



WISCONSIN COVERDELL
STROKE PROGRAM

Building Blocks of a Stroke Program Toolkit

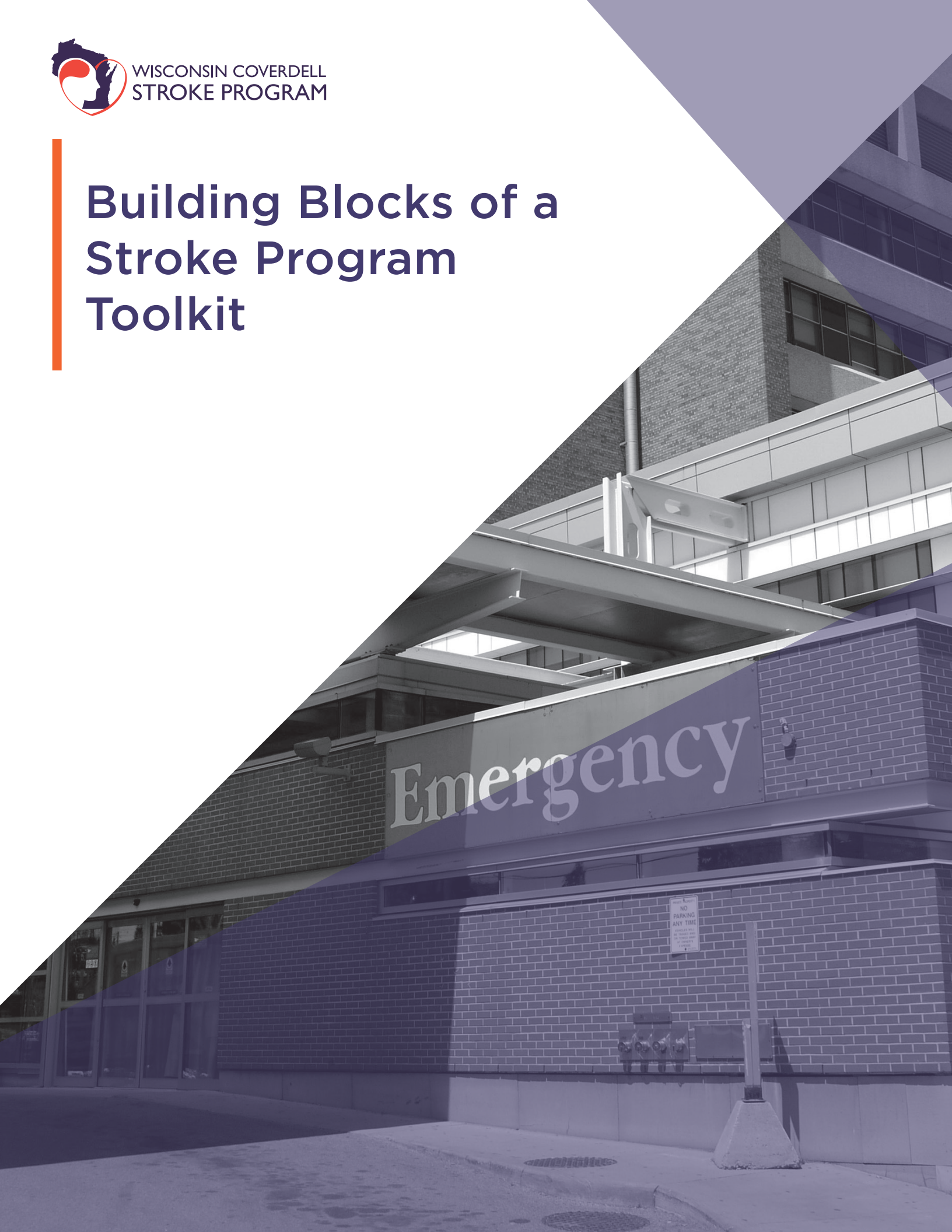


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OVERVIEW

Every minute counts when treating a patient afflicted with stroke. Stroke is the fifth leading cause of death in the U.S. and a leading cause of disability. More than 795,000 people have a stroke each year in the U.S. This means one stroke occurs every 40 seconds (Centers for Disease Control [CDC], 2014). It is incumbent on Wisconsin hospitals to offer stroke patients seamless, timely care regardless of where they enter the stroke system of care (SSoC). The SSoC refers to the continuum of care for those experiencing acute stroke—from dispatch and response of emergency medical services (EMS) to acute treatment via a hospital or telestroke network to discharge.

