World Stroke Organization Global Stroke Services Guidelines and Action Plan

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Every two seconds, someone across the globe suffers a symptomatic stroke. 'Silent' cerebrovascular disease insidiously contributes to worldwide disability by causing cognitive impairment in the elderly. The risk of cerebrovascular disease is disproportionately higher in low to middle income countries where there may be barriers to stroke care. The last two decades have seen a major transformation in the stroke field with the emergence of evidence-based approaches to stroke prevention, acute stroke management, and stroke recovery. The current challenge lies in implementing these interventions, particularly in regions with high incidences of stroke and limited healthcare resources. The Global Stroke Services Action Plan was conceived as a tool to identifying key elements in stroke care across a continuum of health models.

At the *minimal* level of resource availability, stroke care delivery is based at a local clinic staffed predominantly by non-physicians. In this environment, laboratory tests and diagnostic studies are scarce, and much of the emphasis is placed on bedside clinical skills, teaching, and prevention. The *essential* services level offers access to a CT scan, physicians, and the potential for acute thrombolytic therapy, however stroke expertise may still be difficult to access. At the *advanced* stroke services level, multidisciplinary stroke expertise, multimodal imaging, and comprehensive therapies are available. A national plan for stroke care should incorporate local and regional strengths and build upon them.

This clinical practice guideline is a synopsis of the core recommendations and quality indicators adapted from ten high quality multinational stroke guidelines. It can be used to establish the current level of stroke services, target goals for expanding stroke resources, and ensuring that all stages of stroke care are being adequately addressed, even at the *advanced* stroke services level. This document is a start, but there is more to be done, particularly in the realm of primary prevention.

Despite differences in resource availability, the message we wish to convey is that stroke awareness, education, prevention, and treatment should always be feasible. Communities and institutions should set goals to continuously expand their stroke service capabilities. This document is intended to augment stroke advocacy efforts throughout the world, providing a strategic plan for optimizing stroke outcomes.

Key words: acute stroke therapy, developing countries, ischemic stroke, rehabilitation, stroke, treatment

Introduction

Stroke is a leading cause of death and disability worldwide. Stroke systems of care, integrated approaches to stroke care delivery, and the availability of resources for stroke care vary considerably across geographic regions, creating a risk for suboptimal care. The World Health Organization has committed to efforts to significantly reduce risk factors and mortality from noncommunicable diseases by 2025. Mortality and morbidity from stroke could be significantly reduced through organized stroke care, including the implementation of evidence-based clinical practice guidelines and adoption of a continuous quality improvement philosophy and programs (1–3).

The mission of the World Stroke Organization (WSO) is to reduce the global burden of stroke through prevention, treatment, and long-term care. To support many of the WSO's core objectives (side bar) and the goals of the World Health Organization, a Global Stroke Guidelines and Quality Committee (GSGQC) was established to create and promote a strategy for global uptake of evidence-based stroke care. The GSGQC has conducted broad consultations and environmental scans and understood the needs of member regions that experience many challenges in accessing resources to deliver ideal or optimal stroke care. As a result of these efforts, a *Global Stroke Services Action Plan* (referred to as the 'Action Plan' in this document) has been produced to support the progress of all regions to improve care and outcomes for people with stroke.

Several components are provided within the *Global Stroke Services Action Plan* to facilitate and support stroke improvement efforts. First, a model has been developed that categorizes the availability of stroke services globally into three levels: access to *minimal* healthcare services, access to *essential* stroke services, and access to *advanced* stroke services. The Action Plan also includes a framework for stroke services that describes the continuum of stroke care addressed in the Action Plan and core elements within each phase of the continuum. Specific stroke best practice recommendations are then provided for each core element, and where possible, key quality indicators are also included.

