

Community Care of North Carolina's Approach to Asthma Management

Elizabeth Cuervo Tilson

Community Care of North Carolina (CCNC) takes a comprehensive approach to asthma management. Support from CCNC helps providers follow evidence-based practice guidelines; data guide continuous quality improvement initiatives and inform the care of individual patients and populations; and care managers work with high-risk patients.

Asthma is one of the most common chronic diseases of childhood, second only to dental disease. Data from the Child Health Assessment and Monitoring Program (CHAMP) Survey show that prevalence rates of asthma are highest in children aged 5–17 years, and approximately 1 child in 10 was living with asthma in North Carolina in 2011 [1]. Prevalence rates for adults in North Carolina in 2011 were slightly lower, at 8.8% [2]. Prevalence rates of asthma in North Carolina vary with race or ethnicity and with insurance status. Racial or ethnic minority populations and children covered by public insurance have higher prevalence rates of asthma than do white, privately insured individuals [1].

Asthma has a significant economic and social impact. In the United States in 2010, asthma accounted for 439,000 hospital discharges, 1.2 million hospital outpatient visits, 2.1 million emergency department (ED) visits, 10.6 million physician office visits, and \$56.0 billion in economic costs [2]. Asthma is the leading cause of missed days of school in North Carolina [3].

The etiology of asthma is multifactorial, and evidence of the importance of environmental exposures is accumulating [4]. Thus, it is important to have a comprehensive approach to asthma management.

A Comprehensive Approach to Asthma Management

Community Care of North Carolina (CCNC) is a statewide, provider-led primary care medical home and care coordination system that has been growing for the past 10 years. It is a private-public partnership with 14 networks covering all 100 counties in the state. It rests on the framework of Carolina ACCESS Medicaid, a managed care program in which Medicaid recipients are linked to a primary care medical home. CCNC activities are added to that framework to further increase access to high-quality, cost-effective, coor-

ordinated care. By helping providers care for patients, CCNC has shown that it can improve health, reduce rates of ED visits and hospital admissions, and save money. Statewide, more than 5,000 providers and more than 1.2 million Medicaid patients are part of CCNC [5].

Asthma management is one of CCNC's statewide disease management initiatives. As with all disease management initiatives, the asthma initiative is based on nationally recognized evidence-based or best-practice guidelines. Specifically, the National Heart, Lung, and Blood Institute Guidelines for the Diagnosis and Management of Asthma published in 2007 [4] inform the initiative. Metrics that align with the guidelines are developed and approved by the CCNC network clinical directors and CCNC clinical staff members; when possible, these metrics are also aligned with national metrics.

CCNC takes a comprehensive approach to asthma management. The measures developed for asthma include the percentage of patients with asthma who receive a continued care visit with assessment of symptoms; the percentage who undergo assessment of triggers; the percentage who receive a written management plan; the percentage of patients with persistent asthma for whom controller medicines are prescribed; the rate of asthma-related ED visits; and the rate of asthma-related hospitalizations.

Providers are given support and tools to foster high-quality asthma care. Educational sessions and resources on best-practice guidelines are available to practice staff members and providers. Asthma symptom questionnaires, which can be completed by the patient or a parent, are provided to facilitate assessment of asthma control. Asthma management plans and other education materials are made available to practices for use with patients.

Clinicians have access to robust patient information in the CCNC Provider Portal, including a dashboard view of patient data provided by the CCNC Informatics Center. Individual-level information helps guide care of a specific

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Address correspondence to Dr. Elizabeth Cuervo Tilson, Community Care of Wake and Johnston Counties, 2500 Blue Ridge Rd, Ste 330, Raleigh, NC 27607 (btilson@wakedocs.org).

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Mission Children's Hospital's Regional Asthma Disease Management Program

Melinda Shuler, Donald W. Russell

The Regional Asthma Disease Management Program at Mission Children's Hospital in Asheville, North Carolina, was designed to address health care disparities in underserved and impoverished children with asthma in the western part of the state. The program acknowledges the local population's health care habits and asthma care needs, and it delivers asthma education and interventions beyond the clinical setting—in homes, schools, child care centers, and other care facilities.

