What Is Stroke Certification and Does It Matter?

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KEYWORDS

• Stroke certification • Stroke systems of care • Primary stroke center
• Comprehensive stroke center • Benefits of certification

KEY POINTS

- Stroke care and treatment have undergone rapid transformation over the past 2 decades.
- These developments in treatment have necessitated rapid identification of stroke symptoms and hierarchal levels of stroke systems of care.
- Certification of stroke centers is provided by several different agencies and can be costly and is often perceived as burdensome.
- Certification includes the following benefits: provides an objective assessment of stroke care, creates a cohesive team, recognizes the nurse's contribution, and improves patient outcomes.
- The intensive care unit nurse is critical to an organization successfully obtaining stroke center certification. Both patients and nurses benefit from stroke center certification and quality improvement programs.

BACKGROUND

An acute stroke is a medical emergency with treatments that are time dependent. Stroke care has undergone tremendous transformation over the past 2 decades. For ischemic strokes, the introduction of intravenous thrombolysis (alteplase) and endovascular therapies such as mechanical thrombectomy have been imperative to reducing disability and death from stroke[1]

Recombinant tissue plasminogen activator (alteplase) was approved by the US Food and Drug Administration in 1996 for use within 3 hours of onset of stroke symptoms. In 2008, the time window for intravenous (IV) alteplase was extended to 4.5 hours after symptom onset as a result of the European Cooperative Acute Stroke Study trial that tested the efficacy and safety of alteplase administered between 3.0 and 4.5 hours after the onset of a stroke[2] A recent trial by Ma and colleagues[3] reviewed the possibility of extending the alteplase window even further to 9 hours in select patients.

Updated guidelines from the American Heart Association/American Stroke Association (AHA/ASA) in 2015 expanded the window of treatment for thrombectomy from

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6 hours to 16 to 24 hours after last seen well.[4] These changes came after 2 landmark randomized controlled trials, DAWN[5] and DEFUSE-3.[6] DEFUSE-3 was stopped early for efficacy when results revealed improved 90-day functional outcomes with thrombectomy 6 to 16 hours after the onset of symptoms. DAWN extended the time window to 24 hours for selected patients. Patients in the positive thrombectomy trials were treated at hospitals with complex, efficient, team-based stroke systems in place.[7] Experts note, to optimize attainment of trial results in actual practice, patients should receive thrombectomy treatment at facilities certified as having the "resources, personnel, organization, and continuous quality improvement processes characteristic of trial centers."[7] In other words, stroke systems of care.

STROKE SYSTEM OF CARE

The development of acute treatments for stroke has necessitated the rapid identification of stroke symptoms and an organized approach to stroke health care delivery. This has led to a tiered system of certified stroke centers.

As far back as 2000, anticipating the need for a hierarchical organization of stroke care, the Brain Attack Coalition (BAC) provided recommendations for the development of primary stroke centers (PSCs).[8] In the years that followed, BAC published additional recommendations for acute stroke–ready hospitals (ASRHs) and Comprehensive Stroke Centers (CSCs).[8] In 2005, the AHA/ASA brought together a task force on the development of stroke systems.[9] This task force recommended methods for the implementation of stroke systems of care. Nearly 20 years later, the recommendations for regional systems of stroke care remain. The most recent ASA 2018 guidelines recommend that

> *"Regional systems of stroke care should be developed. These should consist of the following; (a) Healthcare facilities that provide initial emergency care, including administration of IV alteplase and (b) Centers capable of performing endovascular stroke treatment with comprehensive periprocedural care…."*[10]

In 2019, ASA updated its prior system of stroke care guidelines paper to help lead policy makers and health care providers. The update spans primordial and primary prevention, acute stroke recognition, secondary prevention at hospital discharge, and rehabilitation and recovery.[11] The paper notes that given the recent developments in treatment, specifically thrombectomy, getting patients to a qualified provider at the right hospital was critical to the patient accessing the highest level of care for which they are eligible. Furthermore, patients with acute complex stroke, such as those with intracranial hemorrhage (ICH) and subarachnoid hemorrhage (SAH), should be evaluated and treated at hospitals with dedicated neurosurgical and neuroscience intensive care services.[11] Given this, the previously mentioned 3-tier system of hospital certification that has emerged over the past 20 years has undergone further refinement to include an additional certification of thrombectomy capable[11]

The differing levels of stroke certification recognize the variances in hospital resources, staff, and training necessary to provide stroke care. In some states, emergency medical services (EMS) have routing protocols that dictate to what level of stroke center a patient will be taken.[12] If hospitals are not properly certified at the level they are equipped to care for patients with stroke, they risk being bypassed by EMS. Not only does this negatively affect the financial health of the hospital, it can delay critical treatment for the patient. This may be a significant financial and clinical motivation for obtaining certification by health care organizations.

