

fore, we recommend that a stroke unit include continuous cardiac and respiratory monitoring when deemed clinically appropriate.

A CSC must have a full ICU because some patients at a CSC (ie, those with large ICHs or SAHs) will require the services of a typical ICU (ie, intubation, ventilator support, peripheral artery and pulmonary artery catheters, ventriculostomies, and use of parenteral vasoactive medications; Table 3).^{218–221} A dedicated neurosciences ICU, although desirable, is not required. The stroke unit may be part of the ICU, although this may not be an efficient use of ICU beds and nursing resources in some hospitals because many ischemic stroke patients do not require the costly infrastructure of an ICU.

The ICU in a CSC should be staffed by physicians with training in cerebrovascular disease and critical care, although they may be different persons. Training in cerebrovascular disease has been defined previously. The critical care physicians must have completed an accredited critical care fellowship program. The ICU director should also have ≥ 8 hours per year of CME training (or equivalent educational activities) related to cerebrovascular disease. Formal training as a neurointensivist, although preferred, is not a requirement. Coverage by attending physicians or residents with expertise in cerebrovascular disease and critical care must be available 24/7 with a written call schedule. Such coverage may consist of a team approach, with some members from critical care medicine or anesthesiology and others from neurosurgery or neurology.

The nurse:patient ratio in an ICU caring for critically ill stroke patients should be 1:1 or 1:2. It is preferred (but not required) that nurses caring for neuroscience patients in the ICU be board certified in neuroscience nursing. The ICU nursing staff must be trained to assess neurologic function and to deal with several aspects of neurocritical care, including (1) function of ventriculostomy and external ventricular drainage apparatus, (2) treatment of increased intracranial pressure, (3) care of patients with ICH and SAH, (4) care of patients after thrombolytic therapy, (5) treatment of blood pressure abnormalities with parenteral vasoactive agents, (6) management of intubated/ventilated patients, and (7) detailed neurologic assessments and scales (ie, NIH Stroke Scale and Glasgow Coma Scale). Such training can be documented by attendance at in-service sessions, participation in regional or national courses, and other modalities as established by the CSC staff and hospital administration. It is recommended that nurses in the ICU caring for stroke patients receive ≥ 10 hours per year of CEU credit (or other educational programs) in areas related to cerebrovascular disease.

All stroke patients should be fully evaluated to determine the etiology of their stroke, which is vital for planning their treatment and deciding on approaches for secondary prevention.²²² While the stroke patient is hospitalized, steps should be taken to reduce the risk of peristroke complications such as cerebral edema, aspiration pneumonia, infection, myocardial infarction, and deep venous thrombosis (DVT).^{21,223–225} A multidisciplinary care pathway is very useful to ensure proper diagnostic and preventive measures are taken in all patients.^{226–229} Medical and surgical therapies should be initi-

ated to prevent secondary strokes and other vascular events.^{230–233} Frequent communications between and among the care team, the patient, and their family will alleviate anxiety and improve planning for poststroke care.

Rehabilitation and Poststroke Care

Rehabilitation after a stroke is a key element for patients. There are 6 areas of focus for poststroke rehabilitation: (1) training for maximum recovery, (2) prevent and treat comorbid conditions, (3) enhance psychosocial coping, (4) promote integration into the community, (5) prevent recurrent strokes and other vascular events, and (6) enhance quality of life.¹⁸ Rehabilitation of stroke survivors should begin as soon as possible. Published studies have demonstrated that organized multidisciplinary stroke rehabilitation reduces death, death or disability, and death or institutionalization (grade IA).^{17,18,229,234–239} Mobilization of the stroke survivor and resumption of self-care activities should occur as soon as medically feasible. Rehabilitation may increase the stroke patient's quality of life and reduce the financial and physical burden on society (grade IA).^{236,240,241} In addition to inpatient rehabilitation, outpatient rehabilitation programs can improve outcomes and prevent deterioration (grade IIB).²⁴²

Rehabilitation services should be directed by a physician with board certification in physical medicine and rehabilitation (ie, physiatrist) or by other properly trained individuals (ie, neurologist experienced in stroke rehabilitation or other physicians or PhDs with fellowship training in rehabilitation). All therapists, social workers, and nurse case managers must meet requirements for state licensure, and have ≥ 1 year of experience in the treatment of stroke survivors. The physical therapists, speech therapists, and social workers must complete a master's degree, whereas the occupational therapists and nurse case managers must complete at least a bachelor's degree. The nurse case managers and social workers must have adequate knowledge of inpatient rehabilitation facilities and community resources in their geographic regions.

