World Stroke Organization

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

ROADMAP IMPLEMENTATION GUIDE

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.

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INTRODUCTION AND OVERVIEW

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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.

PART I: INTRODUCTION AND OVERVIEW

Stroke is a leading cause of death and disability world-wide. 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 sub-optimal care. The World Health Organization has committed to efforts to significantly reduce risk factors and mortality from non-communicable 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.

In 2014, the World Stroke Organization (WSO) published the first-ever *Global Stroke Services Guideline*[1] and Action Plan to support the efforts and progress of all regions to improve care and outcomes for people with stroke. One intent of the roadmap is that all regions use it as an opportunity to conduct a self-assessment of current stroke activities, then apply the findings to help inform decision-making and advocacy efforts to further develop stroke services to achieve the best services possible within geographical and resource access constraints. Several components are included 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 **minimum** healthcare services, access to **essential** stroke services, and access to **advanced** stroke services (Figure 1). 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 appropriate and relevant, key quality indicators are also included.

1. Lindsay P, Furie KL, Davis SM, Donnan GA, Norrving B. World Stroke Organization global stroke services guidelines and action plan. Int J Stroke. 2014 Oct; 9(Issue Supplement A100):4-13.

Purpose of Global Stroke Action Plan Guidelines and Roadmap

This roadmap manual 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 implementation in clinical practice, and the calculation of performance measures to create an environment of continuous quality improvement. The roadmap is organized along the continuum of care starting at the onset of a stroke event through the hyperacute phase, acute inpatient care, stroke rehabilitation, prevention of recurrent stroke and concludes with community reintegration and long term recovery. These phases of care are not discreet and many activities described within each may occur concurrently, such as starting prevention therapies while undergoing rehabilitation.

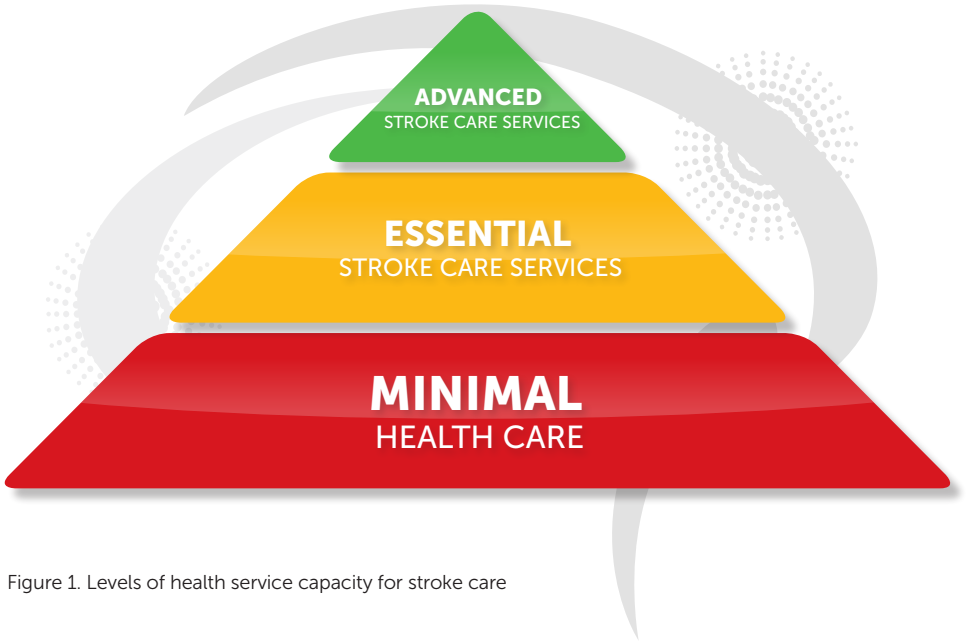


Figure 1. Levels of health service capacity for stroke care

Target Audience: The focus of the roadmap is on the processes of care and impacts on patient outcomes. 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 will be able to 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 programs under development, to help ensure that all key elements defined here are considered from eth beginning of development.

Links to resources from countries around the globe are included in appendices and the reference list. For all groups working on stroke service improvement, the advantage of being aware of and using these existing tools is to allow more time to be spent on systems improvement and less time spent replicating efforts where valid materials already exist that can be adapted to meet local needs.

Global Stroke Services Framework for The Core Elements of Stroke Care Across the Continuum of Care

The purpose of the WSO Global 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 Figure 2.

The WSO Global 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.^

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 health care services, primary prevention is not the main focus of this framework or Action Plan. ^ However, this framework and the supporting Action Plan do focus on secondary prevention services that address the same prevention concepts (such as lifestyle, hypertension, atrial fibrillation and dyslipidemia).

Adaptation of the WSO Global Stroke Care Guideline and Action Plan for Local Use

Stroke audits from around the world have repeatedly shown that a wide gap continues to exist between what the evidence shows as best practices in stroke care and the care that is actually delivered in practice. Goals of the WSO Global Stroke Care guidelines include to facilitate the implementation of evidence into practice, support clinical decision making, specify beneficial therapeutic approaches, and influence public policy (Kastner et al 2011).

The WSO global stroke care guideline includes a core set of stroke care recommendations and key quality indicators that have been established through a rigorous review and adaptation process (Lindsay et al; IJS 2014). They include:

- **System resource elements** that are required to deliver stroke care and implement recommendations.
- Evidence-based **best practice recommendations for stroke care**[2] which are applicable across the continuum of stroke care. For each recommendation there is an indication of the level of service capacity in which these recommendations may be realistically being carried out.
- **Key quality indicators** (core performance measures) that help determine what care is being provided the extent of implementation, and the quality of that care. These indicators may be considered as the foundation for ongoing quality improvement efforts.
- **System-level quality monitoring indicators** are also provided to help support systems change and ongoing improvement efforts.

2. For recommendations that are considered applicable where a minimum 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.