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The mission of the World Stroke Organization (WSO)
WSO aims to accomplish its mission by:

- Fostering the best standards of practice
- Increasing stroke awareness among the population and among health professionals
- Preventing subtle cerebrovascular disease leading to gait disorders, imbalance, vascular cognitive impairment, and behavioral changes
- Influencing policies for stroke prevention and improved health services
- Providing education in collaboration with public and private organizations
- Facilitating stroke research advocacy for people with stroke
- Fostering the development of systems and organizations for long-term support of stroke survivors and their families

Methodology

The *Global Stroke Services Action Plan* was established through a multiphased approach. In the first phase, an environmental scan was undertaken to understand existing stroke care practices, availability and use of clinical practice guidelines, and stroke measurement and monitoring activities through the WSO membership (previously reported) (4). Through this process, many clinical practice guidelines for stroke care were identified. These guidelines were then evaluated for the quality and rigor of their development process using the Appraisal of Guidelines for Evaluation and Research II (AGREE II) tool by four independent reviewers (5). Ten guidelines that achieved scores of greater than 60% on the Rigor and Editorial Independence sections of the AGREE II tool were included as 'reference guidelines' in progressive stages of the *Action Plan* development (6–15).

In the next phase, a consultation process was conducted with members of the WSO to establish the model for stroke services availability, and to develop the stroke services delivery framework. Members working in regions where access to stroke services present significant challenges were directly consulted to ensure their needs and perspectives where brought to light and considered.

In the final phase, a four-round Delphi process was conducted to identify specific stroke best practice recommendations for each core element of the framework and identify valid key quality indicators where appropriate. For the initial Delphi round, a matrix was developed that listed all stroke recommendation topics that were included in each of the reference guidelines. Members were asked to vote on recommendations for inclusion in the Action Plan based on the following criteria: strength of available scientific evidence, importance as a key stroke system driver, and potential impact on stroke mortality and morbidity. They were also asked to vote on key quality indicators based on validity of the indicator, feasibility of data collection, and potential actionability based on measurement results. Finally, members were asked to indicate the applicability of each recommendation to the three levels of the stroke service delivery model (i.e. minimal, essential, advanced stroke services).

All materials were sent electronically to members of the GSGQC for voting on topics to be included in the final Action Plan. The second round was conducted during an in-person meeting held in February 2014. A third round was sent to all members electronically in March 2014 and included a shorter list based on the results of the first two rounds. The final round took place at an in-person meeting held in May 2014. During the May meeting, the final list of recommendations and key quality indicators was confirmed.

Target audience

This toolkit is intended for all providers of stroke care, and targeted especially to low to middle-income countries (LMIC) to use as a foundation for the development of organized stroke care. It can also be used by all stroke providers as a form of self-assessment on core components of stroke care. The recommendations and key quality indicators included are *not* meant as an exhaustive list, rather they are intended as the 'core elements' and can be built upon where local resources and services allow.

Stroke services delivery model

Models for stroke services delivery vary considerably from region to region, and greatly depend on the availability of resources, including human resources, access to healthcare facilities, access to diagnostic and laboratory services, access to medications, and access to transportation. Resource availability impacts the extent to which comprehensive stroke care can be provided across the continuum of care from acute stroke management, to rehabilitation, prevention of recurrent stroke, community reintegration, and long-term recovery. Although not all core components of stroke services may be in place or accessible, all regions are encouraged to use this *Action Plan* to define goals for stroke care delivery, then develop a strategy to achieve those goals over time.

It is recognized that in lower to middle-income countries, there is a wide range of accessibility to some of the most basic healthcare services. These models range from periodic healthcare worker visits to smaller/rural communities to basic organized services within larger communities, and more comprehensive services available in cities. These three levels of service availability have been established as a key part of the framework for the purposes of developing the WSO *Global Stroke Services Action Plan* and its components (see Fig. 1 and Table 1).[1]

The key message underlying the WSO *Global Stroke Quality Action Plan* is that even with the absolute minimal services available to you, at least something can be done for people with stroke that could make a difference to their recovery and outcomes.