The Regional Asthma Disease Management Program implements the 6 key recommendations of a 2008 report from the National Asthma Education and Prevention Program: assess asthma severity, assess and monitor asthma control, use inhaled corticosteroids, use a written asthma action plan, control environmental exposures, and schedule follow-up visits [1]. Through its various components, the program provides clinical assessments (lung spirometry, exhaled nitric oxide, etc.); patient education (using culturally appropriate and literacy-sensitive materials); medication assessments; development and implementation of an asthma action plan; environmental assessments; communication of pertinent information to physicians, families, and others; and educational programs and activities.

Key collaborators include the North Carolina Asthma Program; the Asthma Alliance of North Carolina; school systems and child care centers in Western North Carolina; the North Carolina Department of Health and Human Services, Environmental Health Section, Children's Environmental Health Branch; the National Center for Healthy Housing; the National Asthma Control Initiative of the National Heart, Lung, and Blood Institute of the National Institutes of Health; the Asthma and Allergy Foundation of America; primary care providers in Western North Carolina; and the Cherokee Indian Hospital Authority. The Regional Asthma Disease Management Program has a strong presence outside its clinical settings, having built long-term relationships with faith-based organizations, community agencies, and others.

In Western North Carolina, more than 1 child in 4 lives

in poverty [2]. Western North Carolina also has a large minority population that includes Native Americans, African Americans, and Hispanics. Minorities and groups with lower income-to-poverty ratios have the highest prevalence of asthma [3]. Social determinants of health must be addressed, because impoverished children are at risk for lower school performance, decreased attendance, fragile nutritional status, and inadequate housing.

In 2010, 10.3% of children in North Carolina had asthma [4], compared with 8.4% of children nationally [3]. Asthma is the leading chronic health condition among students in North Carolina schools; in the 2009–2010 school year, 52% of all students with a chronic health condition had asthma [5].

Because of the state's temperate climate—which supports more than 100 species of trees and 1,600 species of flowering plants—plus the prevalence of cigarette smoking and high levels of poverty, children in North Carolina face significant exposure to environmental triggers that exacerbate asthma severity, which leads to relatively high rates of pediatric asthma. The Regional Asthma Disease Management Program uses a multifaceted approach to help families build skills in managing environmental triggers and to connect them with other community resources.

Environmental assessments are conducted at child care centers and school sites, as well as in the homes of children diagnosed with asthma. Each assessment lasts 1–3 hours, and results are discussed with the administrator of the site or the homeowner. An 8-page home environmental assessment questionnaire, which was developed in partnership with the National Center for Healthy Housing, is administered. This questionnaire uses a multipronged strategy to identify allergens and irritants to which the patient is sensitive. The Regional Asthma Disease Management Program uses faith-based organizations and charitable community partners to address the psychosocial needs of patients and to provide cleaning supplies, pest control services, and home remediation. Additional follow-up is conducted if remediation is required.

patient. For example, the "medication fill" history can inform the conversation between provider and patient about medication compliance. Practice-level data can foster population management. For example, practices can download a list of patients with asthma-related care alerts, which are triggered by the detection of asthma-related ED visits, asthma-related hospitalizations, frequent refills of rescue medications, or failure to fill a prescription for a controller medication.

Quality improvement specialists and support are available to foster continuous quality improvement activities and workflow processes within practices. Processes that

may be addressed include how to integrate asthma management tools into the practice workflow, how to facilitate recommended visit frequency, what must be documented in electronic health records (EHRs) to meet the meaningful use criteria of the Centers for Medicare & Medicaid Services (CMS), how to use data to inform the care of individual patients and populations, and how to use existing community resources (eg, care managers, child care health consultants, and school nurses) to help with patient care. Feedback is given to track progress and to identify areas for improvement or the need for additional resources. An example of

Regional workshops are used to take the program's message into the community; this message promotes asthma awareness and the identification of indoor and outdoor environmental triggers. Residents throughout Western North Carolina are invited to attend these workshops, which are usually held in schools, child care centers, and primary care offices. From 2009 through 2011, nearly 3,500 children received "asthma friendly" environmental interventions, and 259 staff members were educated. Asthma community initiatives throughout Western North Carolina impacted an additional 2,767 individuals from 2009 through 2011.