Certification for each level of stroke care can be achieved through independent groups that offer certification programs. Most stroke centers are certified by The Joint

Commission, which has formed a partnership with ASA. The Joint Commission certifies 75% of all CSCs. In addition, Det Norske Veritas and the Healthcare Facilities Accreditation Program offer similar certification programs.[13] In some states, the department of public health also offers certification. Although there are differences between programs, the concepts remain the same across the certifying agencies: each certification program is based on the delivery of consistent, high-quality stroke care based on evidence-based practice. This article focuses primarily on The Joint Commission Stroke Certification in terms of terminology, although the reader is encouraged to review the standards and performance measures for each certifying agency. Whichever certifying agency an organization chooses, it is imperative to have open communication with those who set the standard to ensure the level of quality and attainment make clinical sense for the bedside team.

LEVELS OF CERTIFICATION

Primary Stroke Centers

PSCs comprise the largest group of hospitals that are stroke certified[13] PSCs were the first level of care that was created to address the issues associated with poor patient access to life-saving stroke treatment. In addition to the certifying agencies previously discussed, some state department of public health agencies certify PSC hospitals.

PSC certification requires a formalized, programmatic approach to stroke care that can meet the needs of patients with stroke throughout the duration of their hospitalization. As with all levels of certification, the PSC stroke program must use a standardized method of delivering care that is developed from evidence-based clinical practice guidelines (**Box 1**). PSC certification also requires that the hospital has the capability to monitor stroke care through performance measures and provides stroke education to hospital staff, EMS providers, and the community.

Acute Stroke Ready

Studies have shown that approximately 50% of the US population does not live within 60 minutes of a PSC.[14] ASRHs were developed to fulfill a critical community need within the stroke systems of care. These are frontline providers for many patients and ASRHs must be able to safely administer IV thrombolytics (**Box 2**). ASRHs tend

Box 1
Primary stroke center

- Acute stroke team available 24/7[8,18]
- Access to a neurologist in person or via telemedicine
- Computed tomography (CT) capabilities and laboratory testing 24/7. Availability of CT angiography/magnetic resonance angiography and cardiac imaging
- Ability to provide intravenous thrombolytics
- Stroke unit or designated beds for patients with acute stroke
- Transfer agreement for neurosurgical emergencies/further treatment
- Neurosurgical services within 2 hours
- Annual staff stroke education requirements
- Annual emergency medical services and community education requirements
- Adherence to guidelines and monitoring of performance measures

Box 2
Acute stroke–ready hospital

- Acute stroke team available 24/7[8,18]
- Access to a neurologist: in person or via telemedicine
- CT capabilities and laboratory testing 24/7
- Ability to provide intravenous thrombolytics
- Transfer agreement with primary stroke center (PSC) or comprehensive stroke center
- Neurosurgical services within 3 hours (can be by transfer)
- Adherence to guidelines and monitoring or performance measures[15]

to be smaller facilities with a typical bed count between 30 and 100 and yearly stroke admissions between 25 and 50.[13] They are required to have an acute stroke team available 24/7, a neurologist accessible in person or via telemedicine, computed tomography capabilities to rule out hemorrhage to safely administer IV thrombolytics and have transfer agreements in place with a PSC or CSC to immediately access a higher level of care.

Thrombectomy-Capable Stroke Centers/Primary Plus

This certification is designed for those hospitals meeting the requirements for primary stroke certification that are also able to provide endovascular procedures and post-procedure care (**Box 3**). This is one of newer certifications that was developed to represent an intermediate level of care between PSCs and CSCs. This certification has been somewhat controversial, as it enables PSCs to provide thrombectomy without meeting all the requirements of a comprehensive stroke center. Evidence suggests that patients treated with thrombectomy at low-volume centers have fewer positive outcomes than those at high-volume centers.[15,16] Since the initial introduction of the Thrombectomy-capable Stroke Centers, certifying bodies have introduced minimal thrombectomy volume requirements to ease the concern that some hospitals may not complete enough thrombectomies to be proficient.[17]

