World Stroke Organization

Global Stroke Guidelines and Action Plan: **A Road Map for Quality Stroke Care**

PREHOSPITAL AND EMERGENCY CARE

Authors: Lindsay MP, Norrving B, Furie KL, Donnan G, Langhorne P, Davis S
On Behalf of the Global Stroke Quality and Guidelines Advisory Committee,
the Global Stroke Guidelines Working Group,
and the Global Stroke Quality Working Group.

PURPOSE:

The WSO Roadmap to Delivering Quality Stroke Care is an implementation resource to accompany the *WSO Global Stroke Services Guideline and Action Plan*. This roadmap provides the framework for the implementation, monitoring and evaluation of stroke services globally.

It provides **standardization and consistency** for the selection of **evidence-based** recommendations, **approaches to implementations** in clinical practice, and the **calculation of performance measures** to create an environment of continuous quality improvement.

TARGET AUDIENCE:

The roadmap 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 focus of the roadmap is on the processes of care and impacts on patient outcomes. It is recognized that not all regions will be able to provide all elements of quality stroke care; therefore the recommendations and performance indicators take into account what should be possible within three levels of service access.

It can be used by **local, regional, or country-level health authorities and service** providers as a foundation for their own evaluation frameworks for stroke.

Governments and funders should use these guidelines and action plan to review existing services, and identify service gaps. These groups could then prioritize gaps and look for solutions to improve access to services.
Clinicians and other healthcare workers should use these guidelines and roadmap to scrutinize local care delivery, access to care and ongoing support to achieve recovery goals.

This roadmap will also provide valuable guidance to stroke **programs under development**, to help ensure that all key elements defined here are considered from the beginning of development.

FORMAT:

The roadmap is **organized along the continuum of care** starting at the onset of a stroke event through the acute phase (emergency department and inpatient care), stroke rehabilitation, prevention of recurrent stroke and concludes with community reintegration and long term recovery.

Each section represents a part of the continuum and enables users to **review and assess the structural elements and services available** for stroke care; **core evidence-based best practice** recommendations related to processes of care that should be operational; and, a list of **key quality indicators to monitor levels** of care provided and impact on patient and economic outcomes.

HOW TO USE:

Users of this Roadmap should:
1. **Review** the sections relevant to their phase of stroke services;
2. **Complete an assessment** of current services and resources, current recommendations in place, and current data collection methods and access; then
3. **Develop an implementation plan** to ensure that these core elements are optimized and additional elements added to improve the stroke services they provide.

IMPLEMENTATION:

1. Hands-on hardcopy resource
2. **Electronic interactive app/resource** where users can enter what elements they have available from a master check list and the program identifies current level, recommendations and performance measures.

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This section focuses on the first hours following stroke. This includes early stroke assessment, diagnosis and management from the first onset of stroke symptoms through the first 24 to 48 hours, when the patient becomes medically stable. The goals of care in this phase are to diagnose the type of stroke (ischemic or hemorrhagic), and initiate time-sensitive treatments to minimize the impact of the stroke and prevent further damage. Hyperacute stroke care ideally involves healthcare providers with expertise in stroke care, and takes place in a clinic or emergency department, but may occur in other settings based on resource and facility availability.

Health Service Capacity for Stroke Care Checklists^

Please complete the following information to clearly identify the stroke services you are developing or assessing.

REGION:	ORGANIZATION COMPLETING CHECKLIST:	PRIMARY CONTACT PERSON:

SERVICE SCOPE:	GOALS OF THIS ASSESSMENT/COMMENTS: To be completed by local group
○ Provincial/State/National Assessment ○ Regional/Local assessment ○ Large urban hospital with advanced stroke services (comprehensive stroke services) ○ Community hospitals with access to some stroke services ○ Community with health clinic as only health services available ○ Rural community with a visiting health worker	

A. Stroke Services and Resource Availability

Please review each of these lists and tick all services and resources that you currently have in place and available for providing stroke care. Once completed, review your responses to determine which category of stroke services you most closely fit into.