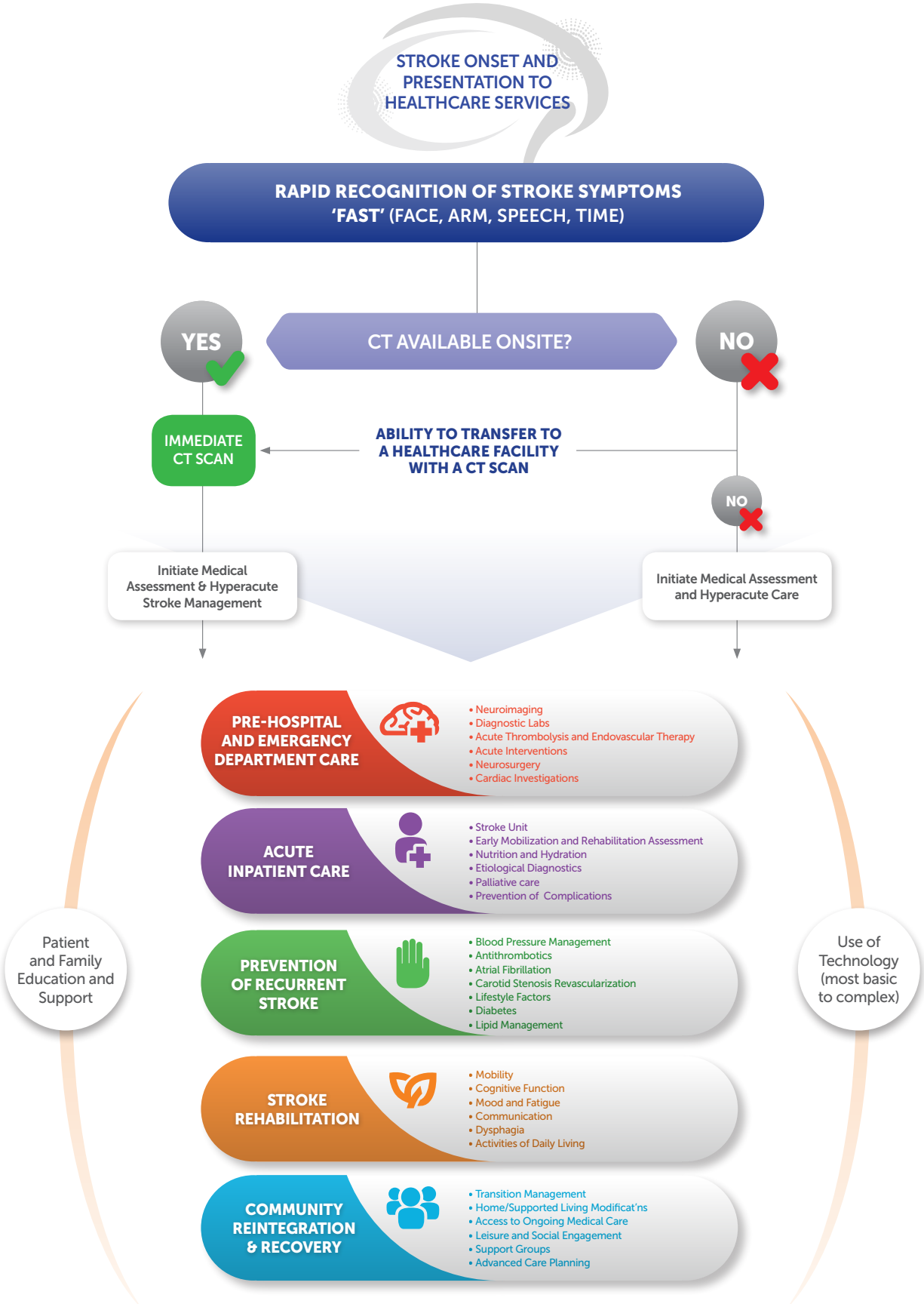


Figure 2. Global Stroke Services Framework

The WSO Global Stroke Care Guideline defines ideal care of stroke patients across the continuum. This guideline highlights topics that have the highest levels of evidence for effectiveness or are considered key system drivers. We recognize that users of the WSO Stroke Care Guideline and Action Plan may only be able to implement some recommendations, and/or may be working on just some phases of the stroke care continuum (as defined in the framework above) at a time.

Figure 3 below describes the steps that should be undertaken when any local, regional or national group adopts and/or adapts the WSO Stroke Care Guideline for local use. It is then followed by more detailed descriptions for each step. Practical considerations are provided where possible for each step. This section also provides links to useful resources should more detailed information be required. In areas where resources are limited, some steps may be modified or skipped altogether. It is important to weigh the benefits and risks of doing this. For example, in establishing the working group, a decision may be made to keep it small; however, it should still ideally include representation from multiple disciplines.

The guideline should be adapted to local use by a group of people with a broad range of expertise relevant to the guideline topic being developed. The way the group works together can have a significant effect on the outcome of the process. For stroke care, healthcare professionals from the following disciplines should be considered for participation in guideline development: medicine (neurology, internal medicine, emergency, primary care, and rehabilitation medicine), nursing, rehabilitation (physiotherapy, occupational therapy, speech-language pathologists, rehab assistants), social work, psychology, and pharmacy. Other disciplines and system leaders may be relevant as well, depending on the phase(s) of the continuum being included in the guideline. It is important to include stroke survivors, family members and informal caregivers as part of the group as well.

Figure 3. Steps to adapting the WSO global stroke care guideline and action plan for local use.

Set up working group	• Ensure key stakeholders represented • Seek experts from other jurisdictions
Define scope and topics	• Identify the applicable stages of the stroke care continuum • Choose the main topics to be addressed in your local guideline
Find best evidence	• Review and select appropriate guidelines from countries contributing to WSO Stroke Care Guideline as basis for local development • Use evidence reviews available from existing global guidelines • Conduct evidence search to identify additional up-to-date evidence
Appraise and Collate evidence	• Follow systematic process for appraising quality and strength of new evidence
Select recommendations and modify as required for local context	• Be as clear and concise as possible. • Include critical content to cover scope (Appendix One) • Link evidence to the recommendations
Consultation and External Review	• Include discussions with end-users, system leaders and funders • External review by experts not involved in original development and adaptation work
Dissemination and Implementation	• Provide tools to support implementation • Provide education and skills training to all involved in care delivery
Evaluation Strategy	• Identify key quality indicators to measure implementation and impact on patient outcomes • Mechanism to collect data through a registry or regular audit process

Refer to Appendix 1 for detailed information on each step of this guideline adaptation process

PART II: WSO STROKE SERVICES DELIVERY FRAMEWORK OVERVIEW

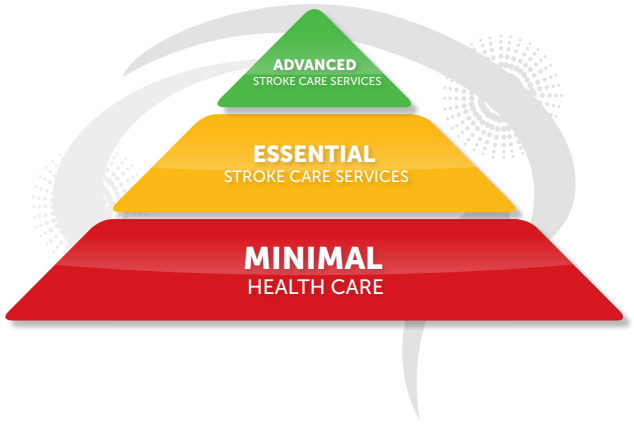
The Global Stroke Guidelines and Action Plan are presented in this Roadmap within a quality improvement model. Each section represents a part of the continuum and enables users to review and assess the structural elements and services available for stroke care; core evidence-based best practice recommendations related to processes of care that should be operational, based on level of services available; and, a list of key quality indicators to monitor levels of care provided and impact on patient and economic outcomes. Further descriptions of each of these elements of the roadmap are provided below.

Users of this Roadmap should review the sections relevant to their phase of stroke services (system level, hyperacute, acute inpatient, prevention of recurrent stroke, stroke rehabilitation, community reintegration); complete an assessment of current services and resources, current recommendations in place, and current data collection methods and access; then, develop an implementation plan to ensure that these core elements are optimized and additional elements added to improve the stroke services they provide.

It should be noted that the recommendations and indicators provided here represent the basic core elements required to deliver optimal stroke care. The essential and advanced stroke services levels build upon and include all elements listed for the previous level of service plus additional services. As resources and expertise allow, stroke providers and systems should expand on these to include a broader set of recommendations within their own regions to increase comprehensiveness of evidence-based stroke care and surveillance. Additional recommendations for each part of the continuum and more in-depth recommendations and quality indicators are available through currently published guidelines from around the world. A list of high quality guidelines that were reviewed in the development of the WSO Global Stroke Guidelines and Action Plan are provided in the reference list.