A CSC should have physical, occupational, and speech therapists on staff or readily available by consultation for patient assessment and therapy during the acute hospitalization. Consults for physical medicine and rehabilitation, physical therapy, occupational therapy, and speech therapy should be requested and completed (when deemed medically necessary) usually within 24 hours of admission so that medical and therapeutic evaluations may begin as soon as the stroke survivor is medically stable. If the CSC does not have inpatient rehabilitation facilities on site, they should have documented referral protocols and a working knowledge of nearby facilities.

Other important measures include steps to prevent and treat medical complications of stroke such as aspiration pneumonia and other infections, cerebral edema/herniation, DVT, pressure sores, and contractures.^{172,223,224} Poststroke care should include assessment and treatment (when possible) of cognitive decline, depression, and social implications of stroke.²²⁵ These various therapies have been reviewed in other recent publications and are not reiterated here.¹⁸

Education

Educational programs are deemed a very important component of a CSC. Such programs can be divided into profes-

sional and public efforts. For professional programs, it is recommended that the CSC staff prepare and present ≥ 2 educational courses per year aimed at health care professionals within or outside of the CSC.

Public education is a vital component that can improve acute care by decreasing delay times for presentation (grade IA).^{243,244} Public education about stroke risk factors may also facilitate improved therapy (grade IIB).^{245–247} Other public education programs related to vascular disease risk factors may also be useful, although results of randomized trials have been mixed.^{248–251} It is recommended that a CSC sponsor at least 2 public educational activities each year that focus on some aspect of stroke. These could include lectures, screening for stroke risk factors, health fairs, and similar events. Such events could be advertised and marketed to high-risk groups in such areas as those with a high minority population, areas with poor access to health care, and other underserved populations.

A fellowship in cerebrovascular disease accomplishes several important goals, such as providing additional training and experience and preparing physicians for a career that focuses on cerebrovascular disease. The Accreditation Council for Graduate Medical Education (ACGME) has recently approved the formation of an officially recognized fellowship program in vascular neurology. A CSC does not need to have a fellowship program to provide excellent patient care. It is recommended that a CSC that chooses to offer a fellowship in cerebrovascular disease follow the guidelines of the ACGME and work closely with the American Academy of Neurology in developing a training curriculum.

Research

Research programs are an important component of academic medical centers, and some community hospitals are also becoming involved in clinical research trials.^{252,253} Past studies have documented that patients involved in clinical research have better outcomes than patients not involved in such research (grade IIIC).^{254–257} However, a hospital can clearly provide excellent care as a CSC and not be involved in any research. Therefore, research is considered an optional component of a CSC.

Other

A stroke registry is an important element of a CSC. A stroke registry is a systematic collection of data that deals with stroke care, risk factors, outcomes, and related issues.^{258–262} Such a registry is important for tracking outcomes and defining areas in need of improvement and is included in the recommendations for a PSC. It is recommended that a CSC have a stroke registry or another similar data collection tool (grade IIIC). A pilot project for developing a national acute stroke registry is currently under way.²⁶³

A stroke clinic could have a multidisciplinary faculty that would address several components of stroke care, including prevention, rehabilitation, medical complications, and social issues. It is recognized that some CSC facilities may not have the space for a multidisciplinary stroke clinic or that other logistical factors could limit the formation of such a clinic. In addition, such care could be provided in another clinic setting

such as a multidisciplinary vascular clinic. For this reason, the stroke clinic is an optional component of a CSC.

An air ambulance is an important transportation option for some hospitals because of specific geographic considerations. In large cities, such a service may reduce transportation times because of high traffic volume on congested highways. In rural locations, an air ambulance may be a vital service offered by a CSC to transport acute stroke patients from outlying facilities.²⁶⁴ Studies have shown that such a service can reduce treatment times for thrombolytic therapy in acute stroke (grade IIB).^{212,265} However, a CSC in some urban settings can certainly function well without such a service. Therefore, an air ambulance is an important but optional feature of a CSC, depending largely on local transportation, referral, and geographic factors.

Quality assurance and improvement are important processes for maintaining and enhancing the quality of health care at any type of stroke center.³ This is particularly true in a CSC, in which very ill patients with complex diseases are sometimes treated with potentially dangerous medications and procedures. Because of the serious consequences of stroke and its related complications, as well as the complexity of surgical and endovascular procedures performed at a CSC, it is essential that outcomes be monitored. A multidisciplinary institutional quality assurance committee should meet on a regular basis to monitor quality benchmarks and review complications. This committee should include members who participate in the care of stroke patients as well as others who are not participating directly in such care but could provide insight into overall patient care. The goal of this quality assurance program is quality improvement, correction of errors, and systems improvement.