Minimum Healthcare Services	Essential Stroke Services (In addition to services listed under Minimal stroke services)	Advanced Stroke Services (In addition to services listed under Minimal and essential stroke services)
○ Care provided in local communities without coordination across defined geographic regions	○ Access to basic diagnostic services • Laboratory blood test (CBC, electrolytes, urea, glucose, INR, PT) • Electrocardiogram (12 lead) • Computed Tomography (CT) scan brain and vasculature • Capability to do CT Angiography (CTA) • Echocardiography • Doppler ultrasound • Holter monitors	○ Access to advanced diagnostic services • Magnetic Resonance Imaging (MRI) • Capability to do MR Angiography • CT Perfusion scans • Prolonged ECG monitoring devices
○ No access to diagnostic services or hospital care for hyperacute stroke treatment	○ Limited access to emergency medical services • Training of ambulance crews to identify stroke signs using FAST mnemonic • Work with ambulance systems to have stroke identified as a high priority transport emergency, in addition to trauma and obstetrical crises	○ Access to physicians with stroke expertise in acute stroke care, stroke prevention and/or stroke rehabilitation • Neurologist • Neurosurgeon • Internist • Neuroradiologist / interventionalist • Geriatrician • Intensivist • Cardiologist • Emergency Medicine • General/Family/Primary care physician • Program to develop and maintain core competencies in stroke care
○ Very limited access to physicians • Provide assessment skill development • Basic training in swallow screens and dysphagia management; and in temperature management	○ Access to nurses and nursing assessment with stroke training • Primary care settings • Acute care settings • Advanced practice nurses • Nurse practitioner	○ Access to additional acute interdisciplinary stroke team members • Nurses • Nursing assistants • Pharmacist • Palliative Care team
○ Variable access to healthcare workers (nurses or lay workers) • Basic training in swallow screens and dysphagia management; and in temperature management	○ Access to physicians with stroke expertise (although may not be stroke specialists) • General/Family/Primary care physicians • Neurologist • Neurosurgeon • Internists • Cardiologist • Geriatrician • Emergency Medicine • Intensivist • Access to stroke specialists through telestroke modalities, and teleradiology	○ Access to advanced interventions: • Intravenous tPA (Alteplase) • Endovascular thrombectomy • Neurosurgery for hemorrhagic stroke • Hemicraniectomy for ischemic stroke • Acute inpatient stroke units • Products to reverse coagulopathy
	○ Access to acute thrombolysis with IV tPA • Intravenous tPA (Alteplase)	

Minimum Healthcare Services	Essential Stroke Services (In addition to services listed under Minimal stroke services)	Advanced Stroke Services (In addition to services listed under Minimal and essential stroke services)
	○ Members of a interdisciplinary stroke team • Physicians with stroke expertise • Stroke Nurses • Nursing assistants • Pharmacist • Social worker/case manager • Palliative Care team • Physiotherapist • Occupational Therapist • Speech-Language Pathologist ○ Protocols for rapid evaluation and diagnosis of stroke patients ○ Patient and family education, skills training, and involvement in care planning ○ Discharge planning ○ Limited coordinated stroke care provided across geographically discrete regions ○ Stroke training programs for all levels of healthcare providers	○ Fully coordinated stroke care provided across geographically discrete regions • Advanced stroke services rationalized to a smaller number of centres • Stroke pathways that define movement of stroke patients across region to higher and lower levels of services as required • Coordinated referral system • Provide telestroke consultations to smaller and more rural; centres • Ambulance bypass agreements in place • Repatriation agreements in place to transfer patients back to home communities • Printed stroke patient educational materials ○ Stroke training programs for all levels of healthcare providers ○ Data collection strategy and mechanisms • Acute inpatient stroke registry • Acute inpatient stroke database (local or regional) • Stroke prevention registry • Stroke prevention database • Stroke rehabilitation registry • Stroke rehabilitation database (local or regional)

B. Core Stroke Care Recommendations

For each best practice recommendation, indicate with a tick whether the described practice is in place as a routine part of care; in development for implementation; not implemented, meaning the service/resource may be available but it is not currently part of stroke care within your services; or, the service/resource/equipment is not available within your facilities, therefore not possible to implement.