Element One: Identify Current Levels of Service Delivery and Capability (Self Assessment)

Models for stroke services delivery vary considerably from region to region, and 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. This first element lists core resources that are reasonable to expect at each service level from minimum to essential and advanced. They are provided in a check list that each stroke services development group should use to assess their own resource capacity and identify potential additional elements to put in place.



The three levels of stroke service availability have been established as a key part of this framework for the purposes of developing the WSO Global Stroke Services Action Plan and its components. By completing the self-assessment, each group will understand where their services are categorized. This provides an opportunity to develop goals and plans to reach higher levels of services within resource ability.

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 their goals for stroke care delivery, then develop a strategy to achieve those goals over time. It is recognized that in lower and 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.

Element Two: Core Stroke Care Recommendations

Best Practice Guidelines are recommendations for practice or policy decisions that are informed by sufficient high quality evidence. They describe the *most effective* health care practices, interventions, and processes determined by research evidence and in some cases, expert opinion, and consensus. Best practices guidelines can take the form of clinical practice/best practice recommendations or policy guidelines.

Through a multi-round Delphi process, a core set of stroke care recommendations have been identified that are considered reasonable to be implemented within the levels of minimal, essential and advanced stroke service models. These recommendations emphasize the fact that even in regions with the minimum of resources something can be done to improve care and outcomes for stroke patients. The recommendations are structured in an incremental model. This means that at the minimum level of services, a core set of recommendations should be implemented. Then at the essential level, all recommendations at the minimum level PLUS additional recommendations identified as reasonable at the essential level should be implemented. Likewise for those performing at a level of advanced stroke services, all recommendations listed for minimum and essential stroke services should be implemented plus additional recommendations for advanced service capability.

Evidence Levels:

All recommendations in this guideline are presented along with evidence levels that reflect the strength of available research to support the recommendation as of October 2015. These recommendations and evidence levels will be reviewed annually and adjusted as required to reflect emerging research findings. Levels of evidence provided are based on the findings from specific research studies; therefore, they are specific to the population studied and may not be applicable to all regions, they may not be reflective of local systems, and local stroke care providers should determine relevance to their own population.

recommendations are supported by strong evidence from systematic reviews, meta-analysis, and/or multiple randomized controlled trials with consistent findings;

recommendations are supported by moderate evidence from single randomized controlled trials, multiple trials with inconsistent findings, large observational studies, and/or large case controlled studies;

recommendations are supported by weak evidence from small observational or case controlled studies; or they are based on expert opinion and/or group consensus. These weaker recommendations are provided when they are considered key elements of stroke care, such as obtaining CT scans to confirm diagnosis.

Element Three: Key Stroke Quality Indicators

Evaluation of stroke care delivery is an essential component of any organized stroke care system, no matter how big or small. Considerations for evaluation should be made early on in the planning process so that mechanisms for data collection can be established as part of the stroke services and guideline implementation plan.

As part of the WSO Global Stroke Care Guidelines and Action Plan, International Classification of Diseases codes were selected to identify appropriate stroke cases to include in a stroke performance measurement strategy. These are defined and included in Appendix 2. A core set of performance measures were then identified in tandem to the process to select core best practice recommendations. These key stroke quality indicators have been provided in this roadmap to increase focus, consistency and standardization of stroke care measurement across jurisdictions. In time it is hoped this information could be used to develop global benchmarks for delivery of stroke services at the minimum, essential and advanced levels of care, and help drive global stroke care improvement efforts through informed decision-making and system planning.

To develop effective local stroke care measurement strategy quality indicators, several elements should be addressed:

- Define stroke case definitions
- Define inclusion and exclusion criteria for target patient population of interest (stroke type, age, gender, setting, phase of care etc)
- Identify key stroke quality indicators from WSO list below, and add additional indicators to sufficiently cover scope of services being delivered and accountabilities
- Identify required data elements and method to ensure all required elements are collected to calculate identified quality indicators
- Develop data collection repository and methodology (who will record data, when, where, how and on which patients)
- Determine time frames for data collection, analysis and reporting
- Determine report structure and format (online dashboard report cards should be considered where possible)
- Establish dissemination and communication plan of results of data analysis to all levels of providers, decision-makers and patient population

Quality Definitions

Standards of care: are the bases of comparison in measuring or judging the capacity, quality, content, or extent of a particular object of activity. In the absence of evidence, standards may be informed by expert opinion. Standards can be considered as the basic requirements of a healthcare profession and are usually defined within policies, procedures, and standards of practice documents. Standards of care specify the minimum acceptable characteristics of what constitutes quality care.

They specify appropriate management based on strong scientific evidence and collaboration between healthcare professionals involved in the treatment of a given condition. Standards of care describe the level at which the average, prudent provider in a given community should practice and how similarly qualified practitioners would have managed the patient's care under the same or similar circumstances.

Quality Indicator: An objective measure of healthcare quality that has been developed to support self-assessment and quality improvement at the provider, hospital or systems level (ACC/AHA Performance Measures task force).

Benchmark: is the performance level which is recognised as the standard of excellence for a specific process of care or outcome and is used for comparisons across groups. Benchmarks provide standard values by which something can be measured, compared, or judged. Benchmarks can be identified through several techniques, including: validated research and statistical methods; identification of top performers; and the past performance of one's own organization.

Target: is the level of performance that an organization aims to achieve within a specified period of time. It is usually a value between the current actual level of performance and the benchmark, but could be equal to or greater than the benchmark. Target values take into account the resources and constraints with respect to meeting the standard of care.

Threshold: is the minimal acceptable level of performance. Performance rates that fall short of the threshold are considered poor performance and should result in corrective action.

*** Performance rates outside the threshold - either above or below as defined by the specific measure - are considered poor performance*

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Conflict of Interest Declarations:
MP Lindsay: None; K. Furie: None; S. Davis: None; G. Donnan: None; B. Norrving: None.

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 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.

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STROKE SYSTEM DEVELOPMENT

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HEALTH SYSTEM DEVELOPMENT AND SURVEILLANCE

This section addresses public recognition of stroke and also system development. This section crosses all phases and settings of stroke care.

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

- Care provided in local communities without coordination across defined geographic regions
- No access to diagnostic services or hospital care for hyperacute stroke treatment
- Very limited access to physicians
  - Provide assessment skill development
  - Basic training in swallow screens and dysphagia management; and in temperature management
- Variable access to healthcare workers (nurses or lay workers)
  - Basic training in swallow screens and dysphagia management; and in temperature management

Essential Stroke Services (In addition to services listed under Minimal stroke services)

- Limited coordinated stroke care provided across geographically discrete regions
- Stroke training programs for all levels of healthcare providers
- Access to basic diagnostic services
- Limited access to emergency medical services
- Access to nurses and nursing assessment with stroke training
- Access to physicians with stroke expertise (although may not be stroke specialists)
- Access to acute thrombolysis with IV tPA
  - Intravenous tPA (Alteplase)
- Access to core members of a interdisciplinary stroke team (MD, RN, PT, OT)
- 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
- Limited access to emergency medical services
  - raining 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

Advanced Stroke Services (In addition to services listed under Minimal and essential stroke services)

- 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)

Access to advanced diagnostic services
- Magnetic Resonance Imaging (MRI)
- Capability to do MR Angiography
- CT Perfusion scans
- Prolonged ECG monitoring devices

