



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

**SECONDARY STROKE  
PREVENTION**

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# A ROAD MAP FOR QUALITY STROKE CARE

## 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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## PREVENTION OF RECURRENT STROKE

This section focuses on assessment and management of stroke risk factors and ongoing physical, cognitive and emotional issues for stroke survivors (including patients with stroke and TIA). This section does not directly address primary prevention of stroke. Stroke prevention services and activities are delivered in the sub-acute phase.

Stroke prevention care ideally involves healthcare providers with expertise in stroke care, and takes place in any setting and for patients with all types of stroke and all stroke severities, including in designated prevention clinics, vascular risk reduction programs, chronic disease management programs, acute care hospitals, emergency departments, primary care and other community settings, and in the home, based on resource and facility availability. Where available, validated mobile educational and preventative tools (e.g. Stroke Riskometer app,; Feigin et al 2015) should be used by both health professionals and lay people.

### Health Service Capacity for Stroke Care Checklists<sup>^</sup>



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	
<ul style="list-style-type: none"> <li><input type="radio"/> Provincial/State/National Assessment</li> <li><input type="radio"/> Regional/Local assessment</li> <li><input type="radio"/> Large urban hospital with advanced stroke services (comprehensive stroke services)</li> <li><input type="radio"/> Community hospitals with access to some stroke services</li> <li><input type="radio"/> Community with health clinic as only health services available</li> <li><input type="radio"/> Rural community with a visiting health worker</li> </ul>		

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## 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)
<ul style="list-style-type: none"> <li><input type="radio"/> Care provided in local communities without coordination across defined geographic regions</li> <li><input type="radio"/> Very limited access to physicians Provide assessment skill development               <ul style="list-style-type: none"> <li>• Provide training in basic stroke risk factor assessment: blood pressure, atrial fibrillation (pulse check), exercise, alcohol, diet (with respect to circumstances)</li> <li>• Basic skills in risk factor management, medications, lifestyle management</li> <li>• Training in basic rehabilitation techniques, mobility and positioning that can be passed on to family</li> <li>• Basic training in swallow screens and dysphagia management; and in temperature management</li> </ul> </li> <li><input type="radio"/> Variable access to healthcare workers (nurses or lay workers)               <ul style="list-style-type: none"> <li>• Training in basic stroke risk factor assessment: blood pressure, atrial fibrillation (pulse check), exercise, alcohol, diet (with respect to circumstances)</li> <li>• Training in basic rehabilitation techniques, mobility and positioning that can be passed on to family</li> <li>• Basic training in swallow screens and dysphagia management; and in temperature management</li> </ul> </li> <li><input type="radio"/> No access to diagnostic services or hospital care</li> <li><input type="radio"/> Limited access to the most basic lifestyle preventative advice</li> <li><input type="radio"/> Access to internet               <ul style="list-style-type: none"> <li>• Access to mobile stroke education (such as WSA)</li> <li>• Access to mobile tools such as Stroke Riskometer</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><input type="radio"/> Access to basic diagnostic services               <ul style="list-style-type: none"> <li>• Laboratory blood test (CBC, electrolytes, urea, glucose, INR, PT)</li> <li>• Electrocardiogram (12 lead)</li> <li>• Computed Tomography (CT) scan brain and vasculature</li> <li>• Capability to do CT Angiography (CTA)</li> <li>• Echocardiography</li> <li>• Doppler ultrasound</li> <li>• Holter monitors</li> </ul> </li> <li><input type="radio"/> Access to nurses and nursing assessment with stroke training               <ul style="list-style-type: none"> <li>• Primary care settings</li> <li>• Acute care settings</li> <li>• Advanced practice nurses</li> <li>• Nurse practitioner</li> </ul> </li> <li><input type="radio"/> Access to physicians with stroke expertise (although may not be stroke specialists)               <ul style="list-style-type: none"> <li>• General/Family/Primary care physicians</li> <li>• Neurologist</li> <li>• Neurosurgeon</li> <li>• Internist</li> <li>• Cardiologist</li> <li>• Geriatrician</li> <li>• Emergency Medicine</li> <li>• Physical and Rehabilitation Medicine</li> <li>• Intensivist</li> <li>• Access to stroke specialists through telestroke modalities, and teleradiology</li> </ul> </li> <li><input type="radio"/> Members of a interdisciplinary stroke team               <ul style="list-style-type: none"> <li>• Physicians with stroke expertise</li> <li>• Stroke Nurses</li> <li>• Nursing assistants</li> <li>• Pharmacist</li> <li>• Social worker/case manager</li> <li>• Palliative Care team</li> <li>• Physiotherapist</li> <li>• Occupational Therapist</li> <li>• Speech-Language Pathologist</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><input type="radio"/> Access to advanced diagnostic services               <ul style="list-style-type: none"> <li>• Magnetic Resonance Imaging (MRI)</li> <li>• Capability to do MR Angiography</li> <li>• CT Perfusion scans</li> <li>• Prolonged ECG monitoring devices</li> </ul> </li> <li><input type="radio"/> Access to physicians with stroke expertise in acute stroke care, stroke prevention and/or stroke rehabilitation               <ul style="list-style-type: none"> <li>• Neurologist</li> <li>• Neurosurgeon</li> <li>• Internist</li> <li>• Neuroradiologist / interventionalist</li> <li>• Geriatrician</li> <li>• Intensivist</li> <li>• Cardiologist</li> <li>• Emergency Medicine</li> <li>• Physical and Rehabilitation Medicine</li> <li>• General/Family/Primary care physician</li> <li>• Program to develop and maintain core competencies in stroke care</li> </ul> </li> <li><input type="radio"/> Access to additional acute interdisciplinary stroke team members               <ul style="list-style-type: none"> <li>• Nurses</li> <li>• Nursing assistants</li> <li>• Pharmacist</li> <li>• Social worker/case manager</li> <li>• Palliative Care team</li> <li>• (See below for rehabilitation staff)</li> </ul> </li> <li><input type="radio"/> Access to additional acute interdisciplinary stroke team members</li> <li><input type="radio"/> Coordinated stroke care provided across geographically discrete regions</li> <li><input type="radio"/> Stroke prevention and management training programs for all levels of healthcare providers</li> </ul>