In areas where SSoC are not evident, care delivery may be fragmented and uncoordinated, and resources may be used inefficiently. When components of care are operating in isolation, less than ideal treatments can result in patient safety concerns. “Every community must create access to a hospital that can safely and quickly provide IV alteplase (also known as intravenous tissue plasminogen activator) and immediately transfer appropriate patients onward to a more capable center as required” (Smith, 2015). Rapid identification by EMS, triage to the facility that will provide the appropriate level of care, and in-hospital care that has adopted and follows current guidelines are our guiding principles. Ensuring your hospital can provide basic care to stroke patients is essential.

This toolkit summarizes the Brain Attack Coalition’s (BAC) recommendations for stroke basic care and incorporates new guidance released from the American Heart Association/American Stroke Association (AHA/ASA) in January 2018 (Powers, 2018). It also provides a self-assessment, examples to assist your hospital in developing a stroke program, and a number of resources. The purpose of this toolkit is to assist your site in building a stroke program or to support your hospital as it pursues Acute Stroke-Ready Hospital (ASRH) certification.

ACKNOWLEDGMENTS

This publication summarizes BAC recommendations for stroke basic care. BAC is a group of professional, voluntary, and governmental organizations dedicated to setting direction, advancing knowledge, and communicating the best practices to prevent and treat stroke. The purpose of this publication is to assist hospitals to build a stroke program or pursue an ASRH certification. The publication was initially made possible through federal funds provided by the Paul Coverdell National Acute Stroke Program (grant cycle 2012-2015) through the Centers for Disease Control and Prevention (CDC).

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For more information about the national and statewide stroke programs, see:

- Paul Coverdell National Acute Stroke Registry: www.cdc.gov/dhdsp/programs/stroke_registry.htm
- Wisconsin Coverdell Stroke Program: www.dhs.wisconsin.gov/coverdell

Stroke Level of Certifications

In November 2013, BAC released its recommendations for ASRHs (Alberts, 2013). These recommendations assist hospitals in increasing stroke capacity and developing stroke programs, as well as states and regions working towards developing SSoc. In the recent past, there were two levels of stroke certification for hospitals: Primary Stroke Center (PSC) and Comprehensive Stroke Center (CSC).

Acute Stroke-Ready Hospital

ASRHs have the infrastructure in place to diagnose, stabilize, treat, and transfer acute stroke patients. They have the capability to treat acute patients with IV alteplase. The ASRH must have telemedicine and transfer protocols in place as

it will often transfer patients to a higher level of care available at, depending on the region, a PSC, Thrombectomy Stroke Capable (TSC), or CSC. The Joint Commission, in collaboration with AHA/ASA, is the predominant hospital certifying body. A hospital can implement all elements of ASRH



criteria without being certified by an accrediting organization. Other higher level of stroke care hospitals are often a resource for smaller, rural hospitals within the region.

Primary Stroke Center

To date there are over 1,100 hospitals nationwide with PSC certification. PSCs have the infrastructure in place to stabilize and treat most stroke patients. Some PSCs also have interventional capabilities. When a higher level of care is needed, the PSC will transfer patients to a TSC or CSC. The PSC hospital has medical professionals trained specifically in stroke care and can provide some acute stroke treatments. PSCs must have dedicated stroke beds where they involve stroke patients in individualized care inclusive of post-discharge needs. Collecting the hospital's treatment data and team performance data is also essential. These data are assessed to constantly improve patient quality of care. Updated PSC recommendations were published by the BAC in 2011 (Alberts, 2011).