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)
	○ Access to nurses and nursing assessment with stroke training • Primary care settings • Acute care settings • Advanced practice nurses • Nurse practitioner ○ 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 acute thrombolysis with IV tPA • Intravenous tPA (Alteplase) ○ 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	○ 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 ○ Access to additional acute interdisciplinary stroke team members • Nurses • Nursing assistants • Pharmacist • Palliative Care team ○ 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

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		
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)	✓	✓	✓	Evidence level: C	☐ In place ☐ In development ☐ Not implemented ☐ Not available
2. All healthcare personnel should be trained to recognize the warning signs and symptoms of stroke	✓	✓	✓	Evidence level: C	☐ In place ☐ In development ☐ Not implemented ☐ Not available
3. All geographic regions should have a local emergency call number or system in place, such as 9-1-1		✓	✓	Evidence level: C	☐ In place ☐ In development ☐ Not implemented ☐ Not available
4. Protocols should be in place in emergency call centres to mobilize EMS personnel to respond to a stroke call with high urgency		✓	✓	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
Health System Monitoring			
1. Stroke incidence rates adjusted for age and sex in the population.	Total number of stroke cases in a population (stratified by stroke type).	Total population based on census information within a given time frame.	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
2.a Prevalence of stroke risk factors in the population.	Total number of people in a population who report or are documented to have one or more stroke risk factors (high blood pressure, elevated cholesterol, diabetes, atrial fibrillation, family history, inactive life style, obesity or over weight, etc) (stratified by stroke type and type of risk factor).	Total population based on census information within a given time frame.	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
2.b Prevalence of vascular risk factors in the population.	Total number of people in a population who report or are documented to have one or more vascular risk factors (high blood pressure, elevated cholesterol, diabetes, atrial fibrillation etc) (stratified by stroke type and type of risk factor).	Total population based on census information within a given time frame.	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
2.c Percentage of people undertaking a vascular risk assessment who have risk factors for stroke.	Number of people within a population found to have one or more identified vascular risk factors following risk assessment	Total population based on census information within a given time frame who undergo vascular risk assessment	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
3. Case fatality (mortality) rates for stroke patients by stroke type, adjusted for age, gender, comorbidities, and stroke severity. Measurements should take place overall in hospital, at 7 days, 30 days and one year post stroke.	Number of people with stroke or TIA who have in-hospital mortality within 7 days, 30 days, and within one year following index stroke symptom onset.	Total number of stroke cases.	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
4. Recurrent stroke rates within 3 months an done year following an initial stroke or transient ischemic attack.	Number of people with stroke who are readmitted to hospital for a new stroke or TIA within 90 days following index stroke symptom onset.	All stroke and TIA patients discharged alive following index stroke.	☐ In place ☐ In development ☐ Not implemented ☐ Not available
5. Functional status measured using the modified Rankin Score at 3 months and one year following stroke or transient ischemic attack that are admitted to an acute care hospital.	Frequency distribution of modified Rankin scores for each patient at time of discharge from acute care and at 90 days post stroke onset. [(We will later use data to categorize MRS 0-2, MRS 0-5, or MRS 0-6.)]	All stroke and TIA patients admitted to an inpatient acute care hospital, and discharged alive	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available

Performance Measures	Numerator	Denominator	Self Assessment
6. The country/region has acute thrombolytic agents available and accessible for use with stroke patients.	Descriptive list of facilities providing acute thrombolytic therapies for stroke patients within a region.		☐ In place ☐ In development ☐ Not implemented ☐ Not available
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.	Descriptive list of regions with established stroke systems of care for stroke patients (need to identify and describe the corer elements of stroke systems – see Step One WSO Stroke Services Checklist).		☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
8. The country/region/facility has implemented evidence based clinical practice guidelines for stroke care.	Descriptive list of each hospital within a region that provides stroke care, and whether clinical practice guidelines are available and formally implemented on stroke patients following a systematic approach.		☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
9. The country/region/facility collects data using International Classification of Disease (ICD) 9 or 10 coding system.	Descriptive list of regions collecting data on stroke patients in a systematic approach using ICD9 or 10 methodology. Include information on percentage of facilities and patients within facilities with data routinely collected.		☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
10. The country/region participates in a quality register or routine and standardized clinical audits for monitoring stroke care.	Descriptive list of each facility within a region that provides stroke care, and whether routine and standardized data collection occurs on every stroke and TIA patient following a systematic approach.		☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
Systems for Stroke Recognition and Response			
1. Availability of basic health services within a region	Descriptive counts and per capita rate data on currently available health services based on Step One checklist		☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
2. Availability of diagnostic labs and imaging within region	Descriptive counts and per capita rate data on currently available diagnostic imaging services based on Step One checklist		☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
3. Availability of inpatient hospital facilities within region	Number of acute care hospitals (public and private) – include count and then calculate number per capita	Total population of the region under study	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
4. Availability and level of training for healthcare workers and healthcare professionals within region	Counts – stratify by t number of people attending training and type of training provided	All healthcare providers working within a specified stroke population.	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
5. Availability of relevant stroke pharmaco-therapies in a region	Create list of possible therapies based on stroke services checklist, then count frequency available per therapy.		☐ 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?

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.

PREHOSPITAL AND EMERGENCY CARE

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?

World Stroke Organization

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

ACUTE INPATIENT STROKE 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.

ACUTE INPATIENT STROKE CARE

This section focuses the acute inpatient care period after the hyperacute stage is completed. This phase of care usually starts from about 24 hours after stroke onset through the first 5 to 7 days. In this phase the patient becomes medically stable and care goals shift to ongoing stroke assessment, determining etiology, management of persistent symptoms, initiating recovery, early rehabilitation, and prevention of acute complications. Acute stroke care ideally involves healthcare providers with expertise in stroke care, and takes place in a clinic or hospital stroke unit or ward, but may occur in other community settings, including the home, 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
○ Very limited access to physicians Provide assessment skill development • Provide training in basic stroke risk factor assessment: blood pressure, atrial fibrillation (pulse check), exercise, alcohol, diet (with respect to circumstances) • Basic skills in risk factor management, medications, lifestyle management • Training in basic rehabilitation techniques, mobility and positioning that can be passed on to family • Basic training in swallow screens and dysphagia management; and in temperature management	○ Access to nurses and nursing assessment with stroke training • Acute care settings • Advanced practice nurses • Nurse practitioner	○ 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 • Physical and Rehabilitation Medicine • General/Family/Primary care physician • Program to develop and maintain core competencies in stroke care
○ Variable access to healthcare workers (nurses or lay workers) • Training in basic stroke risk factor assessment: blood pressure, atrial fibrillation (pulse check), exercise, alcohol, diet (with respect to circumstances) • Training in basic rehabilitation techniques, mobility and positioning that can be passed on to family • 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 • Internist • Cardiologist • Geriatrician • Emergency Medicine • Physical and Rehabilitation Medicine • Intensivist • Access to stroke specialists through telestroke modalities, and teleradiology	○ Access to additional acute interdisciplinary stroke team members • Nurses • Nursing assistants • Pharmacist • Social worker/case manager • Palliative Care team • (See below for rehabilitation staff)
○ No access to diagnostic services or hospital care	○ Access to acute inpatient stroke care, where admitted stroke patients are cared for on: • Stroke Unit • Clustered model on same ward • Scattered throughout hospital	○ 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
○ Limited access to the most basic lifestyle preventative advice	○ Access to stroke unit care (WSA Module): • Geographically defined unit dedicated to the care of stroke patients - *Or, model of clustering stroke patients* • Members of a interdisciplinary stroke team - *Physicians with stroke expertise* - *Stroke Nurses*	
○ Access to internet • Access to mobile stroke education (such as WSA) • Access to mobile tools such as Stroke Riskometer		