In 2009, the Regional Asthma Disease Management Program was 1 of 13 national asthma demonstration sites chosen by the National Heart, Lung, and Blood Institute. Fifty children were enrolled in the institute's National Asthma Control Initiative from 2009 through 2011. These children's medical charts were audited to assess several different indicators of program effectiveness. Unpublished data from the initiative show statistically significant improvements across all variables. Decreases in the rates of emergency department visits and hospitalizations for asthma resulted in cost reductions exceeding \$800,000. Participating patients also showed statistically significant improvements on lung spirometry and exhaled nitric oxide measures. School attendance improved 52%.

The Regional Asthma Disease Management Program emphasizes compassion and patient advocacy. The program's ultimate goals are to improve patients' subjective quality of life, decrease school absenteeism, and decrease emergency department utilization and inpatient admissions for asthma.

In 2012 the program was the premier health care provider recipient of the US Environmental Protection Agency's National Environmental Leadership Award in Asthma Management. This was the first time that the award had been won by a program in the Southeastern United States. **NCMJ**

Melinda Shuler, BSBA, RCP, HHS, AE-C regional clinical program supervisor and principal investigator, Regional Asthma Disease Management Program, Mission Children's Hospital, Asheville, North Carolina.

Donald W. Russell, MD supervising physician, Regional Asthma Disease Management Program, Mission Children's Hospital, Asheville, North Carolina.

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Address correspondence to Ms. Melinda Shuler, Mission Children's Hospital, 11 Vanderbilt Park Dr, Asheville, NC 28803 (melinda.shuler@msj.org).

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successful collaboration between the quality improvement support staff of one CCNC network (Northwest Community Care Network) and a network practice (Wake Forest Baptist Health's Downtown Health Plaza) to address asthma care was described in a recent issue of the NCMJ [6]. Process measures aligning with best-practice recommendations showed marked improvement, and rates of ED visits and hospitalizations for asthma decreased.

Finally, multidisciplinary care managers—including nurses, social workers, and pharmacists—are available to work one-on-one with high-risk patients. Providers can make direct referrals to local care managers in their networks. Connections to hospitals via either the in-person presence of CCNC staff or via information technology (IT) system link-

ages can alert care managers when a patient is hospitalized or comes to the ED for an asthma-related illness. As part of the IT linkage, information about admissions, discharges, and transfers from 57 hospitals across the state allows for data on ED visits and hospitalizations to be fed into the Informatics Center twice daily. In addition, claims-based, risk-adjusted analytics can predict which patients are likely to experience potentially preventable costs related to their asthma. Care managers can use this report to proactively reach out to patients and offer care management services.

The main goals of care management are to promote self-management of chronic diseases and to strengthen the link between patients and providers, especially primary care providers. The local, on-the-ground, care manager staff-

Air Pollution Ignores State Borders

Roy Cooper

A decade ago, residents of Western North Carolina did not need any special equipment to tell them that their air was polluted. They could see the pollution and smell it; on some days, they could even taste it. On those days, their mountains were shrouded in gray—not a morning mist, but a haze of ozone, sulfur dioxide, nitrogen dioxide, and toxic particulates that caused asthma and even death. This chemical fog was killing trees and forming mercury compounds that seeped into the ground and into the water, thus contaminating fish. Worst of all, people were being poisoned in their own backyards with every breath they took. If the situation remained unchanged, local doctors would have to continue to tell their patients with asthma or other respiratory illnesses to stay indoors on days when pollution levels were high. Employers would continue to lose money because of employee illnesses, students would continue to miss school due to asthma attacks, and hospitalizations for respiratory illnesses would continue to rise. The problem was clear but difficult questions remained: What should be done? Who should be held accountable?

Coal-fired plants run by the Tennessee Valley Authority (TVA) were pumping pollution over the state border and into North Carolina's mountains. The utility had promised to clean up the pollution but had moved slowly, and the damage it caused was spreading. As North Carolina Attorney General, in 2006 I filed suit against the TVA on behalf of the state, saying that the pollution was a public nuisance and demanding that it stop. The lawsuit was a last resort. Our office had tried negotiating with the utility, but without the power of a court order, we had no way to ensure results.