Thrombectomy Stroke Capable

The Joint Commission began certifying hospitals as TSC in January 2018. TSC hospitals have all the capabilities and infrastructure of a PSC. In addition, they meet the standards to perform endovascular thrombectomy's in those who have a large vessel occlusion. The standards are rigorous and include meeting volume requirements of endovascular thrombectomy's performed. The TSC hospital must have staff

available to perform endovascular thrombectomy 24 hours a day, seven days a week (24/7), TSCs have a dedicated neurointensive care unit for the treatment of stroke patients, and they collect and analyze data on several performance measures.

Comprehensive Stroke Center

CSC certification requires hospitals to meet all PSC guidelines, as well as have additional training of staff and infrastructure to treat all levels of stroke patients. The CSC can provide advanced imaging capabilities to evaluate the complex stroke, while providing mechanical interventions and highly technical procedures to treat patients. Exemplifying these requirements, all CSCs must have a dedicated neurointensive care unit for the treatment of stroke patients. Neurocritical care must be available 24/7 and the CSC must meet volume requirements for a variety of interventional procedures. CSC recommendations were published by the BAC in 2005 (Alberts, 2005). In 2012, The Joint Commission began certifying hospitals as CSCs.

Site Assessment

Building a stroke program can take many months.

Step 1

The first step in developing a stroke program is to determine the areas of need at your individual site. Before beginning your journey to implement a stroke program, perform a site assessment to determine the elements of basic stroke care that are developed versus those that need to be developed. If your hospital wants to pursue certification as an ASRH, reach out to your accrediting body and request a standards manual. This manual will provide the required elements of stroke care that you will want to include when performing your gap analysis.



Step 2

Upon completing the site assessment, refer to the applicable elements of basic stroke care that need development. Remember to choose manageable pieces as this can be an overwhelming process.

Elements of Basic Stroke Care	Developed	Need to Develop
Designated acute stroke team <ul style="list-style-type: none"> • Four hours of stroke education annually • Provider 15-minute response time to bedside 		
Stroke treatment protocols <ul style="list-style-type: none"> • For all stroke types in the ED • IV alteplase administration • Blood pressure management • Controlling intracranial pressure (ICP) • Seizures • National Institutes of Health Stroke Scale • Inpatient (where appropriate) 		
Laboratory testing, ECG, and CXR capabilities 24/7 Order to result within 45 minutes		
Brain imaging capabilities 24/7 Order to result within 45 minutes (CT)		
Emergency department (ED) EDs who provide direct care to stroke patients participate in 4 hours of stroke education annually		
Telemedicine Telemedicine link made within 20 minutes		
Transfer protocols <ul style="list-style-type: none"> • Processes in place to transfer within two hours of patient arrival to PSC, TSC, or CSC (shorter time is preferred) • Processes in place for neurosurgical services within 3 hours • Transfer agreement • Transfer protocol 		
Monitor performance metrics <ul style="list-style-type: none"> • Use of stroke registry or database • Regular meetings to review stroke performance 		
Administrative support and leadership Designated medical director		

Source: Alberts, 2013

Elements of Basic Stroke Care

Acute Stroke Team

The acute stroke team (AST) has the knowledge of evidence-based stroke practices and clinical expertise to provide care to the stroke patient in an organized and effective manner. The AST at an ASRH consists of a minimum of two providers who are available 24/7. These can be a registered nurse or advanced practice nurse and a physician whose presence, while preferred to be on-site, is within a 15-minute call to the patient bedside.

ASRH certification requires a minimum of four hours of stroke education annually for the AST and the medical director.

Elements of Basic Stroke Care:

- Providers (registered nurse or advanced practice nurse and a physician) 15-min response time to bedside
- 4 hours of stroke education annually for the core team

Stroke Treatment Protocols

It is essential for hospital EDs to have protocols in place for care of all types of strokes (ischemic, intracerebral hemorrhage (ICH), subarachnoid hemorrhage). EDs must have protocols for the administration of IV alteplase. This particular stroke protocol should include the timely elements of brain imaging and lab tests to assist in meeting a fast door-to-needle (DTN) time, where appropriate.