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)
	- *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 • Protocols to guide acute stroke care based on best practice guidelines - *Medical and nursing assessments:* - *Past history* - *Swallow screen* - *Nutrition, hydration* - *Functional status, mobility, DVT risk* - *Level of dependency* - *Skin Integrity* - *Bladder and bowel continence* - *Temperature* • Interdisciplinary meetings weekly to discuss patient progress against treatment goals; update management plans • Early access to rehabilitation therapies – including cross training of skills to nurses, nursing assistants and family members • Patient and family education, skills training, and involvement in care planning • Discharge planning ○ Access to stroke rehabilitation services • Early functional assessments, goal setting and individualized rehab plans developed ○ Access to stroke prevention therapies such as aspirin, lifestyle change recommendations, blood pressure management ○ Limited coordinated stroke care provided across geographically discrete regions ○ Stroke training programs for all levels of healthcare providers	○ 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 • Access to protocols for care of stroke patients: swallow assessment, food and fluids. Positioning, mobilization, continence, complications (fever, DVT, skin breakdown) • 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		
Acute Inpatient Care (First days after stroke)					
1.a Patients with an **acute stroke** should be admitted to hospital.		✓	✓	Evidence level: A	☐ In place ☐ In development ☐ Not implemented ☐ Not available
1.b Patients with **minor stroke or transient ischemic attack** should be urgently assessed and prevention management commenced, (within 48 hours of stroke symptom onset) either in hospital or treated in a specialized outpatient clinic .		✓	✓	Evidence level: B	☐ In place ☐ In development ☐ Not implemented ☐ Not available
2. Patients admitted to hospital with an acute stroke or transient ischemic attack should be treated by an interdisciplinary stroke team, consisting of at least a physician with training in stroke care, a nurse, rehabilitation specialist (such as a physiotherapist, occupational therapist, speech language pathologist).		✓	✓	Evidence level: A	☐ In place ☐ In development ☐ Not implemented ☐ Not available
3. Patients admitted to hospital with an acute stroke or transient ischemic attack 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).		✓	✓	Evidence level: A	☐ In place ☐ In development ☐ Not implemented ☐ Not available
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).	✓	✓	✓	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		
Acute Inpatient Care (First days after 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.	✓	✓	✓	Evidence level: B	☐ In place ☐ In development ☐ Not implemented ☐ Not available
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.		✓	✓	Evidence level: B	☐ In place ☐ In development ☐ Not implemented ☐ Not available
7.a All stroke patients should be assessed for their risk of developing venous thromboembolism		✓	✓	Evidence level: C	☐ In place ☐ In development ☐ Not implemented ☐ Not available
7.b Patients at high risk of venous thromboembolism should be started on venous thromboembolism prophylaxis immediately if there is no contraindication.		✓	✓	Evidence level: A	☐ In place ☐ In development ☐ Not implemented ☐ Not available
8.a Frequent, out-of-bed activity in the very early time frame (within 24 hours of stroke onset) is not recommended. Mobilization may be reasonable for some patients with acute stroke in the very early time frame and clinical judgment should be used.	✓	✓	✓	Evidence level: B Evidence level: C	☐ In place ☐ In development ☐ Not implemented ☐ Not available
8.b All patients admitted to hospital with acute stroke should start to be mobilized early (between 24 hours and 48 hours of stroke onset) if there are no contraindications *(Contraindications to early mobilization include, but are not restricted to, patients who have had an arterial puncture for an interventional procedure, unstable medical conditions, low oxygen saturation, and lower limb fracture or injury.)*	✓	✓	✓	Evidence level: B	☐ 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		
Acute Inpatient Care (First days after stroke)					
8.c Family members should be trained to assist with mobilization.	✓	✓	✓	Evidence level: C	☐ In place ☐ In development ☐ Not implemented ☐ Not available
9.a Temperature should be monitored and initiate temperature-reducing care measures such as antipyretics and tepid baths when increased temperature	✓	✓	✓	Evidence level: B	☐ In place ☐ In development ☐ Not implemented ☐ Not available
9.b For temperature greater than 37.5° Celsius, increase frequency of monitoring, investigate possible infection such as pneumonia or urinary tract infection and initiate antipyretic and antimicrobial therapy as required.	✓	✓	✓	Evidence level: A	☐ In place ☐ In development ☐ Not implemented ☐ Not available
10. The use of indwelling catheters should be avoided due to the risk of urinary tract infection	✓	✓	✓	Evidence level: B	☐ In place ☐ In development ☐ Not implemented ☐ Not available
11. All stroke patients should be screened for urinary incontinence and retention (with or without overflow), fecal incontinence, and constipation	✓	✓	✓	Evidence level: C	☐ In place ☐ In development ☐ Not implemented ☐ Not available
12. The swallowing, nutritional and hydration status of stroke patients should be screened as early as possible (using validated screening tools where possible).	✓	✓	✓	Evidence level: B	☐ In place ☐ In development ☐ Not implemented ☐ Not available
13. Family members should be trained on proper feeding techniques for stroke patients with swallowing difficulties.	✓	✓	✓	Evidence level: C	☐ 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		
Acute Inpatient Care (First days after stroke)					
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		✓	✓	Evidence level: C	☐ In place ☐ In development ☐ Not implemented ☐ Not available
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)	✓	✓	✓	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
Acute Inpatient Care (First days after stroke)			
1. Proportions of presenting stroke patients admitted to acute inpatient hospital	Number of presentations to a health care facility who are admitted to inpatient unit.	Total presentations to a health care facility for stroke or TIA.	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
2. Proportion of TIA patients with access to rapid assessment services.	Number of presentations to a health care facility who receive a rapid assessment for TIA within 48 hours of stroke symptom onset.	Total presentations to a health care facility for TIA.	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
3. Proportion of stroke and TIA patients who are admitted to an acute stroke unit.	Number of stroke and TIA patients admitted to hospital and treated on a specialized acute stroke unit at any time during their hospital stay	All stroke and TIA patients admitted to an inpatient acute care facility.	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
4. Time from stroke onset until first mobilization.	Hours/days from stroke onset to first mobilization after arrival to hospital	All stroke and TIA patients admitted to an inpatient acute care facility.	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
5. Distribution of discharge locations for stroke and TIA patients discharged alive from acute care.	Number of stroke patients discharged to home or place of residence, inpatient rehabilitation, long term care, or other location following inpatient admission for stroke	All stroke and TIA patients admitted to an inpatient acute care facility, And discharged alive	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
6. Percentage of stroke inpatients with a documented swallowing screen completed.	Number of stroke patients admitted to hospital who have documentation in their chart of a completed swallow screen.	All stroke and TIA patients admitted to an inpatient acute care hospital.	☐ 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?

World Stroke Organization

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

SECONDARY STROKE PREVENTION

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.