Within its borders, North Carolina was already doing its part to slow pollution. With urging from the governor and from our office, North Carolina legislators and utilities had agreed on the provisions of the 2002 Clean Smokestacks Act [1]. This act required North Carolina utilities to reduce coal-fired plant emissions and to speed cleanup. However, we could make no such requirements of our upwind neighbors. Thus, the TVA—the nation's largest public utility, with plants not just in Tennessee but also in nearby states—was continuing to pump toxic fumes into Great Smoky Mountains National Park, the counties of Western North Carolina, and beyond.

The Clean Smokestacks Act directs the state to “use all available resources and means . . . to induce other states and entities, including the Tennessee Valley Authority, to achieve reductions in emissions” [1]. The legal theory we used was not new, but the scale of the case was. Our claim was that the TVA's pollution had reached such a stage that it was literally a nuisance to the public. In general terms, this kind of lawsuit is used when public health and safety are endangered and cost-effective solutions are readily available.

Our research showed that the health of North Carolinians was threatened. Experts estimated that if the TVA reduced particulate matter and other airborne toxins, it could prevent 19,000 exacerbated asthma attacks, 99 early deaths, and dozens or even hundreds of emergency department visits and hospital admissions every year in North Carolina [2]. When neighboring states were included in the affected area, the health benefits were expected to reach tens of thousands of people. In addition,

ing allows for a wide range of care management activities designed to achieve these goals. Care managers can work with families over the phone or in person. They can accompany a patient to medical appointments, which can help the care manager understand the care plan recommended by the provider and can help the family operationalize that plan. Care managers can provide extra asthma education on topics such as the physiology of asthma, triggers, symptom recognition, how and when to use medicines and delivery devices (eg, spacers), and how to follow an asthma management plan. Care managers can also make home visits that help them to understand the social and environmental context in which the family is trying to manage this chronic disease. Environmental triggers in the home can be identified, and advice on how to mitigate those triggers can be provided. The care manager can also address barriers to care—lack of transportation, for example. Finally, the care manager can help the family organize the home in a way that facilitates consistent chronic disease management—for instance, they can help the family decide where to store medicines and where to post the asthma management plan.

Local Initiatives and Collaborations

Local initiatives and collaborations further add to statewide activities. Strong evidence supports the effectiveness of home-based, multi-trigger, multicomponent interventions with an environmental focus, because such interventions can improve asthma symptoms, quality of life, and productivity for children and adolescents with asthma [7, 8]. For example, one CCNC network, Community Care of Wake and Johnston Counties, is working in partnership with Wake County Environmental Services and Wake County Human Services to deliver a multidisciplinary, home-based, environmental trigger assessment and mitigation initiative led by a registered sanitarian and a nurse care manager. This initiative shows an average of \$700 in savings per patient, secondary to decreased rates of ED visits and hospitalizations for asthma. In addition, this initiative achieved substantial decreases in network-wide asthma ED rates (from 40 visits per 1,000 member-months in 2003 to 17 visits per 1,000 member-months in 2012) and asthma hospital admission rates (from 8.3 hospitalizations per 1,000 member-months

the pollution was causing our state and its businesses to lose billions in health care dollars and lost workdays [3]. The state was also losing tourism dollars when Grandfather Mountain and the views from the Biltmore Estate were obscured by smog [4]. It was clear to me that action was needed.

After a hard-fought trial, Judge Lacy Thornburg saw it our way, setting limits on emissions and deadlines for improvement at several plants. The TVA fought our attorneys on appeal, but in the end we agreed on a landmark settlement [5], which required the TVA to either close its coal-fired plants or speed installation of pollution control equipment. The TVA also agreed to send \$11.2 million to North Carolina to fund energy efficiency programs. What is most important is that the settlement is reducing harmful emissions and significantly improving views of the mountains. The dollar value of the health benefits alone is estimated to be \$672 million per year [3].

