# GIS Tracks Emerging Statewide Patient Care Patterns

## North Carolina Improves Quality of Care for Medicare and Medicaid Patients

By Mark Carrozza, MA, Health Informatics Developer, HealthLandscape LLC

Like other Medicare and Medicaid providers, Community Care of North Carolina (CCNC), a community-based, public-private partnership, has sought innovative solutions for controlling costs and improving quality of care for the 1.2 million beneficiaries it serves out of the state's 1.6 million Medicaid recipients. CCNC needs to not only manage current expenses but also prepare for the estimated 38.2 percent increase in North Carolina's Medicaid population expected by 2019.

Community Care of North Carolina has taken a population management approach to providing services for the state's most
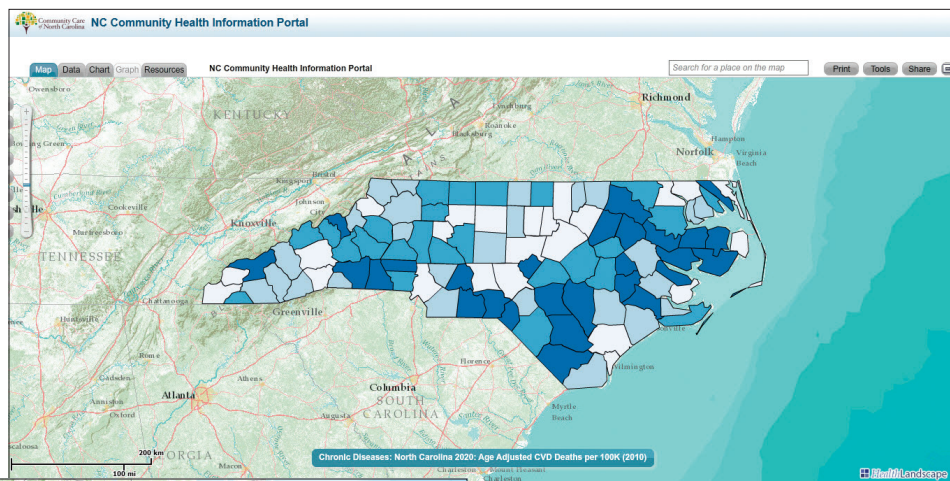
↑ Visualization Showing Age-Adjusted Cardiovascular Deaths per 1,000 Persons (2010) in North Carolina
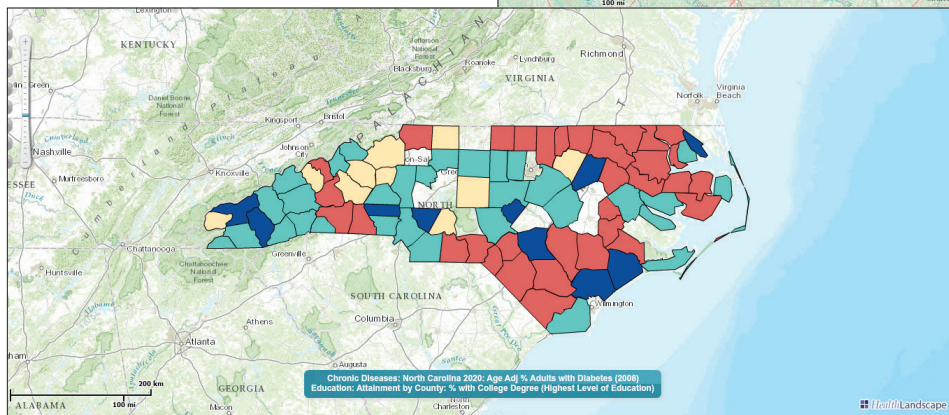
↑ Above is a comparison view of age-adjusted percentage of adults with diabetes and percentage of adults with a college degree. Dark blue shading indicates geographies with high diabetes and high college-degree percentages; red indicates high diabetes, low college-degree percentages; light blue indicates low diabetes, high college-degree percentages; and yellow shows low diabetes and low college-degree percentages.

vulnerable residents. Operating through 14 local network partners, CCNC coordinates patient care via so-called "medical homes," saving taxpayers nearly $1.5 billion between 2007 and 2009, according to one independent study. Managed by primary-care physicians, the medical home model provides accessible, continuous, coordinated, and comprehensive patient-centered care with the active involvement of nonphysician medical personnel.

Esri gave CCNC the edge it needed to achieve quality and efficiency by providing a powerful visual tool that allowed mapping and analysis of emerging patient-care patterns across the state and among CCNC's 14 network partners.