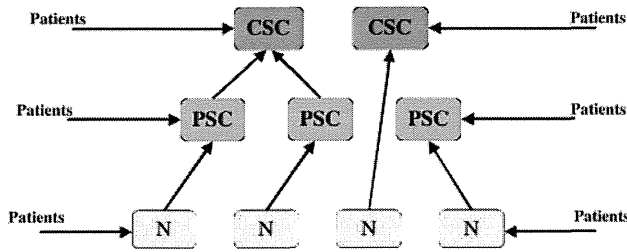
In addition to monitoring the outcomes of procedures performed at a CSC, the quality assurance committee should also monitor the overall care of patients. A database or registry should be established that allows for tracking of parameters such as length of stay, treatments received, discharge destination and status, incidence of complications (such as aspiration pneumonia, urinary tract infection, and DVT), and discharge medications. Specific benchmarks and indicators should be set and reviewed on a regular basis (at least annually). There are several multi-institutional or national databases that can be used to establish appropriate benchmarks.

Discussion

The diagnosis and treatment of some patients with complex types of stroke or with severe deficits and multiorgan problems may require more resources and a higher intensity of care than is offered in many hospitals and in most PSCs. Such patients often require and may benefit from advanced diagnostic and treatment procedures directed by specialty-trained physicians and other health care professionals. A CSC would have the staffing, expertise, infrastructure, and programs to meet the needs of these patients and to serve as a resource to the PSCs in the region.

Many of the recommendations outlined above are meant to benefit the types of patients likely to be cared for in a CSC, namely those with hemorrhagic strokes, large ischemic

Organization of Stroke Centers in a Hospital Network or Geographical Area



Representation of how various facilities caring for stroke patients could be organized based on a hospital network or a defined geographic area. Patients can arrive at the various facilities via direct admission or transfer between facilities. N indicates nonstroke center facility.

strokes, strokes of unknown or unusual etiology, and patients with multisystem involvement. Unlike most of the recommendations for a PSC, there is a relative paucity of data proving that some of the components of a CSC change outcomes. However, there are data to support the utility and advantages of most of our recommendations, particularly in the areas of neuroimaging and certain specialized therapeutic procedures. There are emerging data that support the efficacy of other interventions related to neurosurgery and endovascular therapies. As these fields advance, we anticipate the publication of further studies that provide outcomes data for many of these interventions.

The costs for establishing and maintaining a CSC will vary depending on the existing staffing, infrastructure, and programs at a particular hospital. Several of the components of a CSC are quite costly, including an MRI scanner and an angiography suite, each of which can cost in excess of \$1 million. Many hospitals that strive to be a CSC already have some of the equipment and infrastructure in place, which would reduce the costs considerably. The hiring of additional personnel (ie, endovascular interventionists and neurointensivists) and having staff members on call would also increase the costs, perhaps by \$200 000 to \$300 000 or more each year. Some of these costs could be offset by hospital billing for some procedures and physician billing for professional services. At this time, data do not exist to project a meaningful or accurate cost-benefit analysis for a CSC. Individual hospitals will have to develop business plans that consider the volume of stroke patients, payor mix, average costs and revenue per case, and future growth plans.

In the current health care environment, there continues to be growth of hospital networks and systems throughout the country. Within such a network or system, one approach to acute stroke care might be to designate some hospitals as PSCs and others as CSCs (Figure). This approach would allow for patients, equipment, and expertise to be concentrated at specific hospitals rather than spread throughout the entire network. This is quite similar to the paradigm used for other complex diseases that require a multidisciplinary team approach such as trauma, cancer, severe burns, and organ transplantation. A recent review documented the effective-

APPENDIX Results of National Survey for Components of Comprehensive Stroke Center Elements

