Progress in Stroke Prevention and the North Carolina Stroke System of Care

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The Stroke Advisory Council and its partners created the NC Stroke System of Care, an online repository of strategies and resources, in efforts to prevent rising rates of stroke in our state and to steer our work. A stroke registry was developed to gain a more comprehensive view of stroke in the state and identify gaps in care and health inequities.

Introduction

The North Carolina General Assembly established the Justus-Warren Heart Disease and Stroke Prevention Task Force in 1995 in response to skyrocketing rates of heart disease and stroke in our state [1]. Clinicians, advocates, and health educators recognized these trends and identified the need for a task force to make recommendations for the prevention of heart disease and stroke. The anthropologist Margaret Mead is often quoted as having said, "Never doubt that a small group of thoughtful, committed individuals can change the world. In fact, it is the only thing that ever has." In this spirit through the efforts of this dedicated task force, the Stroke Advisory Council (the Council) was created in 2006 [2]. Under the leadership of founding member and current chair Peg O'Connell, the Council continues to advise the task force on stroke prevention and the latest advances in the stroke system of care.

Stroke is the 4th-leading cause of death in North Carolina; in the United States, stroke ranks as the 5th-leading cause of death [3]. North Carolina sits firmly in the buckle of the stroke belt, a region of the Southeastern United States known for its higher stroke mortality. Although rates of heart disease and stroke have declined in the last four decades due to rapid progress in prevention, national policies to reduce smoking, and progress in clinical treatment (including improvements in hypertension treatment and control, widespread use of statins to lower circulating cholesterol levels, and the development and timely use of thrombolysis and stents), disparities in care, access, and treatment persist [4]. A cause for alarm is that decreases in heart disease and stroke are stalling; and in some cases, rates are increasing while stroke mortality is rising among younger people aged 35–64 in the United States and in North Carolina [5]. Stroke in younger adults who survive can result in long-term disability, increased health needs, and high medical costs.

The NC Stroke Advisory Council developed the NC Stroke System of Care (SSC) in response to this rise in stroke morbidity and mortality among younger people, continuing disparities in stroke prevention and care, and major advances in treatment. The SSC is an online repository of strategies that guide our work and relevant resources for clinicians and stakeholders [6]. Posted on our website, startwithyourheart.com, the SSC is updated regularly and is mobile-friendly for easy access in the hospital or in the field. At its inception, the Council partnered with the North Carolina Health Information Exchange (HIE), known as NC HealthConnex, to get a more complete picture of stroke in the state and build a stroke registry.

Building a Stroke Registry within the HIE

The stroke registry was created in a joint venture with the NC Stroke Advisory Council, North Carolina Division of Public Health, and with NC HealthConnex and its technical partner SAS Institute. The registry provides a population health view of patients who have had strokes across the state; offers information on the continuum of care and on disparities (rural versus urban, racial and ethnic, geographic, access to care, etc.); and supplies data on patients at risk for stroke. This dashboard displays stroke encounters, numbers of patients, and the prevalence of stroke by county and ZIP code; tracks comorbidities; and identifies trends based on demographics such as race and age.

State law requires that health care providers receiving state funds (e.g., Medicaid, State Health Plan) connect to the HIE and share their data [7]. Among others, the goals of the enabling legislation include improving health care and patient outcomes while controlling rising health care costs [8]. The Stroke Advisory Council envisioned leveraging the data submitted to the HIE in a stroke registry to gain a more comprehensive view of stroke in the state and to identify gaps in care and health inequities. The registry pulls demographic and clinical data on stroke patients from more than 80 electronic health record (EHR) software applications and 9,000 health care facilities [9].

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Furthermore, all hospitals that seek stroke certification are required to use a stroke registry [10]. Currently, all stroke-certified hospitals in North Carolina use the American Heart Association's Get With The Guidelines-Stroke® (GWTG-Stroke), an in-hospital program for improving stroke care by promoting adherence to scientific treatment guidelines [11]. There are 108 hospitals in North Carolina that provide stroke services [12], and 68 of those are stroke certified; however, 43 are not certified and do not participate in GWTG-Stroke [13]. These hospitals tend to be smaller and serve lower-resourced communities. The Stroke Advisory Council and North Carolina Division of Public Health built the stroke registry within NC HealthConnex in pursuit of more comprehensive information that would include data from smaller, uncertified hospitals across the state, including those with fewer resources.

In July 2021, the Centers for Disease Control and Prevention (CDC) awarded North Carolina a cooperative agreement to participate in the Paul Coverdell National Acute Stroke Program (PCNASP), the goals being to strengthen the SSC and to identify and address disparities. PCNASP funded our state to build a registry in the HIE to address these goals. Those funds also support health systems to establish protocols to track and monitor health disparities through the data in their EHRs. Disparities in cardiovascular disease—the leading cause of morbidity and mortality globally—are among the starkest reminders of social injustices [14].

Currently, in addition to examining information on patients in NC HealthConnex who have had a stroke, the stroke registry work group is gathering stroke risk factors on patients in the HIE. This data will reveal—by county and ZIP code—where there are pockets of residents with stroke risk factors, and will direct hospitals, providers, and the Stroke Advisory Council to focus stroke education and prevention efforts.

Progress in Stroke Prevention and the Coverdell Stroke Program

Prevention of stroke is a focus of the Stroke Advisory Council and one of the major components of the NC Stroke System of Care (the others are stroke care, post-stroke care, health equity, and advocacy). While cutting-edge treatment of stroke is critical, the Council and our partners agree that it is best not to have a stroke in the first place. The American Stroke Association states that 80% of strokes are preventable [15]. In addition, as a condition of stroke certification, hospitals are required to provide stroke-prevention education in their communities. While primary prevention is crucial, we know that one of the greatest risks for stroke is having had one. Therefore, secondary prevention is also very important.