Framework for the core elements of stroke care across the continuum of care

The purpose of the WSO Stroke Services Framework is to provide a roadmap which is intended to guide local healthcare officials and stroke care clinical groups in establishing stroke systems of care and implementing as many of the defined components as possible throughout the stroke continuum of care. The Framework is presented in Fig. 2.

Table 1 Health service capacity for stroke care checklists*

Advanced stroke services	Essential stroke services	Minimal healthcare services
❑ Access to advanced diagnostic services ❑ Access to physicians with stroke expertise ❑ Access to advanced interventions in addition to tPA, such as interventional radiology and neurosurgery ❑ Access to specialist rehabilitation therapists ❑ Access to community programs for recovery after stroke ❑ Fully coordinated stroke care provided across geographically discrete regions	❑ Access to basic diagnostic services – laboratory, ECG, CT scan, ultrasound ❑ Access to nurses ❑ Access to physicians, although may not be stroke specialists ❑ Access to acute thrombolysis with tPA ❑ Access to elements of stroke unit care, including members of an interdisciplinary stroke team ❑ Access to rehabilitation services ❑ Access to stroke prevention therapies such as aspirin, lifestyle change recommendations, blood pressure management ❑ Limited coordinated stroke care provided across geographically discrete regions	❑ Variable access to healthcare workers (nurses or lay workers) ❑ Very limited access to physicians ❑ No access to diagnostic services or hospital care ❑ Limited access to the most basic lifestyle preventative advice ❑ Care provided in local communities without coordination across defined geographic regions

*These checklists should be used for self-assessment and for stroke services planning. The goal is to achieve as many checkmarks as possible and continually strive to provide the highest level of stroke services that is realistically and reasonably attainable, given local and regional resources and circumstances.
CT, computed tomography; ECG, electrocardiogram; tPA, tissue plasminogen activator.

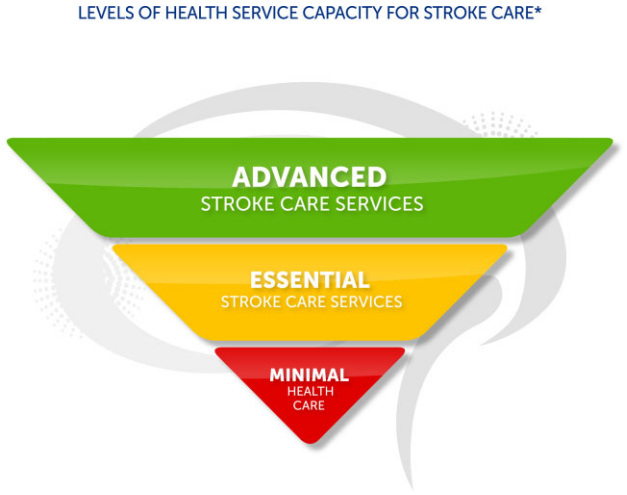

Fig. 1 Levels of health service capacity for stroke care.[2]

The WSO Stroke Services Framework focuses on the continuum of care starting from the onset of stroke signs and symptoms all the way through to rehabilitation and reintegration into the community. The general dimensions of stroke management are *recognition*, *assessment*, *diagnosis*, *intervention*, *prevention*, *education*, *technology* and *measurement*. These are applied across the continuum from stroke recognition, acute care and prevention of complications, rehabilitation, prevention of recurrent stroke, community reintegration, and longer-term recovery.[3] Within each of these stages of care and recovery, several key topics are identified that are considered most relevant in order to optimize stroke management globally. While it is recognized that primary prevention of vascular risk factors is a critical component of healthcare services, primary prevention is not the main focus of this framework or *Action Plan*.

This framework serves as the foundation for the further development of tools and resources to support improvement of stroke care services in all communities. The Framework should be viewed as a high-level pathway. The Framework and Action Plan can be used for self-assessment by individual healthcare providers and groups, and the components could enable evaluation of regional differences, and ongoing monitoring across communities.