	Priority Score*	% of Respondents With Component
Personnel		
Stroke neurologist	4.8	92
CEA surgeon	4.7	95
24/7 radiologists (IH)	4.7	92
Stroke medical director	4.6	85
Interdisciplinary team	4.5	74
24/7 neurosurgeon (IH)	4.4	95
Staff CME	4.4	85
Vascular neurosurgeon	4.4	82
Stroke faculty	4.1	80
Nursing stroke director	4.1	64
Stroke nurse staff	4.1	64
Neurointensivist	3.9	62
Stroke APN	3.7	46
Diagnostic techniques		
MRA	4.7	100
Carotid ultrasound	4.6	100
MRI with diffusion	4.6	92
MR perfusion	4	90
Transcranial Doppler	3.7	82
CT angiography	3.5	80
Surgical and endovascular therapies		
IA lytics	4.4	90
IR coverage 24/7	4.4	80
IR-coil/stents	4.3	82
Endovascular IA ablation	4.3	77
Stent/angioplasty	3.9	87
Infrastructure		
Stroke OP clinic	4.4	77
Stroke unit	4.4	72
Registry	4.3	82
Neuroscience ICU	4.3	69
Pathways	4.2	95
Air ambulance	4.2	92
Interdisciplinary rounds	4.2	67
Educational research programs		
Community educational program	4.6	89
Prevention program	4.6	82
Hospital CME	4.5	87
QI program	4.5	71
Clinical research	4.4	95
National faculty meetings	4	90
Community screening	4	77
Research grants	3.8	80
Drug research	3.7	90
Fellowship	3.7	70

*Priority score is based on the respondent's opinion of how important the component is for a CSC. The range for each element was 1 to 5, with 1 being the least important and 5 being the most important.

IH indicates in-hospital.

ness of the trauma center network for enhancing treatment and improving outcomes for patients with acute traumatic injuries.²⁶⁶

Is there a specific number of hospitalized stroke patients needed to support the formation of a CSC? Without specific cost-benefit data for a CSC, it is difficult to define specific patient volumes. It might be possible to extrapolate from some of the studies cited above that correlate volumes with outcomes. For example, if a CSC must care for ≥ 20 patients per year with SAH, and SAH represents $\approx 10\%$ of all stroke cases admitted to a CSC hospital (this number may be increased because of referral bias of very ill patients), then the number of annual stroke admissions should approximate 200. However, there will be significant heterogeneity based on the surrounding population, catchment area, regional resources, referral patterns, local competition, etc.

Medical knowledge and technology are advancing at a rapid rate in many areas. BAC appreciates the fact that new techniques will become available for diagnostic studies, and new approaches will be developed for systemic and endovascular therapies of stroke. These recommendations are meant to be flexible and modifiable as new diagnostic and therapeutic options become available.

In summary, BAC has developed recommendations for CSCs and systems that will serve to guide the development of such centers and ensure that patients with cerebrovascular disease receive timely and effective care. We are hopeful that these recommendations will also assist hospitals and referral networks of PSCs and CSCs so that stroke patients receive care and resources that are most appropriate for their clinical condition. As new data become available, it will be important to modify these recommendations to reflect best practices and current guidelines.

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Editorial Comment

Organized Stroke Care

The Core of Effective Stroke Care Provision

The past decade has witnessed a dramatic change in treatment of acute stroke, leaving the era of an indifferent approach firmly behind. However, equally important to the development of particular emergency treatments is the recognition that the organization of stroke services per se plays a key role in the provision of effective therapies and in improving the overall outcome after stroke.

In this issue of the journal, the consensus statement from the Brain Attack Coalition (BAC), a group with representatives from major professional and advocacy organizations involved in stroke care, with extensive recommendations for comprehensive stroke centers is published.¹ The report is a companion to the recommendations for the establishment of primary stroke centers published by the same group in 2000.²

Basic Stroke Care: Still Not Fully Established

The previous report of the BAC² detailed 11 key elements of a primary stroke center to improve patient care and outcomes. Recommendations included acute stroke teams, stroke units, written care protocols, and an integrated emergency response system. A major impetus for the recommendation was clearly to establish the infrastructure and logistics to permit broad implementation of intravenous tissue plasminogen activator therapy within the 3-hour window according to the criteria of the NINDS trial. A survey showed that in 2001, emergency services for acute stroke therapy were in place at the majority of hospitals,³ and the situation has further improved later on.