In addition, protocols must be in place for:

- The reversal of anticoagulants in those presenting with an ICH
- Reducing and controlling intracranial pressure (ICP)
- Care of the patient with a seizure
- Blood pressure management
- Stroke assessment, such as the National Institutes of Health Stroke Scale (NIHSS).

The protocols need to be reviewed and updated at least annually to ensure they encompass evidence-based care and current guidelines.

Most stroke patients arriving at an ASRH will be transferred to a higher level of care, which is dependent on their regional SSoC either a PSC, TSC, or CSC. If an ASRH has the capabilities and resources to admit stroke patients from the ED, an inpatient stroke protocol is needed that includes evidence-based processes and measures in alignment with PSC protocol. Elements to be addressed include, for example, administration of antithrombotic therapy when appropriate, deep vein thrombosis prophylaxis, and education.

Elements of Basic Stroke Care:

- Stroke protocols development
- Annual review and revision of stroke treatment protocols annually
- Ability to initiate IV alteplase within 60 minutes from arrival

Emergency Medical Services (EMS)

EMS plays a vital role in a SSoC. EMS personnel are ideally the first contact a stroke patient has with medical professionals. Their initial assessments and actions have significant impact on the patient's subsequent care. Their triage, identification, and communication to the ASRH of a suspected stroke play a vital role in the positive outcome of the patient.

Elements of Basic Stroke Care:

Training and education in stroke triage, identification, and advanced notification.

Emergency Department (ED)

ED caregivers who provide direct care to stroke patients must be knowledgeable regarding current care guidelines and evidence-based treatment of stroke. The recommendation is four hours of education annually related to the care of patients with cerebrovascular disease.

Elements of Basic Stroke Care:

For ASRH, ED providers should receive education at least twice annually. Four hours of education on cerebrovascular disease is required for core stroke team members.

Diagnostic Testing

Blood glucose testing or assessment of blood glucose is the only test that must precede the initiation of IV alteplase in all patients. To conclusively diagnose the stroke patient, basic laboratory, electrocardiogram (ECG), and chest x-ray (CXR) results may be ordered, and results must be available within 45 minutes of order. Basic laboratory tests include the following:

- Complete blood count
- Chemistries
- Coagulation studies
- Pregnancy test (where indicated)
- Troponin

If there is no reason to suspect an abnormal test result, these results should not delay the beginning of IV alteplase (Powers, 2018).

Elements of Basic Stroke Care:

Results must be available within 45 minutes of order.

Brain Imaging

Completion of a noncontrast head computed tomographic scan (CT) in the majority of cases will provide the necessary information needed to determine the diagnosis of a stroke and subsequent treatment options. The ability to complete and interpret the scan must be available 24/7. The recommendations for an ASRH are order time to completion and interpretation of CT in 45 minutes.

Elements of Basic Stroke Care:

Order time to completion and interpretation of CT in 45 minutes.

Telemedicine

A communication link from the emerging ASRH to the receiving higher level of care is essential, as this communication between medical professionals assists in making a diagnosis and subsequent treatment decisions. This link may be available by telephone, by video or both. If telephone consultation is being utilized, ensure your ED providers have hospital privileges to diagnose and treat stroke patients including treating with thrombolytics. The BAC recommends the telemedicine link to be established within 20 minutes of deeming it medically necessary.

Elements of Basic Stroke Care:

Telemedicine link must be made within 20 minutes if deemed medically necessary.

Transfer Protocols

Many acute stroke patients will require the clinical expertise of a neurosurgeon. For an ASRH, this will most likely require transfer to a facility that can offer a higher level of care. The transfer should occur as soon as possible, with a recommendation of no more than two hours after patient arrival to the ASRH. The BAC recommendations state the patient requiring neurosurgical services must have this service within three hours of it being deemed necessary. A protocol, agreement, or understanding for transfer must be completed that includes processes for safe and efficient transfer 24/7. This plan will also include agreed-upon time elements for care expected to be given en route, such as timely neurological assessment and vital signs checks.