Meanwhile, the fight for clean air continues, with a case about the Cross-State Air Pollution Rule of the Environmental Protection Agency (EPA) going to the Supreme Court of the United States this year. Having obtained a federal court order in 2008 to force the EPA to adopt stricter clean air guidelines [6], North Carolina is now fighting alongside the EPA to ensure that upwind states promptly control their pollution. Specifically, our attorneys are arguing that the federal Clean Air Act demands that states *proactively* mitigate their impacts on other states, rather than putting off their responsibilities to downwind states and waiting for the EPA to solve their problems for them.

In the end, the case we brought under the Clean Smokestacks Act was a success for the public health and the economy of North Carolina. The TVA is making changes for the better. Although collaboration and negotiation should always be the first choice, litigation can be an ef-

fective tool when widespread damage to public health and the economy goes unabated. **NCMJ**

Roy Cooper, JD Attorney General of North Carolina, Raleigh, North Carolina.

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Address correspondence to Mr. Roy Cooper, Attorney General's Office, 9001 Mail Service Center, Raleigh, NC 27699-9001 (rcooper@ncdoj.gov).

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in 2003 to 1.9 hospitalizations per 1,000 member-months in 2012). This collaboration received a 2013 Achievement Award in Health from the National Association of Counties. Other CCNC networks—including Northern Piedmont Community Care, Northwest Community Care Network, and Community Care of the Lower Cape Fear—are beginning similar activities to address environmental asthma triggers. The Healthy Homes training offered by the University of North Carolina's Gillings School of Global Public Health is helping to spread these activities.

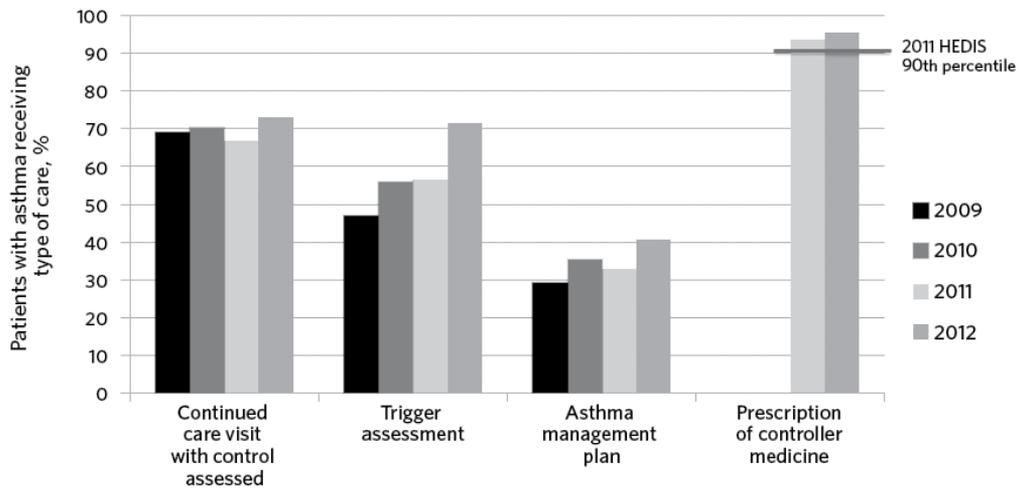
Quality Metrics

Chart review and claims-based measures are used to foster continuous quality improvement initiatives within practices, networks, and the statewide CCNC program. Improvements in all metrics have been achieved. Figure 1 shows chart-review measures, including the percentage of patients with documentation of at least 1 continued care visit with assessment of symptom control, trigger assessment, and provision of a written asthma management plan. An additional measure noting the percentage of patients with

persistent asthma with documentation of a prescription for controller medicine was added in 2011. This measure is the only one with a comparable national HEDIS (Healthcare Effectiveness Data and Information Set) benchmark, and CCNC results show high rates of performance on this measure. In 2011, 93.6% of patients with persistent asthma were prescribed a controller medication. This percentage increased to 95.5% in 2012. These percentages exceed the 90th percentile for national 2011 HEDIS benchmarks for Medicaid Managed Care Organizations, which is 90.6%.