Comprehensive Stroke Center

CSC certification is the most demanding stroke certification available and is designed for those hospitals that have the ability to receive and treat the most complex stroke patients (**Box 4**). The CSC must demonstrate that it has highly trained staff readily available to care for the patient with acute stroke. In addition, the CSC must have

Box 3
Thrombectomy-capable/primary plus

All the same requirements for PSC plus the following[8,18]:

- Ability to perform mechanical thrombectomy and intra-arterial procedures and provide post-thrombectomy care
- Ability to maintain volume requirements for number of cases per year
- Dedicated neurointensive care beds
- On-site critical care coverage 24/7
- Increased staff education requirements
- Increased number of performance measures

Box 4
Comprehensive stroke center select requirements

- Dedicated neurointensive care unit beds for complex stroke patients 24/7[8,18]
- On-site neurointensivist coverage 24/7
- Comprehensive diagnostic services: CT/CT angiography, MRI/magnetic resonance angiography, laboratory tests, catheter angiography 24/7; other cranial and carotid duplex ultrasound and transesophageal echocardiography/transthoracic echocardiography as indicated
- Ability to meet the needs of multiple patients with complex stroke at one time
- Advanced training for nurses caring for patients with complex stroke
- Participates in patient-centered research
- Neurosurgical services available 24/7
- Treatment capabilities: intravenous thrombolytics, endovascular thrombectomy therapy, microsurgical neurovascular clippings of aneurysms, coiling of aneurysms, carotid stenting, carotid endarterectomy; minimal volume requirements for intravenous and endovascular therapy, clipping and coiling of aneurysms
- Extensive quality improvement program and reporting on 18 performance measures (Joint Commission)

the ability to perform advanced diagnostic and treatment techniques, have substantial infrastructure to support the program, and have rigorous educational and patient-centered research programs. The CSC functions as a major resource center for several ASRHs, PSCs, and thrombectomy-capable/primary stroke plus hospitals.

COST OF CERTIFICATION

Cost of stroke program certification is often cited as a barrier to obtaining stroke program designation. The cost of certification varies among different certifying bodies. The certifying agencies may charge an annual fee and also an additional fee for the on-site visit that often occurs every 2 years.

Range of annual certification fees:

- Acute Stroke–Ready Certification: $3900–$4475
- Primary Stroke Certification: $7050–$8400
- Advanced Thrombectomy-Capable/Primary Stroke Plus: $12,200–$17,550
- Comprehensive Stroke Center Certification: $16,400–$24,700

In reality, it is often much more costly to the organization to build the infrastructure that is required to be successful. To attain certification, programs are required to develop, disseminate, and implement evidence-based policies and procedures. Often additional staff must be hired to administer the stroke program, as well as to meet the demand of the quality standards and performance guidelines. Many hospital administrators, physicians, and nurses ask: Why certify? And does it really matter?

WHY CERTIFY?

Certification Provides an Objective Assessment of Clinical Care for Hospital Leadership and Prospective Patients

Health care professionals pride themselves on delivering the best care possible. Intensive care nurses are highly trained, dedicated health care professionals, hence,

objective feedback on care is critical to a nurse's professional success and safe practice. A properly run and supported stroke program allows nurses to get real-time feedback on their care plans, treatment, and decision making. Stroke certification provides a strong platform for data-driven improvements in hospital-based acute stroke care.[11]

Stroke center certification requires an organization to report on several stroke performance measures. Many of these measures are nurse driven. The number of measures will depend on the level of certification. PSC certification generally requires the Stroke (STK) measures. CSC certification requires the highest number of performance measures (STK measures and Comprehensive Stroke (CSTK) measures). Those required by The Joint Commission program are shown in **Tables 1** and **2**. Other certifying agencies use similar performance measures.

In addition, every health care organization establishes internal standards and rules for operations. Stroke certification acts as an objective stamp of approval and ensures that the organization meets regulations and standards set by a recognized, external organization.

Certification distinguishes the stroke center from other health care organizations. Critically ill patients and their families want assurance that they are seeking care in a hospital that can be trusted to provide the best care for their illness. Certification can enhance a hospitals reputation by the following:

- Increasing credibility among the referring health care community and with patients.
- Demonstrating the organization's commitment and dedication to providing top-level stroke care.[18]
- Increasing the organization's ability to attract top-level health care professionals.[18]

Creates a Cohesive, Well-Trained Team

Certification is best accomplished by engaging the entire organization's staff in the journey, including bedside intensive care unit (ICU) nurses who are directly involved in the stroke patient's care.

