

Unbuckling the Stroke Belt: Answering the Call Through the Eastern North Carolina Stroke Network

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The Eastern North Carolina Stroke Network was formed in 2006 by local partners in 30 counties in what is known as the buckle of the stroke belt, where stroke mortality is alarmingly high. The organization's goal is to improve the continuum of stroke care from community prevention through recovery.

In 2009, the 4,391 stroke deaths accounted for an estimated 23,695 years of life lost in North Carolina [1]. (Years of life lost refers to the number of years a person lost by dying prior to the average life expectancy of 77.9 years in 2009.) In 2010, stroke was the fourth leading cause of death in the state [2], but it was the third leading cause of death for residents living in Eastern North Carolina [3]. North Carolina is one of the 8-12 states included in a region that is known as the stroke belt because stroke death rates have been higher there than in the rest of the nation. The coastal plains of North Carolina, South Carolina, and Georgia are known as the buckle of the stroke belt, because stroke mortality rates there are even higher than elsewhere in the belt [4]. Death rates from stroke in Eastern North Carolina are among the highest in the United States [4].

In response to the impact of cardiovascular disease and the prevalence of stroke in Eastern North Carolina's rural communities, the Eastern North Carolina Stroke Network (ENCSN) was established in 2006 following groundwork laid during meetings between Vidant Medical Center (formerly Pitt County Memorial Hospital) and the East Carolina University (ECU) Brody School of Medicine in Greenville, North Carolina. The purpose was to identify ways of improving stroke care in Eastern North Carolina. In 2005, the American Stroke Association (ASA) published an article titled "Recommendations for the Establishment of Stroke Systems of Care" [5]. These recommendations, which ultimately became the framework for the ENCSN, stated that a stroke system of care should do the following things:

First, a stroke system should ensure effective interaction and collaboration among agencies, services, and people involved in providing prevention and the timely identification, transport, treatment, and rehabilitation of individual stroke patients in a locality or region. Second, a stroke sys-

tem should promote the use of an organized, standardized approach in each facility and component of the system. Third, a stroke system should identify performance measures (both process and outcomes measures) and include a mechanism for evaluating effectiveness through which the system and its individual components continue to evolve and improve. [5]

In an effort to enhance cross-collaboration within the entire eastern region of the state, it became obvious that public health leaders could offer expert advice with regard to community engagement through existing and developing relationships. Additionally, the North Carolina Division of Public Health, through funding from the Centers for Disease Control and Prevention, had awarded funding to public health agencies to implement the North Carolina Heart Disease and Stroke Prevention (HDSP) Program in Eastern North Carolina. In 2006, local leaders from the American Heart Association (AHA), ECU Brody School of Medicine, Eastern Area Health Education Center (EAHEC), North Carolina HDSP Program, Vidant Medical Center, and Pitt County Public Health Department assembled in hopes of enhancing and improving stroke care in Eastern North Carolina through connecting health care providers in the region. This effort to engage all providers involved in the care of the stroke patient throughout the continuum from community prevention through recovery was accomplished through quarterly educational programs under the name of the Eastern North Carolina Stroke Network.

The quarterly educational programs offered to the region's health care providers resulted in other initiatives to improve stroke care. ENCSN focused on raising awareness of the complexities of stroke care and increasing educational opportunities related to stroke treatment in hospital settings. This provided impetus for Eastern North Carolina hospitals to plan systems of care using best practices for treatment of stroke and that would improve population health outcomes.

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Journey Toward Improving Stroke Care: Onslow Memorial Hospital

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In 2006, the leadership at Onslow Memorial Hospital (OMH) decided to address stroke care—a major population health issue in Onslow County. OMH is located in the southeastern region of North Carolina, which has been labeled the buckle of the stroke belt [1]. The southeastern region of North Carolina was so labeled due to high rates of hypertension, cardiovascular disease, obesity, and diabetes. Notably, Onslow County had an increase in stroke deaths in 2006 compared to the declining rates in North Carolina overall [2, 3].

The magnitude of the need for stroke care improvement was realized through benchmarking data in the North Carolina Stroke Care Collaborative (NCSCC). This data provided the framework to measure the quality of stroke care using evidence-based standards and recognized performance measures supported by the American Heart Association/American Stroke Association, Brain Attack Coalition, National Quality Forum, and the Joint Commission. Quality improvement (QI) initiatives began with development of an interdisciplinary stroke team to measure progress toward improved stroke care. The NCSCC shared data comparisons with registry hospitals across the state and provided monthly stroke care QI webinars and annual workshops for educational and networking purposes as well as to share best practices and guidelines for current stroke care standards. Additionally, grant funding was available and provided to further support hospitals with development or enhancement of innovative stroke care QI programs and projects.