Global stroke care clinical practice guidelines

The WSO stroke *clinical practice guideline* includes a core set of stroke care recommendations, and key quality indicators have been established through a rigorous review and adaptation process. The evidence-based best practice *recommendations for stroke care* included in this guideline are applicable across the continuum of stroke care (Table 2). For each recommendation there is an indication of the level of service capacity in which these recommendations may be realistically carried out. In addition, the *key quality indicators* (core performance measures) are included where relevant and may be considered as the foundation for ongoing quality improvement efforts. At the end of the section, a list of *system-level quality monitoring indicators* is also provided.

[1]It is recognized that these are very broad categories, and many variations on these models will exist, based on how health care is delivered both locally and regionally. These service levels are provided as a structure for identifying appropriate stroke guideline recommendations to assign to each level. It is expected that local implementation will adapt or customize the components of the toolkit to fit with their models of care and availability of services.
[2]See Footnote 1.

[3]While this framework and the supporting Action Plan do not focus on primary stroke/vascular risk prevention, secondary prevention services will address similar concepts (such as lifestyle, hypertension, atrial fibrillation, and dyslipidemia).

Fig. 2 WSO Stroke Services Framework.
*Prevention of complications – includes venous thrombo-embolism, contractures, pressure ulcers, dysphagia and swallowing, infection, malnutrition and dehydration, falls.

Table 2 *Global Stroke Guidelines and Quality Action Plan* Core stroke care recommendations and key quality indicators

Key evidence-based recommendations	applicable level of health services capacity for stroke care			Key performance measures
	Minimal	Essential	Advanced	
A. Systems for stroke recognition and response				
1. All members of the public should be able to recognize the signs and symptoms of stroke (e.g. FAST).	☑	☑	☑	*System Indicators:* i. Availability of basic health services within a region
2. All healthcare personnel should be trained to recognize the signs and symptoms of stroke.	☑	☑	☑	ii. Availability of diagnostic labs and imaging within region
3. All geographic regions should have a local emergency call number or system in place, such as 9-1-1.		☑	☑	iii. Availability of inpatient hospital facilities within region
4. Protocols should be in place in emergency call centers to mobilize EMS personnel to respond to a stroke call with high urgency.		☑	☑	iv. Availability and level of training for healthcare workers and healthcare professionals within region v. Availability of relevant stroke pharmacotherapies in a region
B. Hyperacute stroke care (first hours after stroke)				
1. Onset of stroke symptoms should be obtained, documented, and communicated to healthcare personnel.	☑	☑	☑	
2. All patients with symptoms of stroke should be transported to a healthcare facility that can provide organized stroke services.		☑	☑	KQI 1. Time from stroke onset to assessment by healthcare professional (in min/h)
3. All patients with focal neurological symptoms/symptoms of stroke should receive brain imaging (CT scan or MRI) without delay.		☑	☑	KQI 2. Proportion of stroke and TIA patients who receive a CT scan within one-hour of hospital arrival and within 24 h of hospital arrival
4. Initial blood work should be performed (*refer to Technical Manual for details of test selection*).	☑	☑	☑	
5. Electrocardiogram should be carried out in all patients, especially where the patient has a clinical history or evidence of heart disease or pulmonary disease.		☑	☑	
6. All patients with stroke should have their swallowing function screened or assessed to determine possible dysphagia before offering food, drink, or oral medications to patient.	☑	☑	☑	KQI 3. Proportion of stroke and TIA patients who are screened or assessed for swallowing deficits
7. All patients with disabling acute ischemic stroke who can be treated within 4·5 h of symptom onset should be evaluated without delay by a physician with stroke expertise (either onsite or by telemedicine/telestroke consultation) to determine their eligibility for treatment with intravenous tissue plasminogen activator (tPA)		☑	☑	KQI 4. Proportion of ischemic stroke patients who are treated with tPA KQI 5. Door-to-needle time for ischemic stroke patients who receive tPA
8. All acute ischemic stroke patients not already on an antiplatelet agent should be given acetylsalicylic acid (ASA) immediately as a one-time loading dose after brain imaging has excluded intracranial hemorrhage.		☑	☑	KQI 6. Proportion of ischemic stroke and TIA patients who receive acute aspirin therapy within the first 48 h
9. Intracerebral hemorrhage should be promptly recognized and patients evaluated immediately by physicians with expertise in hyperacute stroke management.		☑	☑	
C. Acute inpatient care (first days after stroke)				
1. a Patients with an *acute stroke* should be admitted to hospital.		☑	☑	KQI 7. Proportions of stroke patients admitted to acute inpatient facility
1. b Patients with *minor stroke or transient ischemic attack* (TIA) should be urgently assessed and prevention management commenced, either in hospital or treated in a specialized outpatient clinic.		☑	☑	KQI 8. Proportion of TIA patients with access to rapid assessment services
2. Patients admitted to hospital with an acute stroke or TIA should be treated by an interdisciplinary stroke team, consisting of at least a physician with training in stroke care, a nurse, and a rehabilitation specialist (such as a physiotherapist, occupational therapist, speech language pathologist).		☑	☑	

