The Five Best Ways to Improve a Stroke Center

Stroke centers should strive for strong communication, a well-organized team, high-quality imaging, clear processes and protocols, and a well-built hospital network within the community.

BY LEE R. GUTERMAN, PHD, MD, AND HOLLY C. BOWSER, MBA

The treatment of patients with acute stroke has gained in popularity. Use of intravenous tissue plasminogen activator and intra-arterial catheter-based therapies has shown that vessel recanalization can be achieved up to 80% of the time.[1] Hospitals that are committed to treating acute stroke have grown in number. State and private accreditation organizations have been established to certify stroke centers. Successful stroke centers have been able to provide rapid diagnosis and treatment by acquiring imaging and laboratory results within 30 minutes of patient arrival and instituting therapy in less than 60 minutes.

This article presents five ways to improve the treatment of acute stroke patients in an attempt to help guide stroke center organization and processes.

COMMUNICATION

The foundation of any acute stroke program resides with the people who serve the stroke patient population. Communication among allied health professionals controls the efficiency of patient treatment. The fast and efficient transfer of accurate information is at the core of successful acute stroke patient care.

Recording and communicating the time of symptom onset, symptom severity, and the progressive change of signs and symptoms is at the core of successful prehospital care. Clear and concise communication of prehospital patient information enables the hospital team to maximize its state of readiness before patient arrival.

Implementation of a digital communication system can improve all prehospital stroke encounters. Although stroke scales such as the Cincinnati Prehospital Stroke Scale and the National Institutes of Health Stroke Scale can be helpful to describe the acute stroke patient's condition, these neurologic evaluation tools do not adequately represent the stroke patient's prehospital condition. Seizures, hypertension, hypotension, and airway compromise all play a part in the prehospital phase that strongly affects stroke patient outcome. Many ambulances are equipped with laptops that are connected to mobile digital networks. Creating a digital link between the ambulance staff and the hospital stroke team can improve the prehospital impact on stroke patient outcomes. This is especially true in hemorrhagic stroke patients with sustained hypertension during transport to the hospital.

Stroke team communication can also be enhanced using digital communication. A smartphone-based mobile network can enable rapid, simultaneous notification of all segments of the acute stroke team (Elias Sarraf, President, EM Systems, Inc.; personal communication, August 2010). All elements of patient information can be captured and easily disseminated to part or all of the stroke team. The addition of a well-educated registered nurse transfer/triage service can act as the focal point of communication. This creates an environment of information transfer that can prime all elements of the stroke team to a high degree of readiness before patient arrival at the hospital.

Information can be disseminated to doctors, nurses, computed tomography (CT) staff, laboratory staff, angiography on-call teams, nursing supervisors, and bed control.

This coordinated exchange of information can speed triage, diagnosis, imaging, and intervention and even facilitate bed allocation once established.

WELL-ORCHESTRATED STROKE TEAM

A well-orchestrated stroke team meets the acute stroke patient at the ambulance bay. The more information this team has about the acute stroke patient, the better prepared they will be to meet the patient's hyperacute treatment needs. Nurses educated in acute stroke triage and stabilization begin the emergency department (ED) admission process. The ED physician is the core of hyperacute stroke care and early triage. He or she screens the patient for stroke mimics and then facilitates blood pressure control and airway management. The patient is then rushed to CT for imaging studies. The stroke team members should remain with the patient until the patient is transferred out of the ED.

The importance of stroke neurology cannot adequately be reduced to words. All treatment decisions regarding acute stroke patients ultimately rest with the stroke neurologist. He or she must be facile at identifying stroke mimics, have critical care skills to manage stroke patients with multisystem organ comorbidities, be able to interpret neuroimaging studies without delay, know how to titrate blood pressure using intravenous infusions, and be skilled with all forms of intracranial revascularization regardless of modality. The stroke neurologist determines the most appropriate intervention for the acute stroke patient and directs care to neurosurgical and endovascular intervention.

After treatment, patients are taken to a critical care or stroke ward where carefully designed treatment paradigms must be in place to be sure thorough workups are done to prevent recurrent stroke. Hospital, state, and federal guidelines help direct outcome measures.

IMAGING

Rapid access to high-quality imaging 24 hours a day, 365 days a year is critical for stroke center function. CT imaging must be performed as rapidly as possible after acute stroke patient stabilization. In most cases, the CT without contrast should be completed within 30 minutes after the patient arrives at the ambulance bay. Thrombolytic therapy and revascularization depend on this information. Radiologic interpretation must be performed immediately, either by a radiologist or a neurologist, in an effort to rule out intracranial hemorrhage or a completed infarction.