Health System and Stroke Recognition Core Evidence-Based Recommendations	Applicable Level of Health Services Capacity for Stroke Care			Supporting Evidence	Self Assessment
	Minimum	Essential	Advanced		
1. Onset of stroke symptoms should be obtained, documented and communicated to healthcare personnel	✓	✓	✓	Evidence level: C	☐ In place ☐ In development ☐ Not implemented ☐ Not available
2. All patients with symptoms of stroke should be transported to a healthcare hospital that can provide organized stroke services.		✓	✓	Evidence level: B	☐ In place ☐ In development ☐ Not implemented ☐ Not available
3. All patients with focal neurological symptoms/ symptoms of stroke should receive brain imaging (CT scan or MRI) without delay.		✓	✓	Evidence level: B	☐ In place ☐ In development ☐ Not implemented ☐ Not available
4. Initial blood work should be performed	✓	✓	✓	Evidence level: B	☐ In place ☐ In development ☐ Not implemented ☐ Not available
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.		✓	✓	Evidence level: B	☐ In place ☐ In development ☐ Not implemented ☐ Not available
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.	✓	✓	✓	Evidence level: C	☐ In place ☐ In development ☐ Not implemented ☐ Not available
7. All patients with acute ischemic stroke who can be treated within 4.5 hours of symptom onset should be evaluated without delay by a physician with stroke expertise (either on-site or by telemedicine/telestroke consultation) to determine their eligibility for treatment with intravenous tissue plasminogen activator (tPA)		✓	✓	Evidence level: A	☐ In place ☐ In development ☐ Not implemented ☐ Not available

Health System and Stroke Recognition Core Evidence-Based Recommendations	Applicable Level of Health Services Capacity for Stroke Care			Supporting Evidence	Self Assessment
	Minimum	Essential	Advanced		
8. All patients with large vessel occlusion (LVO) and acute ischemic stroke (AIS) should be evaluated for endovascular thrombectomy where these interventions are available (onsite or through transfer to another stroke centre providing endovascular therapy). Endovascular thrombectomy is now the standard of care for selected patients with acute ischemic stroke and large vessel occlusion presenting within 6 hours of stroke onset.			✓	Evidence level: A	☐ In place ☐ In development ☐ Not implemented ☐ Not available
9. All acute ischemic stroke patients not already on an antiplatelet agent and who are not receiving alteplase should be given acetylsalicylic acid (ASA) immediately as *a one-time loading dose (300 – 325 mg) followed by 75 – 150 mg per day after brain* imaging has excluded intracranial hemorrhage.		✓	✓	Evidence level: A	☐ In place ☐ In development ☐ Not implemented ☐ Not available
10. Intracerebral hemorrhage should be promptly recognized and patients evaluated immediately by physicians with expertise in hyperacute stroke management		✓	✓	Evidence level: C	☐ In place ☐ In development ☐ Not implemented ☐ Not available
11. Patients with an **acute stroke** should be admitted to hospital.		✓	✓	Evidence level: A	☐ In place ☐ In development ☐ Not implemented ☐ Not available
12. Patients with **minor stroke or transient ischemic attack** should be urgently assessed and prevention management commenced, either in hospital or treated in a specialized outpatient clinic.		✓	✓	Evidence level: B	☐ In place ☐ In development ☐ Not implemented ☐ Not available

Which recommendations are your highest priorities to implement?

What are your next steps to start development and implementation of these best practices?

C. Key Stroke Quality Indicators

For each quality indicator, please note whether data is being actively and routinely collected; or, data collection processes are in development for the indicator; or, data may be available but it is not currently being collected; or, data for this indicator is not available at all so not able to collect or report it. Please tick the most appropriate box for each indicator.

Performance Measures	Numerator	Denominator	Self Assessment
Hyperacute Stroke Care (First hours after stroke)			
1. Time from stroke onset to assessment by healthcare professional (in minutes/ hours).	Median hour/minutes from Last Seen Normal time to Emergency Department arrival for all stroke and TIA patients	Total number of stroke and/or TIA events in population. ***Or*** Total number of ischemic stroke cases admitted to the ED or hospital (depending on local practices).	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
2. Proportion of stroke and TIA patients who receive a CT scan within one hour of hospital arrival and within 24 hours of hospital arrival.	KQI2.a CT scan started (first slice) within 1 hour of hospital arrival (Yes/no) KQ2.b CT scan started (first slice) within 24 hours of hospital arrival (Yes/ no)	Total number of stroke and/or TIA events in population. ***Or*** Total number of ischemic stroke cases admitted to the ED or hospital (depending on local practices).	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
3. Proportion of stroke and TIA patients who are screened or assessed for swallowing deficits.	Number of stroke/TIA cases with documentation of a swallow screening completed (No judgment about whether needed it or not, applicability or eligibility)	Total number of stroke and/or TIA events in population. ***Or*** Total number of ischemic stroke cases admitted to the ED or hospital (depending on local practices).	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
4. Proportion of ischemic stroke patients who are treated with intravenous tPA.	Number of all ischemic stroke patients who receive tPA (Alteplase).	1. Total number of ischemic stroke cases admitted to the ED or hospital (depending on local practices). 2. Total number of ischemic stroke cases admitted to the ED or hospital (depending on local practices) who arrive within 4.5 hours of stroke symptom onset.	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
5. Door to needle time for ischemic stroke patients who receive tPA (minutes)	Median time (in minutes) from patient arrival in the emergency department to administration of tPA for all patients who receive tPA for the treatment of acute strokeMedian (IQR) Number of all ischemic stroke patients who undergo an endovascular thrombectomy.	Total number of ischemic stroke cases admitted to the ED or hospital (depending on local practices). Total number of ischemic stroke cases admitted to the ED or hospital (depending on local practices).	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available