Table 2 Continued

Key evidence-based recommendations	applicable level of health services capacity for stroke care			Key performance measures
	Minimal	Essential	Advanced	
3. Patients admitted to hospital with an acute stroke or TIA should be treated on an inpatient stroke unit, which is a specialized, geographically defined hospital unit dedicated to the management of stroke patients and staffed by an interdisciplinary stroke team (see Recommendation #2 above).		☑	☑	KQI 9. Proportion of stroke patients who are admitted to an acute stroke unit
4. Management strategies should be implemented for all stroke patients to prevent complications (e.g. fever, infection, pneumonia, hypoglycemia, deep vein thrombosis, skin ulcers, and recurrent stroke).	☑	☑	☑	
5. Patients with devastating stroke should be provided palliative care and appropriate end-of-life care where medical treatment is considered to be futile.	☑	☑	☑	
6. Patients with suspected embolic stroke or lack of clear stroke mechanism (e.g. normal neurovascular imaging, no signs of large vessel disease) should have extended cardiac monitoring.		☑	☑	
7. a All stroke patients should be assessed for their risk of developing venous thromboembolism		☑	☑	
7. b Patients at high risk of venous thromboembolism should be started on venous thromboembolism prophylaxis immediately if there is no contraindication.		☑	☑	
8. a. Patients should be mobilized as early and as frequently as possible to promote recovery and reduce other complications. b. Family members should be trained to assist with mobilization.	☑	☑	☑	KQI 10. Time from stroke onset until first mobilization
9. a Temperature should be monitored and initiate temperature-reducing care measures such as antipyretics and tepid baths when increased temperature	☑	☑	☑	
9. b For temperature greater than 37·5°C, increase frequency of monitoring, investigate possible infection such as pneumonia or urinary tract infection, and initiate antipyretic and antimicrobial therapy as required.	☑	☑	☑	
10. The use of indwelling catheters should be avoided due to the risk of urinary tract infection.	☑	☑	☑	
11. All stroke patients should be screened for urinary incontinence and retention (with or without overflow), fecal incontinence, and constipation	☑	☑	☑	
12. The swallowing, nutritional, and hydration status of stroke patients should be screened as early as possible (using validated screening tools where possible).	☑	☑	☑	
13. Family members should be trained on proper feeding techniques for stroke patients with swallowing difficulties.	☑	☑	☑	
14. Abnormal results from the initial or ongoing swallowing screens should prompt referral to a speech-language pathologist, occupational therapist, and/or dietician for more detailed assessment and management.		☑	☑	
15. Discharge planning should be initiated as soon as possible after the patient is admitted to each phase of care (e.g. emergency department, inpatient acute care, rehabilitation, complex continuing care, home care).	☑	☑	☑	KQI 11: Distribution of discharge locations for stroke and TIA patients discharged alive from acute care
D. Stroke rehabilitation				
1. All patients with acute stroke should have an initial functional assessment to determine rehabilitation needs and receive an individualized rehabilitation plan.		☑	☑	KQI 12. Distribution of disability scores across stroke population using the modified Rankin Scale score at discharge from acute care and at three-months post stroke