The physician-dominated model of care has transitioned to team-based care.[19] Literature has consistently shown a relationship between teamwork and patient

Table 1
Joint commission STK measures

Measure No.	STK Measure Name	Ischemic Stroke	Hemorrhagic Stroke
STK-1	Venous thromboembolism prophylaxis	X	X
STK-2	Discharged on antithrombotic therapy	X	
STK-3	Anticoagulation for atrial fibrillation	X	
STK-4	Thrombolytic therapy	X	
STK-5	Timely antithrombotic therapy	X	
STK-6	Discharged on statin medication	X	
STK-8	Stroke education given	X	X
STK-10	Patient assessed for rehabilitation	X	X

Abbreviations: STK, Stroke; X, performance measure applies to the associated diagnosis.

Table 2
Joint commission CSTK measures

Measure No.	CSTK Measure Name	Ischemic Stroke	Hemorrhagic Stroke
CSTK-1	National Institutes of Health Stroke Scale performed	X	
CSTK-3	Severity measurement performed for subarachnoid hemorrhage and intracranial hemorrhage (ICH)		X
CSTK-4	Procoagulant reversal agent initiation for ICH		X
CSTK-5	Hemorrhagic transformation (rate)	X	
CSTK-6	Nimodipine treatment administration		X
CSTK-8	Thrombolysis in cerebral infarction posttreatment reperfusion grade	X	
CSTK-9	Arrival time to skin puncture	X	
CSTK-10	Modified Rankin score at 90 d, favorable outcome	X	
CSTK-11	Timeliness to reperfusion: arrival time to TICI 2B or higher	X	
CSTK-12	Timeliness of reperfusion: skin puncture to TICI 2B or higher	X	

Abbreviations: CSTK, comprehensive stroke center; X, performance measure applies to the associated diagnosis.

outcomes, particularly in ICUs.[20] The evidence of improved outcomes sufficiently warrants the implementation of programs that are designed to improve the level of teamwork and collaboration among intensive care providers.[21]

Stroke certification programs highly value interprofessional practice models. The very nature of stroke care requires coordination of multiple clinical services. Collaboration among physicians, nurses, and other health care professionals increases a team awareness of each discipline's unique knowledge and skills and leads to continued improvement in decision making.[22]

Properly formed teams benefit from the knowledge, skills, and experience of a wider range of people to solve their problems. The dynamic interaction of the individuals is often the best way to find effective solutions to problems[19]

A study completed by Kagan and her colleagues[23] that looked at the effect of Joint Commission accreditation on the nursing work environment found that the process created a climate that was "improvement oriented, encouraged teamwork and quality improvement."

Certification Recognizes Nursing Contributions

The 2019 recommendations for the establishment of stroke systems of care developed by the ASA recognizes nurses as key stakeholders in the process of building regional and state systems of care.[11] At the hospital level, any attempt to obtain stroke certification will not be successful without buy-in and commitment from nursing leadership and the nurses providing direct patient care. Stroke certification programs

strongly recognize the contributions of nurses in the care of patients with stroke, and most stroke programs are led by registered nurse stroke coordinators.[24] Advanced practice providers also are highly suggested or required to be a part of the stroke team.[17,24]

Certifying agencies require that each nurse caring for the patient with stroke receive an appropriate orientation to his or her unit and stroke care education. This orientation must be documented.[17] Nurses should have access to stroke protocols and reference materials. Yearly evaluations and ongoing stroke competency assessments also are required.[17]

Eight hours annually of stroke education for ICU nurses caring for patients with complex stroke in a CSC is required or highly preferred, depending on the certifying agency.[24] This can be extremely challenging and an expensive endeavor for the organization. Different teaching modalities can be used to meet this requirement, such as computerized learning, face-to-face or taped lectures, journal articles, review of protocols and guidelines, stroke conferences, National Institutes of Health Stroke Scale training, and Emergency Neurologic Life Support training.