In early evaluations of CCNC's asthma initiatives, 2 published studies [9, 10] found sizeable decreases in rates of hospitalization and ED use for asthma. An evaluation by the University of North Carolina's Cecil G. Sheps Center for Health Services Research [9] showed substantially lower rates of ED visits and inpatient admissions during the period 2000–2002 for Carolina ACCESS Medicaid patients who were enrolled in CCNC than for those who were not. A subsequent study [10] showed a 16.6% decline in the rate of ED visits and a 40% decrease in the rate of inpatient admissions for CCNC-enrolled patients with a diagnosis of asthma

FIGURE 1.
Statewide Results for the Quality of Asthma Care for Patients Enrolled in Community Care of North Carolina, 2009–2012



Note. HEDIS, Healthcare Effectiveness Data and Information Set.

between fiscal years (FYs) 2003 and 2006.

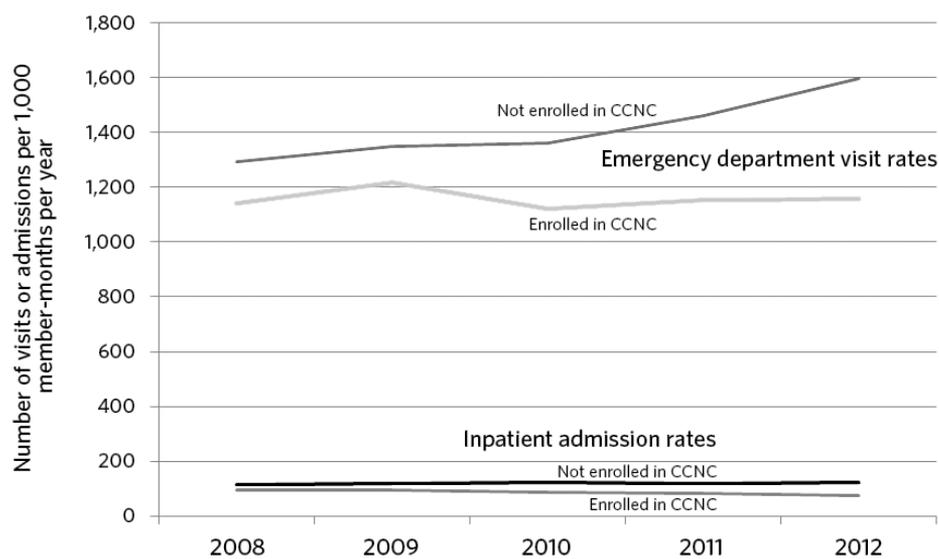
While ED utilization rates have continued to rise for Medicaid recipients with asthma who are not enrolled in CCNC, rates have remained consistently lower within the CCNC program. Additionally, while asthma-related inpatient admission rates have remained steady for Medicaid recipients who are not enrolled in CCNC, inpatient rates have continued to decline for CCNC-enrolled patients (Figure 2). In 2012 the ED visit rate was 38% lower and the inpatient admission rate was 65% lower for Medicaid recipients with

asthma who were enrolled in the CCNC program compared with those who were not enrolled in CCNC (Figure 3).