Table 2 Continued

Key evidence-based recommendations	applicable level of health services capacity for stroke care			Key performance measures
	Minimal	Essential	Advanced	
2. All patients who are admitted to inpatient rehabilitation following stroke should be treated on a specialized stroke rehabilitation unit.		☑	☑	KQI 13. Proportion of stroke patients in inpatient rehabilitation who are treated on a rehab stroke unit
3. Therapy should include repetitive and intense use of tasks that challenge the patient to acquire the necessary skills needed to perform functional tasks and activities.	☑	☑	☑	KQI4: Average amount of direct therapy received from each rehabilitation discipline each day (in min)
4. Patients should receive adaptive training (such as the use of specialized devices) to improve performance of specific functional tasks.	☑	☑	☑	
5. Spasticity and contractures can be prevented or treated by antispastic pattern positioning, range-of-motion exercises, and/or stretching. Routine use of splints is not recommended.	☑	☑	☑	
6. Healthcare workers and families should be taught to protect and support the paretic arm during movement, and to protect arm during wheelchair use by using a hemi-tray or arm trough.	☑	☑	☑	
7. Patients should be made aware of their increased risk for falls and given a list of precautions to reduce their risk of falling	☑	☑	☑	KQI 15: (a) Percentage of stroke patients in hospital or rehabilitation facility who experience a fall post stroke. (b) The percentage of stroke patients who experience a fall who require medical treatment for injuries that were sustained during the fall.
8. Patients should be assessed for post stroke pain, including persistent central pain and shoulder pain on affected side.		☑	☑	
9. Patients should be assessed for communication deficits.	☑	☑	☑	
10. Interventions to improve functional communication for patients with aphasia should be implemented (such as teaching families about the need for ongoing conversation, use of nonverbal strategies).	☑	☑	☑	
11. Patients with aphasia should be referred to a speech-language pathologist for individualized therapy to improve communication ability.		☑	☑	
E. Secondary stroke prevention				
1. a Assess stroke and TIA patients for vascular disease risk factors and lifestyle management issues: smoking, exercise levels, diet, weight, and alcohol and sodium intake.	☑	☑	☑	
1. b Assess stroke and TIA patients for vascular disease risk factors: hypertension, diabetes, atrial fibrillation, and hypercholesteremia		☑	☑	
1. c Assess stroke and TIA patients for vascular disease risk factors: carotid disease, cardiac disease.		☑	☑	
2. Provide information and counseling about possible strategies to modify lifestyle for vascular risk reduction (smoking, weight, diet, sodium intake, exercise, stress, alcohol intake).	☑	☑	☑	
3. Referrals should be made to appropriate specialists to provide more comprehensive assessments and structured programs to manage specific vascular risk factors.		☑	☑	
4. All patients with ischemic stroke or TIA should be prescribed antiplatelet therapy for secondary prevention of recurrent stroke unless there is an indication for anticoagulation (*once a CT has established a diagnosis of ischemic etiology*).		☑	☑	KQI 16. Proportion of ischemic stroke and TIA patients who are prescribed an antiplatelet agent
5. All patients with stroke or TIA should have their blood pressure monitored regularly. Antihypertensive medication should be initiated before hospital discharge for all stroke patients to treat to individualized targets.	☑	☑	☑	