A written agreement should exist with one or more facilities. Tracking data for these cases is encouraged in order to determine delays in treatment, complications, and outcomes. Communication that provides feedback is essential between the transferring and receiving sites.

Elements of Basic Stroke Care:

- Transfer to an appropriate higher level of care within two hours of patient arrival to the ASRH if medically stable.
- Neurosurgical services available within three hours of being deemed medically necessary.

Performance Metrics

In order for an ASRH to evaluate its care, performance metrics need to be monitored, collected, and analyzed. The emerging ASRH may utilize an internal data collection system. However, it is recommended a stroke registry be utilized to assist in data entry consistency, and to continuously measure quality improvement (Powers, 2018). Many time-based elements have been described in detail above.



The Joint Commission has three Acute Stroke Ready Inpatient (ASR-IP) measures and two Acute Stroke Ready Outpatient (ASR-OP) measures:

ASR-IP measures:

- ASR-IP-1 Thrombolytic Therapy: Inpatient Admission
- ASR-IP-2 Antithrombotic Therapy By End of Hospital Day 2
- ASR-IP-3 Discharged on Antithrombotic Therapy

For more information on ASR-IP measures visit: <https://manual.jointcommission.org/releases/TJC2018A/AcuteStrokeReadyInpatient.html>.

ASR-OP measures:

- ASR-OP-1 Thrombolytic Therapy: Drip and Ship
- ASR-OP-2 Door to Transfer to Another Hospital

For more information on ASR-OP measures visit: <https://manual.jointcommission.org/releases/TJC2018A/AcuteStrokeReadyOutpatient.html>.

The emerging ASRH will need to consider collecting data elements distinctive to their facility. These may include door-to-CT initiation, compliance with a stroke severity scale, IV alteplase use, arrival time at ASRH to arrival at PSC or CSC, or other measures. A regular meeting of a multidisciplinary team is ideal. These meetings provide a forum to review and discuss performance metrics, transfer processes, and outcomes of the developing stroke program. An example of a tool with fictitious Quarter 1 (Q1) 2018 times for reporting performance metrics follows.

Elements of Basic Stroke Care:

- Use stroke registry or internal data collection system for tracking program results.
- Conduct regular meetings to review stroke care performance.

Stroke Ready Performance Metrics Monitor Goal: 67% or greater	Q1 2018	Q2 2018	Q3 2018	Q4 2018
Acute stroke team response time within 15 minutes	70%			
NIHSS performed	80%			
Dysphagia screening performed	55%			
Brain imaging (CT) order to results within 45 minutes	45%			
Laboratory testing order to results within 45 minutes	50%			
Arrival to initiation of IV alteplase within 60 minutes	50%			
Neurosurgical services within 180 minutes	100%			
Initiation of telemedicine link time within 20 minutes	95%			

Administrative Support and Leadership

Administrative leadership is a key factor in moving toward developing a strong stroke program, as organizational support is necessary for initiating processes that improve stroke care. Medical leadership in the form of a designated medical director with demonstrated experience in care and treatment of those with cerebrovascular disease is a very important element of an ASRH. This person does not necessarily need to be a neurologist or neurosurgeon. An ED physician or an advanced practice nurse would be appropriate for this role in many instances.

Elements of Basic Stroke Care:

Designated medical director.

Resources

Current Stroke Certifying Bodies

- Det Norske Veritas (DNV): <https://dnvglhealthcare.com/>
- Healthcare Facilities Certification Program (HFAP): <https://www.hfap.org/>
- The Joint Commission: <http://www.jointcommission.org/>

Get With The Guidelines® Stroke Toolbox

This site contains an abundance of resources to assist you in building your stroke program, including team meeting tools and clinical tools, such as examples of order sets, discharge instructions, and patient education forms.

Website: <https://www.heart.org/en/professional/quality-improvement/get-with-the-guidelines/get-with-the-guidelines-stroke/get-with-the-guidelines-stroke-clinical-tools>

Heart and Stroke Statistics

Find current statistics on heart disease, stroke, and vascular disease.