Performance Measures	Numerator	Denominator	Self Assessment
Hyperacute Stroke Care (First hours after stroke)			
6. Proportion of all ischemic stroke patients who receive acute endovascular therapy.	Median time (in minutes) from patient arrival in the emergency department to arterial access (e.g., groin puncture) for all ischemic stroke patients who receive endovascular therapy.	Total number of ischemic stroke cases admitted to the ED or hospital (depending on local practices).	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
7. Median time from hospital arrival to arterial access (such as groin puncture) for patients undergoing endovascular therapy (minutes)	Proportion of ischemic stroke and TIA patients who receive acute aspirin therapy within the first 48 hrs following symptom onset.	Total number of ischemic stroke cases admitted to the ED or hospital (depending on local practices).	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
8. Proportion of ischemic stroke and TIA patients who receive acute aspirin therapy within the first 48 hours.	Proportion of all public/private healthcare facilities within a region that provide intravenous (and intra-arterial) tissue plasminogen activator and/or endovascular therapy.	Total number of ischemic stroke cases admitted to the ED or hospital (depending on local practices).	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
9. System indicator – availability of tPA medication and endovascular services in region	B. Number of professionals within each organization/region trained and able to provide acute thrombolysis	Number of health service facilities in the region (predefined). Number of eligible healthcare professionals within each organization/ region	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available

What indicators are priority for us?

Who will collect the data?

How will the data be collected (electronically, on paper, etc)?

How will the data be analyzed? When? How often?

Who will receive the results?

The Roadmap to implementation of the WSO Global Stroke Guidelines and Action Plan includes several modules that together address the full continuum of stroke care. The following modules are available for you to use as part of stroke service planning, self-assessment and implementation. Each Roadmap module includes the relevant service and resource checklist, applicable stroke best practice recommendations and important key quality indicators. Some modules in the Roadmap include additional elements and expanded information to those in the published WSO Global Stroke Care Guidelines and Action Plan to be of further practical use for all sites.

Users of these tools are encouraged to review all modules of the Roadmap.

The following modules are available as part of the WSO Roadmap for Quality Stroke Care:

World Stroke Organization - Clinical Practice Guideline

http://www.world-stroke.org

Clinical Practice Guideline Guidelines recommended by the WSO Guidelines and Quality subcommittee.
WSO International Stroke Guildelines 2012; American Academy of Neurology guideline publication.
Evidence-based Guideline: Prevention of stroke in nonvalvular atrial fibrillation. Summary of Evidence-based Guideline for CLINICIANS. Summary of Evidence-based Guideline for PATIENTS and their FAMILIES
More information: https://www.aan.com/Guidelines/Home/ByTopic?topicId=20
Heart and Stroke Foundation resource for healthcare providers. Taking Action for Optimal Community and Long-Term Stroke Care (TACLS). French version: Agir en vue de soins optimaux communautaires et de longue durée de l'AVC.

About the World Stroke Organization

OUR VISION: A LIFE FREE OF STROKE.

OUR MISSION:

The World Stroke Organization's mission is to reduce the global impact of stroke through prevention, treatment and long-term care. We work to reduce the impact of stroke on individuals, their families, and their communities. Our members campaign together to increase awareness of stroke risk and to improve treatment and care. We believe that reducing the global burden of stroke makes the world a healthier place for everyone.

Corporate partners

The World Stroke Campaign has been made possible through the generous financial contribution of its corporate partners.

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EVER NEURO PHARMA

Maria Grupper
Executive Officer
World Stroke Organization
7, rue Francois Versonnex
PO Box 6053
CH 1211 Geneva 6, Switzerland
Email: mgrupper@kenes.com

www.world-stroke.org