Table 2 Continued

Key evidence-based recommendations	applicable level of health services capacity for stroke care			Key performance measures
	Minimal	Essential	Advanced	
6. A statin drug should be prescribed as secondary prevention to most patients who have had an ischemic stroke or TIA.		☑	☑	KQI 17. Proportion of ischemic stroke and TIA patients who are prescribed a statin agent (system indicator: availability of statin medications in region)
7. Glycemic levels should be monitored in diabetic patients with stroke or TIA.		☑	☑	
8. Diabetic patients with stroke or TIA should be treated to achieve individual glycemic targets. In most cases, patients should be treated to achieve a glycated hemoglobin A1C level ≤7·0%.		☑	☑	
9. Patients with atrial fibrillation or atrial flutter (paroxysmal, persistent or permanent) should receive an oral anticoagulant.		☑	☑	KQI 18. Proportion of ischemic stroke and TIA patients who are prescribed an anticoagulant agent
10. Patients with TIA or nondisabling stroke and ipsilateral 50 to 99% internal carotid artery stenosis should be evaluated by an individual with stroke expertise.		☑	☑	
11. Selected patients with ipsilateral 50 to 99% internal carotid artery stenosis should be offered and referred for carotid revascularization as soon as possible, with the goal of operating within 7 to 14 days.			☑	KQI 19. Proportion of ischemic stroke and TIA patients with carotid territory disease who undergo carotid revascularization KQI 20. Time from stroke onset to carotid revascularization
F. Longer-term stroke recovery				
1. All patients with stroke should be screened for depressive symptoms (ideally using a validated tool).		☑	☑	KQI 21: Proportion of patients with documentation of a follow-up using a comprehensive checklist (e.g. Post Stroke Checklist)
2. Patients diagnosed with a depressive disorder following formal assessment should be considered for therapeutic interventions – medication, counseling, or combination.		☑	☑	KQI 22: Percentage of stroke patients diagnosed with a depressive disorder at six-months and one-year post stroke.
3. Stroke patients should be screened for changes in cognitive status.		☑	☑	KQI 23: Percentage of stroke patients diagnosed with a new cognitive impairment at six-months and one-year post stroke.
3. b Patients with cognitive dysfunction should receive cognitive rehabilitation individualized to their deficits.		☑	☑	
4. Patients surviving a stroke, as well as their families and informal caregivers, should be approached by the stroke healthcare team to participate in advance care planning.		☑	☑	
5. Patients, families, and informal caregivers should be provided with information, education, training, emotional support, and community services specific to the transition they are undergoing.	☑	☑	☑	KQI 24: Percentage of stroke patients and families with failure to cope at six-months and one-year post stroke.
6. Patients, families, and informal caregivers should participate in goal setting.	☑	☑	☑	
7. People with stroke living in the community should have regular and ongoing monitoring and follow-up with healthcare providers to assess recovery, prevent deterioration, maximize functional and psychosocial outcomes, and improve quality of life.	☑	☑	☑	KQI 25: Documented evidence of follow-up appointment with member of stroke team at approximately six-weeks post discharge.
8. Postacute stroke patients who experience a change/decline in functional status should be re-assessed, even if months after stroke.		☑	☑	KQI 26: Percentage of stroke patients who are returned to the community after their stroke and then within six-months or one-year requires admission to a long-term care facility *(Note: may also measure days of community dwelling before admission)*

Table 2 Continued

Key evidence-based recommendations	applicable level of health services capacity for stroke care			Key performance measures
	Minimal	Essential	Advanced	
9. Stroke patients should be routinely monitored for poststroke fatigue during healthcare visits (e.g. primary care, home care, and outpatient) following return to the community and at transition points.	☑	☑	☑	
10. Patients, who experience poststroke fatigue, their families, and informal caregivers, should be taught energy conservation strategies and fatigue management.	☑	☑	☑	

CT, computed tomography; EMS, emergency medical services; MRI, magnetic resonance imaging.