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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)
	<ul style="list-style-type: none"> <li>○ Access to secondary prevention services               <ul style="list-style-type: none"> <li>• Organized prevention clinics or experts</li> <li>• Risk factor assessments</li> <li>• Blood pressure management</li> <li>• Antiplatelet and anticoagulant medications</li> <li>• Patient and family education, skills training, and involvement in care planning</li> <li>• Ongoing rehabilitation</li> <li>• Cognition assessment and management</li> <li>• Depression assessment and management</li> </ul> </li> <li>○ Limited coordinated stroke care provided across geographically discrete regions</li> <li>○ Stroke training programs for all levels of healthcare providers</li> </ul>	<ul style="list-style-type: none"> <li>○ Data collection strategy and mechanisms               <ul style="list-style-type: none"> <li>• Acute inpatient stroke registry</li> <li>• Acute inpatient stroke database (local or regional)</li> <li>• Stroke prevention registry</li> <li>• Stroke prevention database</li> <li>• Stroke rehabilitation registry</li> <li>• Stroke rehabilitation database (local or regional)</li> </ul> </li> </ul>

*one voice*  
One World Voice for Stroke

# A ROAD MAP FOR QUALITY STROKE CARE

## 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.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.	✓	✓	✓	Evidence level: B	<input type="checkbox"/> In place <input type="checkbox"/> In development <input type="checkbox"/> Not implemented <input type="checkbox"/> Not available
1.b Assess stroke and TIA patients for vascular disease risk factors: hypertension, diabetes, atrial fibrillation, and hypercholesteremia.		✓	✓	Evidence level: A	<input type="checkbox"/> In place <input type="checkbox"/> In development <input type="checkbox"/> Not implemented <input type="checkbox"/> Not available
1.c Assess stroke and TIA patients for vascular disease risk factors: carotid disease, cardiac disease.		✓	✓	Evidence level: A	<input type="checkbox"/> In place <input type="checkbox"/> In development <input type="checkbox"/> Not implemented <input type="checkbox"/> Not available
2. Provide information and counseling about possible strategies to modify lifestyle for vascular risk reduction (smoking, weight, diet, sodium intake, exercise, stress, alcohol intake).	✓	✓	✓	Evidence level: B	<input type="checkbox"/> In place <input type="checkbox"/> In development <input type="checkbox"/> Not implemented <input type="checkbox"/> Not available
3. Referrals should be made to appropriate specialists to provide more comprehensive assessments and structured programs to manage specific vascular risk factors.		✓	✓	Evidence level: C	<input type="checkbox"/> In place <input type="checkbox"/> In development <input type="checkbox"/> Not implemented <input type="checkbox"/> Not available
4. All patients with ischemic stroke or transient ischemic attack 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).		✓	✓	Evidence level: A	<input type="checkbox"/> In place <input type="checkbox"/> In development <input type="checkbox"/> Not implemented <input type="checkbox"/> Not available
5. All patients with stroke or transient ischemic attack should have their blood pressure monitored regularly.	✓	✓	✓	Evidence level: B	<input type="checkbox"/> In place <input type="checkbox"/> In development <input type="checkbox"/> Not implemented <input type="checkbox"/> Not available