However, and somewhat surprisingly from a non-US perspective, establishment of stroke units was given less emphasis in the BAC recommendations. Stroke units were not considered to be required for primary stroke centers that did not intend to provide care beyond the hyperacute period (ie, longer than the emergency department evaluation and emergency therapy), and stroke units did not need to be distinct hospital wards or units. In contrast, acute stroke teams, which lack scientific support for efficacy, were included among the key elements. The hospital survey³ showed that stroke units (and continuing staff education—an integral component of a stroke unit) were established at only 38% of the hospitals. A recent report provided a much more positive result (stroke units at 85% of hospitals), but only data from 34 academic centers participating in a quality improvement project were included in this study.⁴

Similar problems in translating knowledge into practice are presents in almost all other regions and countries worldwide. In the registry of the Canadian Stroke Network 31% received care on a stroke unit.⁵ The proportion was also low (23%) in an Australian stroke audit.⁶ In Europe, the 1995 Helsingborg declaration, prepared by World Health Organization Europe and the European Stroke Council in collaboration with 4 other professional societies, strongly emphasized the need to establish stroke units with acute admissions and set the target that organized stroke care should be available for all patients in the year 2005.⁷ However, this development is still in progress and the target has not been met. In most European countries, stroke unit care is available for half of all patients or less and is unevenly distributed.⁸ Only in Scandinavia has the proportion gradually increased to ≈75%. In most European countries, the elements of comprehensive stroke unit care outlined by the Stroke Unit Trialists' collaboration^{9,10} have been adopted and include assessment and monitoring, physiological management, early mobilization, skilled nursing care, and short-term multidisciplinary team rehabilitation services. At most centers, intravenous tissue plasminogen activator is given in such a unit. Thus, acute thrombolytic therapy is an integral part of the activities of a stroke unit, closely linked to prehospital and emergency services.

Clearly, the emphasis on various aspects of organized stroke care differs between regions, countries, and continents, which may reflect traditions as well as variations in health care systems. Intravenous tissue plasminogen activator therapy and stroke unit care are both top priorities in modern stroke management. However, we should not forget that because stroke unit care is applicable to all patients with

stroke, the overall impact of this therapy is several-fold larger than that of intravenous tissue plasminogen activator therapy, for which patient selection criteria apply.¹¹

Comprehensive Stroke Care

A proportion of stroke patients need more specialized therapy than what could be provided by a primary stroke center or nonintensive care stroke unit. The BAC defines a comprehensive stroke center (CSC) as a facility for stroke patients who require high-intensity medical and surgical care, specialized tests, and interventional therapies. The report reviews the scientific background and delineates the personnel expertise, advanced neuroimaging capabilities, surgical and endovascular techniques, and infrastructure at a CSC.¹

There is clear consensus that intensive care facilities are needed for a proportion of patients with stroke, eg, those patients who require intubation, ventilatory support, and intracranial pressure (ICP) monitoring. There is also strong scientific support (level 1 evidence) for surgical and endovascular therapy of intracranial aneurysms. However, the precise application of several other advanced therapies reviewed still remains to be established because of paucity of data from randomized controlled trials. Endovascular interventions for acute arterial occlusions intracranially (intra-arterial thrombolysis, clot removal, angioplasty), decompressive craniectomy for malignant middle cerebral artery infarction, extracranial carotid angioplasty and stenting, and microsurgical procedures for large-vessel occlusive disease belong to this group of treatments for which level I evidence permitting a grade A recommendation are still not available. Such procedures are today performed at many centers on an individual patient basis, but further studies are needed before their widespread use can be endorsed. The BAC recommendations adequately emphasize that, if performed, they should be performed by physicians who have the necessary skill and expertise. CSC also have an important role in contributing to systematic collection of data on such procedures and to provide the framework for performing randomized controlled trials and contribute to high-quality research. Quality control and stroke registers are also rightly emphasized as important elements at a CSC.

Comprehensive stroke centers also have an important role to act as an expertise resource and to provide education for other stroke facilities in the region. Establishment of partnerships between medical centers is necessary to provide best possible care and may include, eg, telemedicine service. Public education is another important activity. Even very recently published data show that more than two-thirds or more of all patients with stroke cannot even be considered for intravenous thrombolytic therapy within a 3-hour window because of patient delays in seeking emergency care.¹² Changing the patients' behavior in the event of acute suspected stroke remains a major challenge.

Most Patients Are Not Cured by Acute Stroke Therapies

For almost all patients with stroke, even those with a mild one,¹³ the event represents a major change in life. Although much attention has been given to management issues in the

acute phase, the initial hospital period is extremely short viewed in a lifetime perspective. Even with intravenous tissue plasminogen activator and more advanced therapies, the proportion of all patients who are actually cured is very small. The majority will need further rehabilitation for long periods. Rehabilitation should start already in the acute phase, and even at an intensive care unit, as the patient's condition permit. Appropriately, rehabilitation has been given a separate section in the BAC recommendations, although this part is less detailed than the other sections.