CCNC turned to HealthLandscape LLC—developer of UDS Mapper, Med School Mapper, and other web-based GIS applications—to build the North Carolina Community Health Information Portal (NC-HIP). It was developed as an extension of the HealthLandscape platform, which uses Esri's ArcGIS 10.1 for Server, ArcGIS API for Flex, ColdFusion, and SQL Server.

According to Annette DuBard, MD, MPH, director of quality, informatics, and evaluation for CCNC, the organization has, since its inception 25 years ago, viewed GIS as a natural next step in using data to inform patient care.

Although CCNC had a long and successful history of engaging providers around data, its systems were incomplete. Still missing was a way to visualize and understand emerging patterns of care across the state and with the company's network partners. Moreover, there was no system in place for comparing CCNC's internal indicators against public health indicators.

GIS offered the hope that by putting clinical and claims data together with public data, CCNC could better understand what was happening at the community level, DuBard said.

"We were seeing greater use of mapping and visual representations of data," she said. "We became really interested in developing a GIS system to help us identify where opportunities for improvement exist."

Project History

In 2010, one of CCNC's network partners, Southern Piedmont Community Care Plan (now called Community Care of Southern Piedmont), was named a Beacon Community by the Office of the National Coordinator for Health Information Technology (ONC).

ONC awarded grant money to the federal Beacon Communities program over three years to build and strengthen health information technology (IT) infrastructure and exchange capabilities; make investments in IT that would result in measurable improvements in cost, quality, and population health; and develop innovative approaches to measure performance and improve patient care. Community Care of Southern Piedmont, one of 17 Beacon Communities in the United States, was awarded a $15 million grant.

Stakeholders within the Southern Piedmont Beacon Community (SPBC) saw the program funding as an opportunity to implement a GIS-based data dissemination system. Each had its own need: CCNC recognized that visually displaying clinical data collected via electronic health records on a GIS map could significantly add to CCNC's ability to drive quality improvement, public health partners wanted more timely access to clinical data; and all stakeholders wanted a way to visualize public health indicators alongside clinical health indicators.

CCNC Network Sites

NC-HIP is currently in the second of three phases and includes a public-facing site with county-level data as well as restricted sites for each of the 14 networks.

"Some data is restricted to internal CCNC network staff, such as practice-level data on costs and utilization and also risk-adjusted performance measures," said Sarah Lesesne, data analyst for CCNC and a coordinator of the rollout efforts. "For our networks, these measures help display any potential geographic trends in their practice data."

Lesesne has designed a comprehensive program to ensure the tool is used widely across CCNC.

"We have presented the portal to various workgroups: pediatrics workgroups, quality improvement practice support groups, network quality improvement staff, network and clinical directors, and others," she said. "We've also identified 'super users' within each of the networks. Their role is to be point person for the portal; facilitate regular training sessions; and bring users together to share lessons learned and discuss how they're using the portal to help answer a question, solve a problem, or just start a conversation."

Public Health Partners

HealthLandscape incorporated the ability to compare two indicators directly. This is particularly important to public health professionals, who want to be able to compare clinical indicators against public health data.

Side-by-side views enable users to look at two indicators at once. The Comparison tool allows users to visualize the relationship between two indicators; they can see a high/high, high/low, low/high, and low/low representation of the data and can adjust the breakpoints for comparison.

The North Carolina Institute for Public Health, one of the SPBC partners, will be training health department users in a more formalized fashion, potentially offering certification in the tool.

Initial Findings and Phase III

According to DuBard, the portal is enabling analysts to obtain a new view of metrics they have been following for some time.

"It gives us the ability to see where we have wide variation in our clinical care quality measures," she said. "Often, there's a 10 percent spread between the lowest and the highest quartiles. Showing the data geographically helps us hone in on where improvement opportunities exist."

Finally, said DuBard, GIS paints a broad picture for all SPBC's constituents. "It is more compelling to see the data on a map, and it makes it easier to talk about health factors at a community level. We can now take some of this data to more of a lay audience and focus it, saying, 'This is an issue for our community.' It is helping us identify indicators that the community can engage around," she said.

DuBard's team, which is still making enhancements to the portal, has two goals. "First, it's important to obtain smaller-than-county views that map out disease prevalence data, chronic disease outcomes, and hospital utilization rates for smaller geographies—perhaps down to the census tract level," said DuBard.

Then the team wants to both see the data stratified by subpopulations—race, gender, income—and be able to do comparative visualizations to get a better view of health care disparities.

"Ultimately," said DuBard, "CCNC wants to develop NC-HIP into a tool that gives doctors, public health workers, and policy makers a robust way to respond to the health needs of the community."

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