Initial data collected in 2006 showed that OMH's com-

pliance with the stroke education performance measure score was only 28%, which was the lowest measured score for all the stroke performance indicators. There was a clear need to improve stroke care at OMH as well as in the community. OMH created an interdisciplinary stroke team to work on low stroke measure performance scores. The team helped implement process improvements such as stroke education with staff, improved documentation needed to show compliance with stroke performance measures, and enhanced educational resources for patients and families about stroke disease risks and poststroke care. These interventions improved OMH's stroke education performance score to 40% by 2007. In 2007, OMH began participation in the NCSCC's Quality Improvement Working Group which meets monthly to review registry data and makes recommendations for stroke care QI initiatives that are reasonable and feasible for hospitals to implement. OMH participation ensures that the perspective of a rural community hospital is taken into consideration when making decisions about which initiatives to implement. From this work came relevant stroke care QI monthly presentation topics for participating registry hospitals. Pivotal to the successes at OMH is the unwavering and unique support from the OMH Board and executive leadership in conjunction with the passion of frontline stroke care champions. These champions include nurses, physicians, physical therapists, pharmacists, radiologists, dietitians, and other health professionals who help ensure compliance with stroke standards, mentor new staff, and identify opportunities to improve stroke care.

From July through September of 2008 the regional coordinators of the Eastern and Northeastern North Carolina HDSP programs, who had been designated by partners to staff the ENCSN, initiated a strategic planning effort in response to the ENCSN's growth. As had been the case in 2003 and 2006, key strategic partners—including the AHA and Vidant Medical Center—recognized the value and importance of engaging members from 30 targeted counties in Eastern North Carolina in the strategic planning process. Counties were identified as targets based on several definitions of Eastern North Carolina: counties located east of Interstate 95; counties with the highest stroke mortality; counties previously grouped by trauma systems; and counties falling within the service areas of the ECU Brody School of Medicine, EAHEC, the North Carolina HDSP Program, Vidant Medical Center, and other networked hospitals.

Ultimately, stakeholders from 25 organizations met 3 times to develop plans for strengthening the ENCSN's structure and membership and to identify priority actions for addressing stroke care needs in Eastern North Carolina. During the planning process, the ASA recommendations

for the establishment of stroke systems of care [5] were adopted and each facet of the stroke continuum of care—primary prevention, pre-hospital, acute, subacute, secondary prevention, and rehabilitation/recovery—was discussed.

As a result of the strategic planning process, the vision, mission, structure, and membership targets were defined. The vision of the ENCSN is "to be recognized as a leading resource for voluntary collaboration on stroke best practices in Eastern NC communities." The mission of the network is "to improve the prevention, treatment, and quality of stroke care in Eastern NC through a coordinated regional system" [6]. The ENCSN is staffed by regional coordinators of the North Carolina HDSP Program, who receive support from a steering committee. Target membership counties of the ENCSN are Beaufort, Bertie, Camden, Chowan, Carteret, Craven, Currituck, Dare, Duplin, Edgecombe, Gates, Greene, Halifax, Hertford, Hyde, Jones, Lenoir, Martin, Nash, Northampton, Onslow, Pamlico, Pasquotank, Perquimans, Pitt, Tyrrell, Warren, Washington, Wayne, and Wilson. Membership is open to any person or organization from these counties who will champion the improvement of

OMH's focus is on increasing the community's awareness of the state's stroke reduction program using a three-pronged approach: prevention and education in pre-hospital screening; individualized acute care education; and post-hospital follow-up. Grant funding in 2008 from the NCSCC, the NC Stroke Association (NCSA), and the Kate B. Reynolds Charitable Trust (KBR) further optimized opportunities to enhance the OMH Stroke Program and realize its vision. Through this funding, a dedicated Stroke Nurse Coordinator (SNC) was hired to coordinate the increasing need to facilitate the stroke care across the continuum. The dedicated educator/SNC serves as the liaison to and resource for community stroke needs and patient and family education while also providing education and support to hospital staff. The SNC also facilitates interdisciplinary care coordination and monitors stroke outcomes.

The SNC provides community outreach and education on inpatient and outpatient poststroke care utilizing a Stroke Risk Identification Screening Program which provides standardized protocols for identifying stroke risk factors, counseling participants, directing them to resources, and providing outcome management through partnerships for those found to be at high risk for stroke. In this way, potential problems with access and interventions, as needed, are identified. Staff education is ongoing from the time of orientation to the hospital. The education includes annual mandatory computerized module learning, updates at regular staff meetings and real time feedback with chart reviews and care management discussions.

In 2010, OMH became designated as Stroke Capable with the Onslow County Emergency Medical Services (EMS). Performance measure scores for stroke education improved to 96.9%. In 2011, OMH's stroke education per-

formance score for stroke education (95.2%) was statistically higher than the aggregate 80.4% stroke education score for all NCSCC registry hospitals. In June 2012, Onslow Memorial Hospital received accreditation from the Joint Commission as Advanced Primary Stroke Certified. NCMJ

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stroke care in their community.

Following the formal strategic planning process, the ENCSN moved forward to work on 4 priorities: community prevention education, hospital plans of care, quality improvement programs, and continuing education requirements for health professionals. Representatives of the AHA, EAHEC, North Carolina Stroke Care Collaborative, Onslow Memorial Hospital, Vidant Medical Center, and Pitt County Health Department were identified as co-chairs for work groups for each of the Network's priorities.