Website: http://www.heart.org/HEARTORG/General/Heart-and-Stroke-Association-Statistics_UCM_319064_SubHomePage.jsp

Stroke Statements and Guidelines

Access past and current stroke statements and guidelines.

Website: http://professional.heart.org/professional/GuidelinesStatements/UCM_316885_Guidelines-Statements.jsp

The Joint Commission

This site provides an overview of ASRH certification including information on fees and benefits, steps to certification, and requirements.

Website: http://www.jointcommission.org/certification/acute_stroke_ready_hospitals.aspx

List of Acronyms

AST	Acute stroke team
ASRH	Acute Stroke-Ready Hospital
AHA/ASA	American Heart Association/American Stroke Association
BAC	Brain Attack Coalition
CT	Computed tomographic scan
CSC	Comprehensive Stroke Center
CXR	Chest x-ray
DNV	Det Norske Veritas
DTN	Door-to-needle time
ED	Emergency Department
ECG	Electrocardiogram
EMS	Emergency Medical Services
HFAP	Healthcare Facilities Accreditation Program
ICH	Intracerebral hemorrhage
ICP	Intracranial pressure
IV alteplase	Intravenous tissue plasminogen activator
NIHSS	National Institutes of Health Stroke Scale
PSC	Primary Stroke Center
SSoC	Stroke systems of care
TSC	Thrombectomy Stroke Capable
24/7	24 hours a day, seven days a week

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The Joint Commission Stroke Certification Programs – Program Concept Comparison

Program Concept	ASRH	PSC	TSC	CSC
Eligibility	General eligibility requirements; use of a standardized method of delivering care centered on evidence-based guidelines for stroke care.	General eligibility requirements; use of a standardized method of delivering care centered on evidence-based guidelines for stroke care.	General eligibility requirements; use of a standardized method of delivering care centered on evidence-based guidelines for stroke care. Organization must have performed mechanical thrombectomy and post-procedure care for at least 15 patients with ischemic stroke over the past 12 months (or 30 over past 24 months). Neurointerventionists who routinely take call to perform mechanical thrombectomy must: - Be CAST certified; OR - Completed ACGME equivalent residency in neurosurgery, neurology, radiology; - Completed ACGME CAST UCNS equivalent stroke neurocritical care neuroradiology fellowship; - Completed neuroendovascular training (CAST accredited or similarly rigorous program); - Performed 15 mechanical thrombectomies over the past 12 months (or 30 over past 24 months) (procedures performed at hospitals other than the one applying for TSC certification can be included)	General eligibility requirements; use of a standardized method of delivering care centered on evidence-based guidelines for stroke care. Treatment of 20 SAH caused by aneurysm annually (40 over 2 years) Capable of treating aneurysms by performing 15 endovascular coiling or microsurgical clipping procedures annually (30 over 2 years) Administering IV thrombolytic therapy 25 times annually (50 times over 2 years) **CSCs will be required to meet a minimum mechanical thrombectomy volume for eligibility in the future**
Program Medical Director	Sufficient knowledge of cerebrovascular disease	Sufficient knowledge of cerebrovascular disease	Neurology background with ability to provide clinical and administrative guidance to program	Has extensive expertise; available 24/7
Acute Stroke Team	Available 24/7, at bedside within 15 minutes	Available 24/7, at bedside within 15 minutes	Available 24/7, at bedside within 15 minutes	Available 24/7, at bedside within 15 minutes
Emergency Medical Services Collaboration	Access to protocols used by EMS	Access to protocols used by EMS	Access to protocols used by EMS, routing plans; records from transfer	Access to protocols used by EMS, routing plans; records from transfer
Stroke Unit	No designated beds for acute care of stroke patients	Stroke unit or designated beds for the acute care of stroke patients	Dedicated neuro intensive care beds for complex stroke patients available 24/7; on-site critical care coverage 24/7	Dedicated neuro intensive care beds for complex stroke patients available 24/7; on-site neurointensivist coverage 24/7
Initial Assessment of Patient	Emergency Department physician, nurse practitioner, or physician assistant	Emergency Department physician	Emergency Department physician	Emergency Department physician
Diagnostic Testing Capability	CT, labs 24/7 (MRI 24/7 if used)	CT, MRI (if used), labs 24/7; CTA and MRA (to guide treatment decisions), at least one modality for cardiac imaging when necessary	CT, MRI, labs, CTA, MRA, catheter angiography 24/7; other cranial and carotid duplex ultrasound, TEE as indicated	CT, MRI, labs, CTA, MRA, catheter angiography 24/7; other cranial and carotid duplex ultrasound, TEE, TTE as indicated

