2004/nc.html>. Updated October 19, 2005. Accessed December 12, 2007.
- 21 Overall infant mortality rate in US largely unchanged: Rates among black women more than twice that of white women [news release]. May 2, 2007. National Center for Health Statistics Web site. <http://www.cdc.gov/nchs/pressroom/07newsreleases/infantmortality.htm>. Updated May 21, 2007. Accessed December 12, 2007.
- 22 Fraher, EP. Shaping health workforce policy through data-driven analyses: The Sheps/NC AHEC Collaboration. Presented at: The National AHEC Organization Program Directors; April 26, 2007; Washington, DC.
- 23 North Carolina Department of Health and Human Services, Division of Facility Services. *2007 State Medical Facilities Plan*.
- 24 NC Detect: North Carolina Disease Event Tracking and Epidemiologic Collection Tool. University of North Carolina at Chapel Hill Web site. <http://www.ncdetect.org/>. Accessed December 14, 2007.
- 25 Waller AE, Ising AI, Deyneka L. Running the Numbers: North Carolina emergency department visit data available for public health surveillance. *NC Med J*. 2007; 68(4):289-291.
- 26 National Center for Health Statistics. US Department of Health and Human Services. *Health, United States, 2006 With Chartbook on Trends in the Health of Americans*. Hyattsville, MD: 2006.
- 27 Carolina Cost and Quality Initiative. The Cecil G. Sheps Center for Health Services Research Web site. <http://www.shepscenter.unc.edu/ccqi/>. Updated October 8, 2007. Accessed December 14, 2007.