Comprehensive Stroke Centers: Part of the Broad Package of Stroke Services Needed

Despite scientific proof for more than a decade on the effectiveness of organized stroke care, stroke systems are not fully implemented in practice. Opportunities for treatment are missed with serious consequences. All efforts to improve organization of stroke care should therefore be welcomed. Whereas activities at a CSC will certainly be modified as advanced diagnostic and therapeutic options are redefined or new therapies will emerge, it is an advantage that the infrastructure is in place so that organization of care is not lagging behind scientific advances.

The present recommendations should be viewed as an important part of the broad range of facilities that needs be implemented for stroke management in different stages.¹⁴ Establishing well-organized systems for stroke care is a major challenge for all regions and continents, and it deserves the full cooperation of professionals and health care providers

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Advanced Certification Comprehensive Stroke Centers

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Final Certification Eligibility Criteria for Comprehensive Stroke Centers (CSC)

The Joint Commission has developed a new Disease-Specific Care Advanced Certification Program for Comprehensive Stroke Centers (CSC) in collaboration with the American Heart Association and the American Stroke Association. The CSC requirements are rigorous and will require additional technology and resources when compared to Advanced Certification for Primary Stroke Centers (PSC).

Organizations seeking certification as a Comprehensive Stroke Center must meet all of the general eligibility requirements for Disease-Specific Care certification:

- The program is in the United States, or operated by the US government or under a charter of the US Congress.
- The program is provided within a Joint Commission accredited organization.
- The program must have served a designated minimum number of patients (for CSC volume requirements, see below).
- The program uses a standardized method of delivering clinical care based on clinical practice guidelines and/or evidence-based practice.
- The program uses performance measurement to improve its performance over time.

All standards and requirements for Primary Stroke Center certification are incorporated into the Comprehensive Stroke Center requirements. In addition, eligibility for Comprehensive Stroke Centers includes all of the following requirements:

1. Volume of cases:

- The CSC will care for at least 20 subarachnoid hemorrhage patients per year.
- The CSC will perform at least 10 craniotomy surgeries for aneurysm per year.
- The CSC will perform at least 15 endovascular coiling surgeries (either acute or elective) for aneurysm per year.
- The CSC will administer IV tPA to at least 25 eligible patients per year.

Note 1: Providing IV tPA to an average of 25 eligible patients each year over a two year period is acceptable.

Note 2: IV tPA administered in the following situations can be counted in the requirement of 25 administrations per year:

- IV tPA ordered and monitored by the CSC via telemedicine with administration occurring at another hospital.
- IV tPA administered by another hospital which then transferred the patient to the CSC.

2. The hospital will be able to provide:

- Carotid duplex ultrasound
- Catheter angiography available 24 hours a day, 7 days a week
- CT angiography available 24 hours a day, 7 days a week
- Extracranial ultrasonography
- MR angiography-MRA available 24 hours a day, 7 days a week
- MRI, including diffusion weighted MRI, available 24 hours a day, 7 days a week
- Transcranial Doppler
- Transesophageal Echocardiography
- Transthoracic Echocardiography

3. Post hospital care coordination for patients.

4. Dedicated neuro-intensive care unit (ICU) beds for complex stroke patients:

- The hospital will have dedicated neuro-intensive care unit (ICU) beds for complex stroke patients, that include staff and licensed independent practitioners with the expertise and experience to provide neuro-critical care 24 hours a day, 7 days a week.

5. Peer review process:

- The hospital will have a peer review process to review and monitor the care provided to patients with ischemic stroke, SAH and administration of tPA.

6. Participation in stroke research:



- The CSC will participate in IRB-approved, patient-centered stroke research.

7. Performance measures:

- Initially, CSCs will be required to collect all of the standardized performance measures for Primary Stroke Centers. Additional CSC-specific performance measures are in development.

More details on CSC certification will be found in the final Comprehensive Stroke Center certification standards.

Coming Soon from Joint Commission Resources:

Stroke Certification Seminar

June 6, 2012 – Joint Commission Headquarters, Oakbrook Terrace, IL

This one-day program will include three separate educational tracks

- Comprehensive Stroke Centers
- Primary Stroke Centers
- Stroke Rehabilitation

For more information, visit www.jcrinc.com or call 877-223-6866.



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Ⅱ. 研究成果の刊行に関する一覧表

研究成果の刊行に関する一覧表
(平成 22 年度～平成 24 年度)

書籍

著者氏名	論文タイトル名	書籍全体の 編集者名	書籍名	出版社名	出版地	出版年	ページ
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