Nurses caring for patients with complex stroke in the ICU of a CSC are expected to be experts in stroke care. Competencies are listed as follows:

Neuro-ICU Nursing Competencies for The Joint Commission (TJC) CSC[17]

Demonstrate expertise in the following:
- Neurologic and cardiovascular assessment
- Management of ventriculostomy devices
- Management of intracranial pressure
- Nursing care of patients with hemorrhagic stroke (ICH and SAH)
- Nursing care of patients receiving IV and intra-arterial alteplase
- Management of malignant Ischemic Stroke (IS) with craniectomy
- Use of thermoregulation protocols
- Use of IV vasopressor, antihypertensive, and positive inotropic agents
- Intracranial hemodynamic monitoring
- Ventilatory management

Understanding the Key Role of Nurses in Caring for the Patient with Stroke

The nursing plan of care is one of the most heavily scrutinized areas that is reviewed during the certification site visit.

Certifying agency reviewers specifically look at the following:

- Neuroassessment and reassessment
- Dysphagia screening
- Medication monitoring and administration
- Individualized stroke education
- Utilization of appropriate consults: rehabilitation professionals, social work, palliative care, case management, and chaplaincy

Certification Improves Patient Care and Outcomes

Quality improvement is an important activity for all members of the interdisciplinary team, including nurses.[25] The national project Quality and Safety Education for Nurses, has developed competencies for nurses across the spectrum of nursing education and practice.[26] Sponsored by the Robert Wood Johnson Foundation, the competencies included patient-centered care, teamwork, quality improvement,

evidence-based practice, safety, and informatics.[26] Stroke certification programs encompass all of these competencies.

Going through the accreditation process helps to streamline operations, improve the quality of care, and build trust with patients and the community. Certification as a stroke center has been associated with a number of quality improvement initiatives, perhaps most importantly increased access to timely thrombolytic therapy and improved outcomes. The implementation of stroke performance measures used by the ASA and the Get With The Guidelines continuous quality improvement program in addition to the multiple stroke certifying bodies has been associated with large-scale improvement in stroke care.[27] Given the more than 795,000 strokes occurring annually, fostering a system of care that reduces stroke-related deaths by 2% to 3% annually would have a profound impact. It could translate into approximately 20,000 fewer deaths in the United States and possibly 400,000 fewer deaths worldwide.[11]

Stroke certification heavily emphasizes standardized care. The word standards or standardization often has a negative connotation for many people. Some associate standardization of treatment with bureaucracy in health care and believe that it mistakenly means that care cannot be individualized. An appropriate amount of standardization is vital to the foundation of health care improvement and is a primary method of reducing variation in treatment that can cause errors.[28] Developing and implementing a standard set of behavior policies and procedures is critical. Stroke treatment policies need to be consistent and universally applied in order for all patients to receive a high-level care that does not vary based on time of day, unit, or provider.

OUTCOMES

It has been shown that organized stroke care, in the form of stroke care units, reduces morbidity and mortality associated with stroke. Guidelines from the Society of Neurointerventional Surgery recommend that postoperative thrombectomy care should be performed in a dedicated stroke unit with coordinated interdisciplinary care.[29]

In a study completed in 2016, Chaudhry and colleagues[30] compared the rates of in-hospital adverse events and discharge outcomes in patients with stroke admitted to PSCs compared with those admitted to non-PSC hospitals in the United States.[30] Compared with non-PSC admissions, patients admitted to PSCs are less likely to experience adverse events and more likely to have better discharge outcomes. In another study that looked at outcomes, it was noted that obtaining stroke certification reduces stroke mortality.[31]

An important factor in caring for patients with stroke includes the sequelae of stroke, such as hemorrhagic conversion, hydrocephalus, and malignant intracranial hypertension, which often require a higher level of care in stroke centers prepared to manage these complications.[8] This care requires interdisciplinary decision making best performed by a stroke team that includes expert ICU nurses, neurointensivists, and neurosurgeons[8] Expert nursing care as part of a larger system of stroke care can go a long way in reducing post-stroke disability that would greatly improve the quality of life of patients, and reduce health care costs overall. Certification of stroke centers greatly contributes to this cause.

SUMMARY

Many academic and community hospitals have obtained stroke center certification. Participation in structured quality improvement programs that also incorporate an objective assessment has been shown to improve outcomes and foster team building.

Although certification programs are not always perfect, they provide a framework to ensure hospitals provide evidence-based stroke care. For the ICU nurse, awareness and participation in the certification programs process is an important part of professional nursing practice.

DISCLOSURE

The author has nothing to disclose.

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