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, primacy 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^

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
○ Very limited access to physicians Provide assessment skill development • Provide training in basic stroke risk factor assessment: blood pressure, atrial fibrillation (pulse check), exercise, alcohol, diet (with respect to circumstances) • Basic skills in risk factor management, medications, lifestyle management • Training in basic rehabilitation techniques, mobility and positioning that can be passed on to family • 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 physicians with stroke expertise in acute stroke care, stroke prevention and/or stroke rehabilitation • Neurologist • Neurosurgeon • Internist • Neuroradiologist / interventionalist • Geriatrician • Intensivist • Cardiologist • Emergency Medicine • Physical and Rehabilitation Medicine • General/Family/Primary care physician • Program to develop and maintain core competencies in stroke care
○ Variable access to healthcare workers (nurses or lay workers) • Training in basic stroke risk factor assessment: blood pressure, atrial fibrillation (pulse check), exercise, alcohol, diet (with respect to circumstances) • Training in basic rehabilitation techniques, mobility and positioning that can be passed on to family • 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 • Internist • Cardiologist • Geriatrician • Emergency Medicine • Physical and Rehabilitation Medicine • Intensivist • Access to stroke specialists through telestroke modalities, and teleradiology	○ Access to additional acute interdisciplinary stroke team members • Nurses • Nursing assistants • Pharmacist • Social worker/case manager • Palliative Care team • (See below for rehabilitation staff)
○ No access to diagnostic services or hospital care	○ 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	○ Access to additional acute interdisciplinary stroke team members
○ Limited access to the most basic lifestyle preventative advice		○ Coordinated stroke care provided across geographically discrete regions
○ Access to internet • Access to mobile stroke education (such as WSA) • Access to mobile tools such as Stroke Riskometer		○ Stroke prevention and management training programs for all levels of healthcare providers

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)
	○ Access to secondary prevention services • Organized prevention clinics or experts • Risk factor assessments • Blood pressure management • Antiplatelet and anticoagulant medications • Patient and family education, skills training, and involvement in care planning • Ongoing rehabilitation • Cognition assessment and management • Depression assessment and management ○ Limited coordinated stroke care provided across geographically discrete regions ○ 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.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	☐ In place ☐ In development ☐ Not implemented ☐ Not available
1.b Assess stroke and TIA patients for vascular disease risk factors: hypertension, diabetes, atrial fibrillation, and hypercholesteremia.		✓	✓	Evidence level: A	☐ In place ☐ In development ☐ Not implemented ☐ Not available
1.c Assess stroke and TIA patients for vascular disease risk factors: carotid disease, cardiac disease.		✓	✓	Evidence level: A	☐ In place ☐ In development ☐ Not implemented ☐ 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	☐ In place ☐ In development ☐ Not implemented ☐ 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	☐ In place ☐ In development ☐ Not implemented ☐ 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	☐ In place ☐ In development ☐ Not implemented ☐ Not available
5. All patients with stroke or transient ischemic attack should have their blood pressure monitored regularly.	✓	✓	✓	Evidence level: B	☐ 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		
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	☐ In place ☐ In development ☐ Not implemented ☐ Not available
7. Glycemic levels should be monitored in diabetic patients with stroke or transient ischemic attack.		✓	✓	Evidence level: B	☐ In place ☐ In development ☐ Not implemented ☐ 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 ≤7.0 percent.		✓	✓	Evidence level: A	☐ In place ☐ In development ☐ Not implemented ☐ 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	☐ In place ☐ In development ☐ Not implemented ☐ 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	☐ In place ☐ In development ☐ Not implemented ☐ 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	☐ 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
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)	☐ Data collected ☐ In development ☐ Data not collected ☐ 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)	☐ Data collected ☐ In development ☐ Data not collected ☐ 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)	☐ Data collected ☐ In development ☐ Data not collected ☐ 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)	☐ Data collected ☐ In development ☐ Data not collected ☐ 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).	☐ 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?

World Stroke Organization

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

STROKE REHABILITATION

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.

STROKE REHABILITATION

This section focuses on rehabilitation goal setting, assessment, therapies and other and interventions to promote optimal ongoing physical, cognitive and emotional recovery for stroke survivors. The goals of stroke rehabilitation are to help stroke survivors regain as much independence in functioning and increase quality of life. Stroke rehabilitation could significantly improve outcomes for stroke survivors, and should be goal-oriented.

Stroke rehabilitation services and activities are delivered in the sub-acute phase, usually staring soon after a stroke occurs, once the person is medially stable, and it could be beneficial for weeks, months or even years following a stroke. Stroke rehabilitation ideally involves healthcare providers with expertise in stroke recovery, and takes place in many settings including inpatient rehabilitation units, community-based rehabilitation programs, acute care hospitals, day programs, and in the home, 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 physicians with stroke expertise (although may not be stroke specialists) • Physical and Rehabilitation Medicine • General/Family/Primary care physicians • Neurologist • Access to stroke specialists through telestroke modalities, and teleradiology	○ Access to physicians with stroke expertise in acute stroke care, stroke prevention and/or stroke rehabilitation • Physical and Rehabilitation Medicine • Neurologist • General/Family/Primary care physician • Program to develop and maintain core competencies in stroke care
○ Very limited access to physicians Provide assessment skill development • Provide training in basic stroke risk factor assessment: blood pressure, atrial fibrillation (pulse check), exercise, alcohol, diet (with respect to circumstances) • Basic skills in risk factor management, medications, lifestyle management • Training in basic rehabilitation techniques, mobility and positioning that can be passed on to family • Basic training in swallow screens and dysphagia management; and in temperature management	○ Access to nurses and nursing assessment with stroke rehabilitation training • Advanced practice nurses • Nurse practitioner	○ Access to stroke rehabilitation interdisciplinary team members • Physiotherapist • Occupational Therapist • Speech-Language Pathologist • Recreation therapists • Neuropsychological services • Social worker • Vocational Therapist • Rehabilitation Assistants • Nurses • Nursing assistants • Pharmacist • Social worker/case manager • Other _____
○ Variable access to healthcare workers (nurses or lay workers) • Training in basic stroke risk factor assessment: blood pressure, atrial fibrillation (pulse check), exercise, alcohol, diet (with respect to circumstances) • Training in basic rehabilitation techniques, mobility and positioning that can be passed on to family • Basic training in swallow screens and dysphagia management; and in temperature management	○ Early access to rehabilitation therapies – including cross training of skills to nurses, nursing assistants and family members	○ Provide telestroke consultations to smaller and more rural; centres
○ Access to internet • Access to mobile stroke education (such as WSA) • Access to mobile tools such as Stroke Riskometer	○ Access to stroke rehabilitation services • Early functional assessments, goal setting and individualized rehab plans developed • Inpatient stroke rehabilitation beds • Training programs for patients and families in simple rehabilitation techniques and self-management • Home care rehabilitation services for stroke patients • Organized outpatient stroke rehabilitation services • Local/private community stroke rehabilitation programs • Patient and family support groups	○ Printed stroke patient educational materials
	○ Access to stroke rehabilitation unit care (WSA Module): • Geographically defined unit dedicated to the care of stroke patients - *Or, model of clustering stroke patients*	○ Stroke training programs for all levels of healthcare providers
		○ Data collection strategy and mechanisms • Stroke rehabilitation registry • Stroke rehabilitation database (local or regional)