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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		
Antihypertensive medication should be initiated before hospital discharge for all stroke patients to treat to individualized targets.					
6. A statin drug should be prescribed as secondary prevention to most patients who have had an ischemic stroke or transient ischemic attack.		✓	✓	Evidence level: B	<input type="checkbox"/> In place <input type="checkbox"/> In development <input type="checkbox"/> Not implemented <input type="checkbox"/> Not available
7. Glycemic levels should be monitored in diabetic patients with stroke or transient ischemic attack.		✓	✓	Evidence level: B	<input type="checkbox"/> In place <input type="checkbox"/> In development <input type="checkbox"/> Not implemented <input type="checkbox"/> Not available
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 (HbA1C) level $\leq 7.0$ percent.		✓	✓	Evidence level: A	<input type="checkbox"/> In place <input type="checkbox"/> In development <input type="checkbox"/> Not implemented <input type="checkbox"/> Not available
9. Patients with atrial fibrillation or atrial flutter (paroxysmal, persistent or permanent) should receive an oral anticoagulant. Direct oral anticoagulants are preferred over warfarin in non-valvular AF.		✓	✓	Evidence level: A	<input type="checkbox"/> In place <input type="checkbox"/> In development <input type="checkbox"/> Not implemented <input type="checkbox"/> Not available
10. Patients with transient ischemic attack or non-disabling stroke and ipsilateral 50 to 99 percent internal carotid artery stenosis should be evaluated by an individual with stroke expertise.		✓	✓	Evidence level: B	<input type="checkbox"/> In place <input type="checkbox"/> In development <input type="checkbox"/> Not implemented <input type="checkbox"/> Not available
11. Selected patients with ipsilateral 50 to 99 percent internal carotid artery stenosis should be offered and referred for carotid revascularization as soon as possible, with the goal of operating within seven to fourteen days.			✓	Evidence level: B	<input type="checkbox"/> In place <input type="checkbox"/> In development <input type="checkbox"/> Not implemented <input type="checkbox"/> Not available

# A ROAD MAP FOR QUALITY STROKE CARE

Which recommendations are your highest priorities to implement?

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

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## 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
1. Proportion of ischemic stroke and TIA patients who are prescribed an antiplatelet agent.	Number of ischemic stroke and TIA patients who are discharged from the ED or from inpatient acute care on antiplatelet therapy.	Number of ischemic stroke and TIA patients within the defined population and setting (based on location, time frame etc)	<input type="checkbox"/> Data collected <input type="checkbox"/> In development <input type="checkbox"/> Data not collected <input type="checkbox"/> Data not available
2. Proportion of ischemic stroke and TIA patients who are prescribed a statin agent (system indicator: availability of statin medications in region)	Number of ischemic stroke and TIA patients who are prescribed lipid-lowering medication within defined setting and time frame	Number of ischemic stroke and TIA patients within the defined population and setting (based on location, time frame etc)	<input type="checkbox"/> Data collected <input type="checkbox"/> In development <input type="checkbox"/> Data not collected <input type="checkbox"/> Data not available
3. Proportion of ischemic stroke and TIA patients who are prescribed an anticoagulant agent	Number of ischemic stroke and TIA patients with atrial fibrillation and no contraindication for anticoagulant therapy who receive anticoagulant therapy in defined setting and time frame	Number of ischemic stroke and TIA patients within the defined population and setting (based on location, time frame etc)	<input type="checkbox"/> Data collected <input type="checkbox"/> In development <input type="checkbox"/> Data not collected <input type="checkbox"/> Data not available
4. Proportion of ischemic stroke and TIA patients with carotid territory disease who undergo carotid revascularization.	Number of stroke patients with moderate to severe carotid stenosis who undergo a carotid intervention procedure.	Number of patients diagnosed with stroke and moderate to severe (50-99%) carotid artery stenosis within the defined population and setting (based on location, time frame etc)	<input type="checkbox"/> Data collected <input type="checkbox"/> In development <input type="checkbox"/> Data not collected <input type="checkbox"/> Data not available
5. Time from stroke onset to carotid revascularization.	Median time (in days) from stroke symptom onset to carotid revascularization for acute stroke and TIA patients with carotid territory disease (IQR)	Total number of ischemic stroke and TIA cases with carotid territory disease admitted to the ED or hospital (depending on local practices).	<input type="checkbox"/> Data collected <input type="checkbox"/> In development <input type="checkbox"/> Data not collected <input type="checkbox"/> Data not available

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**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?**

# A ROAD MAP FOR QUALITY STROKE CARE

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:

### Introduction and Overview

#### 1. Stroke System Development

#### 2. Prehospital and Emergency Care

#### 3. Acute Inpatient Stroke Care

#### ➔ 4. Secondary Stroke Prevention

#### 5. Stroke Rehabilitation

#### 6. Community Reintegration and Long Term Recovery

## 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 Guidelines 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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