CT perfusion and CT angiography can also be helpful in determining if salvageable brain or large vessel occlusion is present. Magnetic resonance (MR) imaging can be very useful if conventional CT imaging fails to elucidate the origin of neurologic deterioration. In addition, MR imaging can be very helpful in preventing secondary stroke. Stroke centers should strive to have around-the-clock CT and MR imaging available.

Endovascular intervention requires sophisticated angiography equipment with road map fluoroscopy to help guide the catheter and device placement in tortuous anatomy of the intracranial circulation. Three-dimensional reconstruction can be very helpful in treating hemorrhagic stroke caused by a ruptured cerebral aneurysm. As new devices emerge, the ease of vessel recanalization will improve, and time to recanalize will decrease. Many acute stroke patients present to the ED outside of the time window for intravenous lytic therapy. Catheter-based recanalization methods extend the time window for acute stroke therapy. Although nationally the number of neurointerventionists is increasing, the number of interventionists will not support a catheter-based program at every stroke center.

PROTOCOLS AND PROCESSES

To facilitate fast and efficient stroke patient triage and treatment and to maximize patient outcome, the acute stroke patient's care must be choreographed like a complex ballet. Each step in the process must be described so that all who participate know their parts. This can be accomplished with development of protocols and order sets that can help define and guide the process for care of the acute stroke patient. These order sets and clinical process guidelines help ensure that no phase of the stroke patient's care goes unattended. A detailed written description of each phase of the acute stroke patient's care from admission to follow-up should be developed.

Careful completion of prefabricated data sheets and order sets not only sets a high standard for patient care but also ensures that state-mandated indicators are adequately documented. As the acute stroke program expands to include transfers from smaller regional hospitals, standardized orders and clinical processes can help streamline patient care at the referring hospitals as well.

Evaluating problems with patient flow, treatment decisions, and analyzing treatment outcomes are the core of process improvement. When treating acute stroke patients, time is of the essence. Therefore, continued retrospective process analysis and retrospective analysis of time delays must be performed monthly. Multidisciplinary case reviews help normalize the stroke team's knowledge base and serve to improve the treatment of acute stroke patients.

Development of a Process Improvement program is critical to the success of a hospital stroke program. Once protocol and clinical processes have been implemented, monitoring of performance and critical evaluation of process errors are required to ensure that quality is maintained. It is easy for processes to revert to pre–stroke center methods. As a result, patient care can suffer and outcomes may decline.

Development and implementation of a physician-lead morbidity and mortality review is a critical tool in improving the care of the acute stroke patient. This conference can help normalize the skill sets of physicians and allied health professionals as they strive to deliver a standardized level of quality acute stroke care.

HOSPITAL NETWORKS

Each stroke center must serve the community in which it is based. More than likely, communities adjacent to established stroke centers will be devoid of adequate stroke care. It is the duty of all stroke centers to reach out regionally to help elevate the care of acute stroke patients in adjacent communities. This can be achieved through educational events, interhospital training, physician and allied health professional relationships, stroke screening fairs, and transfer agreements.

Formal stroke coverage relationships between stroke centers and remote locations can be facilitated using telemedicine stroke products that are routinely available. These telemedicine tools have documentation instruments that help guide the process, record timing of events, and facilitate the organized transfer of information. Successful implementation of stroke-telemedicine relationships requires cooperation between the hospitals involved; these relationships are most productive when many of the processes implemented at a designated stroke center are established at the referring site. The implementation of the stroke process at the referring hospital can save time and help improve patient outcome.

CONCLUSION

The care of acute stroke patients is complex and time and labor intensive. The experience of reversing the signs and symptoms in an acute stroke patient provides motivation to invest in this arduous process. The best method to achieve high-quality, long-lasting improvement in the acute stroke patient population is through process and dedication. The ongoing goal of any stroke center should be to strive for good communication, a well-organized team, high-quality neuroimaging, well-developed processes and protocols, and the establishment of regional hospital networks. ■

Lee R. Guterman, PhD, MD, is Medical Director, Stroke, Catholic Health System, and is with the Buffalo Neurosurgery Group in Buffalo, New York. Dr. Guterman may be reached at lguterman@buffaloneuro2.com.

Holly C. Bowser, MBA, is Vice President, Neuroscience and Vascular Service Lines, Catholic Health System in Buffalo, New York. Ms. Bowser may be reached at hbowser@chsbuffalo.org.

1. Brekenfeld C, Schroth G, Mattle HP, et al.Stent placement in acute cerebral artery occlusion: use of a self-expandable intracranial stent for acute stroke treatment. Stroke. 2009;40:847-852.