For recommendations that are considered applicable where a minimal level of healthcare services exist, such as in remote and rural locations without organized stroke services (category 1), it is anticipated that local healthcare workers would be able to adapt these recommendations and provide some level of understanding and training to families of stroke survivors to enable them to better care for the person who experienced a stroke.

Not all recommendations will be applicable to a particular care environment, and there may not be capacity to implement all recommendations within each level of care. However, this list provides the *recommended and required* core services that all groups should strive to build capacity for inclusion in stroke care delivery plans as resources permit, and serves as a suggested template for the further development of services which may not yet exist in a particular care environment.

Key quality indicators and health system indicators are included in this framework and *Action Plan*. Establishing a *data collection system* to track key quality indicator and system-level indicator data should be included as a component of any stroke services. Such data could be used for monitoring rates of stroke, mortality, and morbidity in a given community for health system planning, to guide quality improvement, to advocate for additional services to meet the community's needs, and to facilitate comparisons and benchmark setting.

Further detailed information on each recommendation and quality indicator, as well as practical considerations and guidance on the implementation of the stroke care recommendations and quality indicators is included in *Global Stroke Guidelines and Quality Action Plan* Technical Manual available at www.world-stroke.org

Health system monitoring indicators

Health system monitoring[#] indicators provide important information at a population level, for the general population of a region and for the stroke population specifically. These indicators could be used by all countries and regions to monitor stroke rates, the availability of resources, the uptake of guidelines, and to develop/enhance stroke data monitoring systems.

HSI 1. Stroke incidence rates adjusted for age and sex in the population.

HSI 2. Prevalence of stroke risk factors in the population.
(a) Prevalence of vascular risk factors in the population.
(b) Percentage of people undertaking a vascular risk assessment who have risk factors for stroke.

HSI 3. Case fatality rates for stroke patients by stroke type, adjusted for age, gender, comorbidities, and stroke severity. Measurements should take place overall in hospital, at seven-days, 30 days, and one-year post stroke.

HSI 4. Recurrent stroke rates within three-months and one-year following an initial stroke or transient ischemic attack.

HSI 5. Functional status measured using the modified Rankin Score at three-months and one-year following stroke or transient ischemic attack.

HSI 6. The country/region has acute thrombolytic agents available and accessible for use with stroke patients.

HSI 7. The country/region has a coordinated system of stroke care in place which links stroke patients with access to essential diagnostic services and expertise in stroke care.

HSI 8. The country/region/facility collects data using International Classification of Disease (ICD) 9 or 10 coding system.

HSI 9. The country/region/facility has implemented evidence-based clinical practice guidelines for stroke care.

HSI 10. The country/region participates in a quality register or routine and standardized clinical audits for monitoring stroke care.

[#]Note: Detailed definitions of these indicators and the key quality indicators, as well as the applicable stroke case definitions are available in the Global Stroke Guidelines and Quality Action Plan Technical Manual available at www.world-stroke.org

Summary/Conclusion

The Global Stroke Guidelines and Quality Action Plan is the first global stroke guideline published. The Action Plan has been developed through a collaborative effort with experts in stroke care and guideline methodology from a range of countries with varied socio-economic profiles. Through the work of the Stroke Guidelines Working Group and the Global Stroke Quality Working Group, the Action Plan includes a model of stroke services delivery

capability, a framework for establishing the essential components of stroke care across the continuum and across phases and settings of care, and a core list of evidence-based practice recommendations. The key quality indicators provide a mechanism and opportunity for local, regional and global benchmarking of stroke care delivery, with a common goal of achieving high quality comprehensive stroke care to all people affected by stroke. This Action Plan should be used to inform stroke policy and setting strategic directions to elevate standards of care for people with stroke. Successful implementation of as many of the elements of this Action Plan as possible within local communities and regions may have a significant positive impact on our global goals of decreasing mortality and morbidity from stroke.

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