From January 2009 through May 2012, 9 ENCSN meetings were held and the regional coordinators of the North Carolina HDSP Programs helped sponsor 4 Eastern Regional Stroke Conferences in partnership with other major stroke stakeholder organizations, including the ECU Brody School of Medicine, EAHEC, and Vidant Medical Center.

Quarterly meetings are rotated throughout the region to engage the full partnership base and are usually held at a facility belonging to a member of the ENCSN. Since 2009, meetings have been held in Greenville, Jacksonville, Kinston, Morehead City, New Bern, Rocky Mount, and Williamston.

The ENCSN has been able to successfully attract local, state, and national speakers to these meetings. Topics addressed have included innovative practices and emerging issues facing each of the ENCSN's work groups, including, but not limited to topics such as assistive technology for stroke patients, emergency medical services and hospital collaboration in Duplin County, faith-based cardiovascular disease management in Eastern North Carolina, and telehealth and chronic care management to reduce hypertension.

Specialized trainings sometimes occur immediately following quarterly meetings. For example, in January 2012, a blood pressure measurement mini-course was offered by the regional coordinators of the North Carolina HDSP Program. Because the ENCSN meetings draw attendees from across the region, partners from a variety of locations were able to attend the class. Attendees included people who work in acute stroke care, emergency medical services, federally qualified health centers, hospital community outreach, long-term care, and public health.

As part of the quarterly meeting format, health care professionals from community-based organizations, pub-

lic health organizations, hospitals, physician practices, rural and community health centers, rehabilitation centers, emergency medical services, educational institutions, Area Health Education Centers, the AHA, and the North Carolina Stroke Collaborative join together with stroke survivors to plan, coordinate and accomplish goals which improve patient care through education and best-practice management throughout the continuum of care. As part of the network's response to the region's needs, a rehabilitation/transitions of care work group was added to the ENCSN's organizational structure in 2010. The network's membership continues to grow. As of August 2012, the ENCSN had 400 members representing all of the 30 target membership counties in Eastern North Carolina. For comparison, in April 2009 the ENCSN had only 165 participants, and only 80% of the target counties were represented. When the membership was last surveyed, the top 4 types of organizations participating in the ENCSN were hospital-based staff (41%), emergency medical services (26%), public health (15%), and rehabilitation (7%).

Integral components of the ENCSN include a wealth of resources and the means to share and replicate these resources—processes for educating health professionals and patients, for managing cases, for rehabilitating patients, for supporting applied health care providers, and for supporting individuals dealing with stroke. In addition to its regular programs, the ENCSN has led the region toward increased use of the Advanced Stroke Life Support (ASLS) curriculum by encouraging prehospital and hospital collaboration in the provision of stroke care; by providing technical assistance to providers seeking information about ASLS; by subsidizing ASLS training costs in critical areas; and by promoting ASLS classes offered by members throughout the region. Members have had the opportunity to apply for and receive scholarships from the ENCSN that enable them to attend other stroke continuing education courses, such as the Stroke Knowledge Program at the University of North Carolina at Chapel Hill. Also, the ENCSN has promoted and helped hospitals apply for funding to support improvement of stroke care through organizations such as the North Carolina Stroke Care Collaborative and the North Carolina Stroke Association. A Web site (www.encsn.org) has been developed to help those trying to manage cardiovascular disease and stroke; it contains data, references, resources, and partner news and events.

The ENCSN has demonstrated success in carrying out the ASA's 3 recommendations to implement a stroke system of care [5]. First, quarterly meetings, work groups, and individual partner connections have fostered effective interaction and collaboration among ENCSN members. Second, hospitals in Eastern North Carolina have worked together through the ENCSN to establish and share stroke care plans that reflect best-practice recommendations, and hospital-based stroke teams have formed that represent the stroke continuum of care at the community level.

Third, progress toward improving the quality of stroke care provided in Eastern North Carolina is measured, evaluated, and shared with the ENCSN members by stakeholder partners, including the AHA (which offers a program called "Get with the Guidelines—Stroke"), the North Carolina Office of Emergency Medical Services, the North Carolina Stroke Care Collaborative (which is a Paul Coverdell Stroke Registry), and the Primary Stroke Center at Vidant Medical Center. Through a combination of structure, initiatives, and key relationships, the ENCSN has developed into a locally determined and relevant vehicle for implementing 6 historical priorities of the NC HDSP Program including increasing awareness of the signs and symptoms of heart attack and stroke; controlling high blood pressure; controlling high cholesterol; improving quality of care; improving emergency response; and eliminating health disparities.

The ENCSN continues to grow and to provide resources to those serving on the front lines of stroke care in Eastern North Carolina. The network hopes to remain a strategic partner in bridging the gaps in the continuum of care to help unbuckle the stroke belt in Eastern North Carolina. **NCMJ**

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