The Joint Commission Stroke Certification Programs – Program Concept Comparison

Program Concept	ASRH	PSC	TSC	CSC
Neurologist Accessibility	24/7 via in person or telemedicine	24/7 via in person or telemedicine	24/7 via in person or telemedicine; written call schedule for attending physicians providing availability 24/7	Meets concurrently emergent needs of multiple complex stroke patients; Written call schedule for attending physicians providing availability 24/7
Neurosurgical Services	Within 3 hours (provided through transferring the patient)	Within 2 hours; OR is available 24/7 in PSCs providing neurosurgical services	Within 2 hours; OR is available 24/7 in TSCs providing neurosurgical services	24/7 availability; Neurointerventionist; Neuroradiologist; Neurologist; Neurosurgeon
Telemedicine	Within 20 minutes of it being necessary	Available if necessary Telemedicine	Available if necessary	Available if necessary
Treatment Capabilities	IV thrombolytics; Anticipate transfer of patients who have received IV thrombolytics	IV thrombolytics and medical management of stroke	IV thrombolytics; Mechanical thrombectomy, IA thrombolytics	IV thrombolytics; Endovascular therapy; Microsurgical neurovascular clipping of aneurysms; Neuroendovascular coiling of aneurysms; Stenting of extracranial carotid arteries; Carotid endarterectomy
Transfer protocols	With one PSC or CSC	For neurosurgical emergencies	For neurosurgical emergencies	For receiving transfers and circumstances for not accepting transferred patients
Staff Stroke Education Requirements	ED staff – a minimum of twice a year; core stroke team at least 4 hours annually	ED staff – a minimum of twice a year; core stroke team at least 8 hours annually	Nurses and other ED staff – 2 hours annually; Stroke nurses and core stroke team – 8 hours annually	Nurses and other ED staff - 2 hours annually; Stroke nurses and core stroke team – 8 hours annually
Provision of Educational Opportunities	Provides educational opportunities to prehospital personnel	Provides educational opportunities to prehospital personnel; Provides at least 2 stroke education activities per year to public	Provides educational opportunities to prehospital personnel; Provides at least 2 stroke education activities per year to public	Sponsors at least 2 public educational opportunities annually; LIPs and staff present 2 or more educational courses annually for internal staff or individuals external to the comprehensive stroke center (e.g., referring hospitals)
Clinical Performance Measures	Standardized Measures: 3 inpatient and 2 outpatient stroke measures	Standardized Measures: 8 core stroke measures	Standardized Measures: 8 PSC stroke measures as well as 5 ischemic hemorrhagic CSTK measures for a total of 13.	Standardized Measures: 8 core stroke measures and 10 comprehensive stroke measures for a total of 18
Research	N/A	N/A	N/A	Participates in patient-centered research that is approved by the IRB
Guidelines	Recommendations from Brain Attack Coalition for Acute Stroke Ready Hospitals, 2013	Recommendations from Brain Attack Coalition for Primary Stroke Centers, 2011	AHA ASA Focused Update for the Early Management of Patients with Acute Ischemic Stroke Regarding Endovascular Treatment, 2015	Recommendations from Brain Attack Coalition for Comprehensive Stroke Centers, 2005
Review	One Reviewer, One Day	One Reviewer, One Day	One Reviewer, Two Days	Two Reviewers, Two Days