Future Directions and Emerging Initiatives

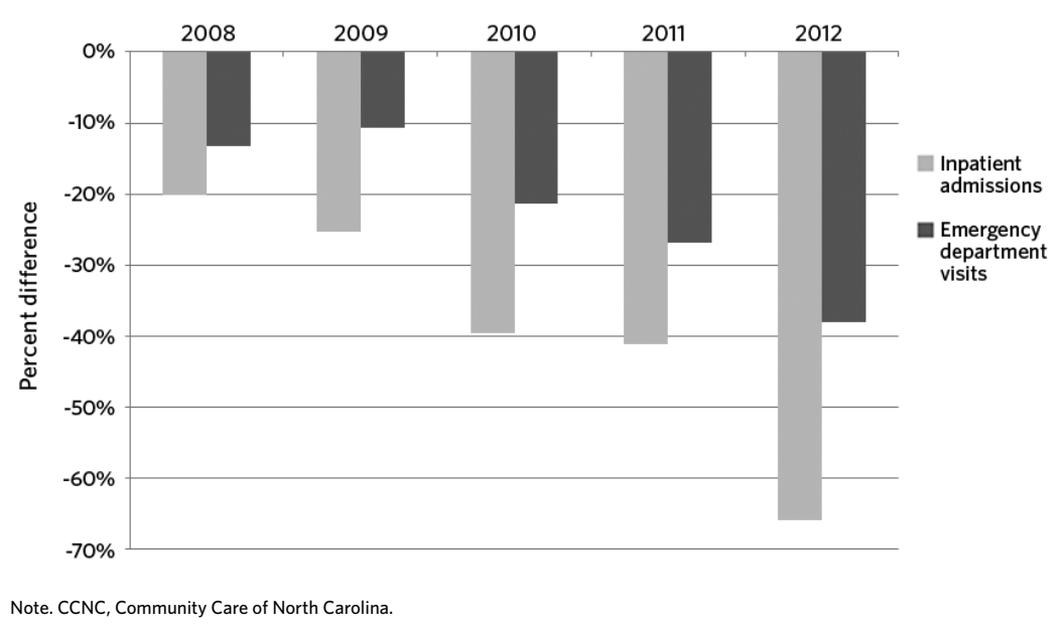
To further facilitate population management, an asthma disease registry is under development as a resource for practices engaged in asthma quality improvement work. This registry will couple claims data (such as ED visit and medication fill data) with clinical data from EHRs—for example, data regarding asthma management plans and allergy and

FIGURE 2.
Rates of Asthma-Related Emergency Department Visits and Inpatient Admissions for North Carolina Medicaid Recipients



Note. CCNC, Community Care of North Carolina.

FIGURE 3.
Percent Difference Between Medicaid Recipients Enrolled in CCNC and Those Not Enrolled in CCNC, for Rates of Asthma-Related Emergency Department Visits and Inpatient Admissions, 2008-2012



trigger management. Initially, the registry will be accessed through the CCNC Provider Portal, and claims information and clinical information will be provided by the North Carolina Health Information Exchange. A next step will be to integrate all of the information into a single view and to develop an interactive dashboard tool for the asthma registry that will enable real-time manipulation of data related to asthma and asthma care. Future capabilities will also include the integration of care alerts to prompt action for asthma management. The registry will also support asthma-related reporting requirements to help practices meet the meaningful use criteria established by CMS.

Another emerging initiative involves exploring effective ways to disseminate patient-centered tools for shared decision making (SDM) that have been shown to produce positive changes in asthma outcomes [11, 12]. The Asthma SDM Toolkit includes a tool to assess baseline asthma control; a guide for eliciting the patient's goals for treatment priorities; educational materials about asthma; a tool to guide the negotiation process and to jointly develop a treatment regimen that accommodates the patient's goals and preferences; and an asthma action plan that has been developed by a Carolinas Healthcare System team and has been shown to improve asthma outcomes [13]. Through a grant from the Patient-Centered Outcomes Research Institute and in partnership with Carolinas Healthcare System, CCNC will test a novel dissemination process to spread the Asthma SDM Toolkit to primary care practices. Facilitators will work with selected practices to individually tailor the toolkit to the practice's unique circumstances. Patients receiving care at practices where the toolkit is being implemented

will be compared with control patients at nonparticipating practices using quantitative outcomes data (from EDs, hospitals, outpatient clinics, and pharmacies) as well as qualitative data (regarding provider and patient satisfaction, for instance). The knowledge gained from this initiative and the partnerships formed between practice-based research networks and CCNC practices will facilitate the dissemination of effective SDM patient education materials to other CCNC practices statewide. *NCMJ*

Elizabeth Cuervo Tilson, MD, MPH primary care pediatrician, Wake County Human Services, and medical director, Community Care of Wake and Johnston Counties, Raleigh, North Carolina.

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I'm 1 of 4,000 New teens every day who take their first step towards suffering a heart attack or stroke. I smoked my first cigarette.

You have the chance to empower the Food and Drug Administration to regulate cigarettes and protect our youth. Heart disease and stroke are the nation's No. 1 and No. 3 killers and one out of every three deaths caused by smoking is related to cardiovascular diseases. Yet the tobacco industry and its deadly products remain unregulated.

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