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 • Protocols to guide stroke rehabilitation care based on best practice guidelines - *Medical and nursing assessments:* - *Swallow screen* - *Nutrition, hydration* - *Functional status, mobility, DVT risk* - *Level of dependency* - *Upper and lower limb function, gait and balance function* - *Communication issues* - *Vision and perceptual deficits* - *Cognitive function* - *Mood and depression screening and management* • Interdisciplinary meetings weekly to discuss patient progress against treatment goals; update management plans • 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	

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. All patients with acute stroke should have an initial functional assessment to determine rehabilitation needs and receive an individualized rehabilitation plan.		✓	✓	Evidence level: A	☐ In place ☐ In development ☐ Not implemented ☐ Not available
2. All patients who are admitted to inpatient rehabilitation following stroke should be treated on a specialized stroke rehabilitation unit.		✓	✓	Evidence level: A	☐ In place ☐ In development ☐ Not implemented ☐ Not available
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.	✓	✓	✓	Evidence level: A	☐ In place ☐ In development ☐ Not implemented ☐ Not available
4. Patients should receive adaptive training (such as the use of specialized devices) to improve performance of specific functional tasks.	✓	✓	✓	Evidence level: A	☐ In place ☐ In development ☐ Not implemented ☐ Not available
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.	✓	✓	✓	Evidence level: B Evidence level: A	☐ In place ☐ In development ☐ Not implemented ☐ Not available
6. Healthcare workers and families should be taught to protect and support the paretic arm during movement, and to protect during wheelchair use by using a hemi-tray or arm trough.	✓	✓	✓	Evidence level: B	☐ In place ☐ In development ☐ Not implemented ☐ Not available
7. Patients should be made aware of their increased risk for falls and given a list of precautions to reduce their risk of falling.	✓	✓	✓	Evidence level: C	☐ In place ☐ In development ☐ Not implemented ☐ Not available
8. Patients should be assessed for post stroke pain, including persistent central pain and shoulder pain on affected side.		✓	✓	Evidence level: C	☐ 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		
9. Patients should be assessed for communication deficits.	✓	✓	✓	Evidence level: C	☐ In place ☐ In development ☐ Not implemented ☐ Not available
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 non-verbal strategies).	✓	✓	✓	Evidence level: B	☐ In place ☐ In development ☐ Not implemented ☐ Not available
11. Patients with aphasia should be referred to a speech-language pathologist for individualized therapy to improve communication ability.		✓	✓	Evidence level: C	☐ 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
1. Distribution of disability scores across stroke population using the modified Rankin Scale score at discharge from acute care and at 3 months post stroke.	Frequency distribution of modified Rankin scores for each patient at time of discharge from acute care and at three months post stroke onset. [(We will later use data to categorize MRS 0-2, MRS 0-5, or MRS 0-6.)]	All stroke and TIA patients admitted to an inpatient acute care hospital, And discharged alive	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
2. Proportion of stroke patients in inpatient rehabilitation who are treated on an inpatient rehabilitation stroke unit.	Number of stroke and TIA patients admitted to an inpatient rehabilitation bed and treated on a specialized rehabilitation stroke unit at any time during their hospital stay	All stroke and TIA patients admitted to an inpatient rehabilitation hospital.	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
3. Average amount of direct therapy received from each rehabilitation discipline each day (in minutes)	Median number of time (minutes) of direct therapy for each patient admitted to an inpatient rehabilitation bed (calculate overall, then separate out for each type of therapy received – e.g., PT, OT, SLP)	All stroke and TIA patients admitted to an inpatient rehabilitation hospital.	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
4. Proportion of stroke patients in hospital or rehabilitation hospital who experience a fall post stroke or TIA	Number of stroke and TIA patients admitted to an inpatient setting (acute or rehabilitation) who experience at least one fall during their stay	All stroke and TIA inpatients in a health care hospital (split by acute hospital and rehabilitation hospital)	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
5. The proportion of stroke patients who experience a fall who require medical treatment for injuries that were sustained during the fall.	Number of stroke and TIA patients admitted to an inpatient setting (acute or rehabilitation) who experience at least one fall during their stay that required medical intervention for injuries of the fall.	Number of stroke and TIA patients admitted to an inpatient setting (acute or rehabilitation) who experience at least one fall during their stay	☐ 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?

World Stroke Organization

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

COMMUNITY REINTEGRATION AND LONG TERM RECOVERY

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.

COMMUNITY REINTEGRATION AND LONG TERM RECOVERY

This section focuses on stroke survivors in the subacute phase of care as they leave inpatient care (acute and/or rehabilitation) and return to the community, either back to their place of residence before their stroke, or to a different location to meet increased care and support needs resulting from their stroke. The goals of community reintegration are to promote the person's return to an acceptable lifestyle, participating in both social and domestic activities, and regain as much independence in functioning and a increase quality of life. Successful reintegration could significantly improve outcomes for stroke survivors, and should be goal-oriented.

Community reintegration and stroke management services and activities start during discharge planning from acute care, and is an ongoing set of care activities lasting years following a stroke. Community reintegration ideally involves healthcare providers with expertise in stroke recovery, social and family support, rehabilitation, leisure activities, quality of life. It takes place across many settings including community-based rehabilitation programs, day programs, leisure programs, educational environments, work places, and in the home, 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

- Care provided in local communities without coordination across defined geographic regions
- Very limited access to physicians
  - Provide assessment skill development
  - Provide training in basic stroke risk factor assessment: blood pressure, atrial fibrillation (pulse check), exercise, alcohol, diet (with respect to circumstances)
  - Basic skills in risk factor management, medications, lifestyle management
  - Training in basic rehabilitation techniques, mobility and positioning that can be passed on to family
  - Basic training in swallow screens and dysphagia management; and in temperature management
- Variable access to healthcare workers (nurses or lay workers)
  - Training in basic stroke risk factor assessment: blood pressure, atrial fibrillation (pulse check), exercise, alcohol, diet (with respect to circumstances)
  - Training in basic rehabilitation techniques, mobility and positioning that can be passed on to family
  - Basic training in swallow screens and dysphagia management; and in temperature management
- No access to diagnostic services or hospital care
- Limited access to the most basic lifestyle preventative advice
- Access to internet
  - Access to mobile stroke education (such as WSA)
  - Access to mobile tools such as Stroke Riskometer

Essential Stroke Services (In addition to services listed under Minimal stroke services)

- Access to nurses and nursing assessment with stroke training
  - Primary care settings
  - Advanced practice nurses
  - Nurse practitioner
- Ability to reaccess to physicians with stroke expertise (although may not be stroke specialists)
  - General/Family/Primary care physicians
  - Neurologist
  - Neurosurgeon
  - Internists
  - Cardiologist
  - Geriatrician
  - Emergency Medicine
  - Physical and Rehabilitation Medicine
  - Access to stroke specialists through telestroke modalities, and teleradiology
  - Protocols to guide post-acute community stroke care based on best practice guidelines
    - *Medical and nursing assessments:*
    - *Past history*
    - *Swallow screen*
    - *Nutrition, hydration*
    - *Functional status, mobility, DVT risk*
    - *Level of dependency*
    - *Skin Integrity*
    - *Bladder and bowel continence*
  - Patient and family education, skills training, and involvement in care planning
  - Discharge planning
- Access to stroke prevention therapies such as aspirin, lifestyle change recommendations, blood pressure management
- Limited coordinated stroke care provided across geographically discrete regions
- Stroke training programs for all levels of healthcare providers