County Health Rankings reveal that North Carolina ranks higher than the national average on adult smoking, adult obesity, and physical inactivity [16]. Other risk factors for stroke include age, gender, race/ethnicity, genetics and family history, high blood pressure, diabetes, excessive alcohol consumption, high blood lipids (e.g., cholesterol), abnormal heart rhythm (e.g., atrial fibrillation), other heart conditions, and sleep apnea [17].

Seeing dramatic increases in stroke among the patients they serve, NC Coverdell Stroke Program partners are examining data from their EHRs and family medicine practices, evaluating social drivers of health (SDOH), and collaborating with community organizations to provide outreach, education, and follow-up services to populations at high risk for stroke.

For example, Novant Health's stroke program worked with its business intelligence clinical team to build a screening tool in the EHR to identify patients at high risk for stroke and to monitor disparities. Novant is providing blood pressure monitors to underserved patients in the Charlotte market and is making concerted efforts to partner with community agencies for education and outreach to individuals at risk for stroke, including the unhoused, those with disabilities, younger people, and those living in rural areas. Novant Health convened a work group composed of stroke and neurology managers, stroke navigators, case managers, and community health workers to address barriers to care in priority populations. Novant also formed Community Collaborative Councils in multiple communities to respond to specific needs and plan stroke education. Recognizing needs for financial resources to afford medication, transportation to attend follow-up appointments, and access to healthy food, Novant Health is also providing vouchers, help with medication, and food. Novant Health New Hanover Regional Medical Center (NHRMC) conducted focus groups and surveys inquiring about residents' knowledge of stroke, experiences in health care, and barriers to healthy living in two rural southeastern counties with high rates of stroke [18]. Responses from residents are guiding outreach and education efforts in this region.

ECU Health stroke teams review GWTG-Stroke data to identify trends and direct educational offerings. They also review Perception of Care surveys, which are completed during hospital admissions to determine patient needs, opportunities to improve care, and barriers that may impact compliance with discharge instructions. Through these surveys, ECU Health identified patients with stroke risk factors and recognized the need to ensure patient understanding of new or changed medications, daily goal planning, and follow-up care. They are collaborating with transitional care teams and case management to follow up with patients by telephone after discharge, provide needed equipment and medical supplies, and enroll patients in the telehealth program. ECU Health also developed Stroke Awareness Matters (SAM) [19], an educational program on stroke prevention and stroke symptom recognition, which is delivered in school to students in 3rd–5th grades. The stroke team created SAM in response to high rates of stroke in the northeastern Coastal Plain region.

Northern Regional Hospital (NRH) in Mount Airy is identifying and monitoring patients with stroke risk factors assessing patients for SDOH needs, sharing resources to address barriers, and providing education. In partnership with the local family medicine practice, NRH is tracking stroke risk in patients where data showed, for example, an alarmingly high incidence of diabetes among Medicare recipients (internal data, NRH). As a result, NRH is providing individualized patient education on the link between diabetes and stroke. NRH also identified transportation and the lack of financial resources as patient-reported barriers to care. Using comorbidity data coupled with information on SDOH, NRH refers patients to the care coordinator embedded at Northern Family Medicine for education and assessment for inclusion in the Chronic Care Management program. The stroke team observes that it is vital to optimize data-gathering systems so that they can respond to patient needs quickly enough to impact stroke risk.

To address a systemic hypertension inequity, for the past year Cone Health monitored the percentage of Black and African American individuals aged 18–85 with a diagnosis of essential hypertension whose blood pressure was less than 140/90. Working through their community clinics, they developed process improvements for both treatment and controls to eliminate the equity gap. Interventions have increased the percentage from 66% to 70.82% of those with blood pressure less than 140/90 (internal data, Cone Health). Ongoing work on improving this community measure continues into 2024.

Policy Strategies

Smoking is the leading cause of preventable death in the United States [20]. We know what works to prevent and reduce tobacco use. According to the CDC, proven strategies include 1) implementing comprehensive programs to prevent initiation of tobacco use; 2) providing barrier-free access to standard-of-care tobacco treatment; 3) eliminating exposure to secondhand smoke; 4) raising cigarette taxes; and 5) reducing youth access to tobacco products. Yet, North Carolina's cigarette tax ranks 48th in the nation at 45 cents per pack [21]; and North Carolina is one of only eight states that has yet to adopt a state law to increase the age of sale for tobacco products to 21, which would comply with federal law passed in 2019. Every year, the Justus-Warren Heart Disease and Stroke Prevention Task Force and other advocates educate members of the North Carolina General Assembly on the importance of funding effective interventions to reduce the health burdens of tobacco addiction and exposure. Approximately $140 million comes to our state each year from the Tobacco Master Settlement Agreement but is not allocated to reduce the harms of tobacco use or exposure. In better news, Medicaid Expansion in our state will have a huge impact on the health and well-being of North Carolinians and on stroke prevention. State participation in Medicaid expansion is associated with higher rates of insurance coverage, improved out-of-hospital cardiac outcomes, and some improvements in prevention and screening [22]. According to the American Heart Association, "To the extent that outpatient care enables better screening and management of stroke risk factors in low-income adults, Medicaid expansion could reduce the severity of strokes when they do occur" [23].

The Justus-Warren Heart Disease and Stroke Prevention Task Force, the Stroke Advisory Council, and our partners will continue to educate and advocate for these and other policies to decrease heart disease and stroke in our state. NCMJ

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