Advanced Stroke Services (In addition to services listed under Minimal and essential stroke services)

- Access to community programs for recovery after stroke
  - Inpatient stroke rehabilitation beds
  - Early supported discharge programs
  - Home care services for stroke patients
  - Organized outpatient stroke rehabilitation services
  - Local/private community stroke rehabilitation programs
  - Patient and family support groups
  - Stroke prevention clinics
  - Vocational rehabilitation
- 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
  - STroek 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. All patients with stroke should be screened for depressive symptoms (ideally using a validated tool).		✓	✓	Evidence level: B	☐ In place ☐ In development ☐ Not implemented ☐ Not available
2. Patients diagnosed with a depressive disorder following formal assessment should be considered for therapeutic interventions – medication, counseling or combination.		✓	✓	Evidence level: A	☐ In place ☐ In development ☐ Not implemented ☐ Not available
3.a Stroke patients should be screened for changes in cognitive status.		✓	✓	Evidence level: C	☐ In place ☐ In development ☐ Not implemented ☐ Not available
3.b Patients with cognitive dysfunction should receive cognitive rehabilitation individualized to their deficits.		✓	✓	Evidence level: B	☐ In place ☐ In development ☐ Not implemented ☐ Not available
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.	✓	✓	✓	Evidence level: C	☐ In place ☐ In development ☐ Not implemented ☐ Not available
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.	✓	✓	✓	Evidence level: A	☐ In place ☐ In development ☐ Not implemented ☐ Not available
6. Patients, families and informal caregivers should participate in goal setting.	✓	✓	✓	Evidence level: C	☐ In place ☐ In development ☐ Not implemented ☐ Not available
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.	✓	✓	✓	Evidence level: B	☐ 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. Post-acute stroke patients who experience a change/decline in functional status should be re-assessed, even if months after stroke.		✓	✓	Evidence level: B	☐ In place ☐ In development ☐ Not implemented ☐ Not available
9. Stroke patients should be routinely monitored for post-stroke fatigue during healthcare visits (e.g., primary care, home care, and outpatient) following return to the community and at transition points.	✓	✓	✓	Evidence level: C	☐ In place ☐ In development ☐ Not implemented ☐ Not available
10. Patients, who experience post-stroke fatigue, their families and informal caregivers, should be taught energy conservation strategies and fatigue management.	✓	✓	✓	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
B. Longer Term Stroke Recovery			
1. Proportion of patients with documentation of a follow up with a comprehensive check (e.g., Post Stroke Checklist)	Number of patients with documentation of follow-up assessment by a healthcare professional.	All stroke and TIA patients discharged alive back to the community.	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
2. Percentage of stroke patients diagnosed with a depressive disorder at 6 months and 1 year post stroke.	Number of patients with a diagnosis of depression documented at 6 months or one year from time of index stroke onset.	All stroke and TIA patients discharged alive back to the community.	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
3. Percentage of stroke patients diagnosed with a new cognitive impairment at 6 months and 1 year post stroke.	Number of patients with a cognitive assessment done and documented at 6 months or one year from time of index stroke onset.	All stroke and TIA patients discharged alive back to the community.	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
4. Percentage of stroke patients and families with failure to cope at 6 months and one year post stroke.	Number of patients with a diagnosis of failure to cope documented at 6 months or one year from time of index stroke onset.	All stroke and TIA patients discharged alive back to the community.	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
5. Documented evidence of follow-up appointment with member of stroke team at approximately 6 weeks post discharge.	Number of patients with a follow up visit for stroke or TIA done and documented within 6 weeks of discharge from acute care hospital.	All stroke and TIA patients discharged alive back to the community.	☐ Data collected ☐ In development ☐ Data not collected ☐ Data not available
6. Percentage of stroke patients who are returned to the community after their stroke and then within 6 month s or 1 year require admission to a long term care facility. (Note: may also measure days of community dwelling before admission).	Number of patients who are admitted to a long term care facility within 6 months or one year following an index stroke or TIA.	All stroke and TIA patients discharged alive back to the community.	☐ In place ☐ In development ☐ Not implemented ☐ 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?

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APPENDIX 1

STEPS TO ADAPTING WSO GLOBAL STROKE CARE GUIDELINE FOR LOCAL USE

Adapting the WSO Global Stroke Care Guideline for Local use

The WSO Global Stroke Care Guideline defines ideal care of stroke patients across the continuum. This guideline highlights topics that have the highest levels of evidence for effectiveness or are considered key system drivers. We recognize that users of the WSO Stroke Care Guideline and Action Plan may only be able to implement some recommendations, and/or may be working on just some parts of the stroke care continuum (as defined in the framework above) at a time.

Clinical practice guidelines are produced as enablers for getting evidence into clinical practice. Stroke audits from around the world have repeatedly shown that a wide gap continues to exist between what the evidence shows as best practices in stroke care and the care that is actually delivered in practice. Some goals of the WSO Global Stroke Care guidelines are to facilitate the implementation of evidence into practice, support clinical decision making, specify beneficial therapeutic approaches, and influence public policy (Kastner et al 2011).

Local uptake and implementation of stroke care recommendations should follow a validated and rigorous process. The WSO Global Stroke Guidelines and Quality Committee has developed a framework to assist groups in implementing the WSO Global Stroke Guidelines, based on existing models such as the ADAPTE model (ADAPTE Collaboration, 2009) and the AGREE Guidelines assessment tool (AGREE Trust, 2010).

The following flow diagram describes the steps that should be undertaken when any local, regional or national group adopts the WSO Stroke Care Guideline for local use. It is then followed by more detailed descriptions for each step. Practical considerations are provided where possible for each step. This section also provides links to useful resources should more detailed information be required.

In areas where resources are limited, some steps may be modified or skipped altogether. It is important to weigh the benefits and risks of doing this. For example, in establishing the working group, a decision may be made to keep it small; however, it should still ideally include representation from multiple disciplines.

Steps to adapting the WSO global stroke care guideline and action plan for local use.

Set up working group	• Ensure key stakeholders represented • Seek experts from other jurisdictions
Define scope and topics	• Identify the applicable stages of the stroke care continuum • Choose the main topics to be addressed in your local guideline
Find best evidence	• Review and select appropriate guidelines from countries contributing to WSO Stroke Care Guideline as basis for local development • Use evidence reviews available from existing global guidelines • Conduct evidence search to identify additional up-to-date evidence
Appraise and Collate evidence	• Follow systematic process for appraising quality and strength of new evidence
Select recommendations and modify as required for local context	• Be as clear and concise as possible. • Include critical content to cover scope (Appendix One) • Link evidence to the recommendations
Consultation and External Review	• Include discussions with end-users, system leaders and funders • External review by experts not involved in original development and adaptation work
Dissemination and Implementation	• Provide tools to support implementation • Provide education and skills training to all involved in care delivery
Evaluation Strategy	• Identify key quality indicators to measure implementation and impact on patient outcomes • Mechanism to collect data through a registry or regular audit process

Detailed Steps in Uptake and Implementation of the WSO Global Stroke Guideline and Action Plan

1.0 Set up the Working Group

Guidelines should be developed by a group of people with a broad range of expertise relevant to the guideline topic being developed. Lists of people to be considered are found in the various guideline developer handbooks (refer to links at the end of this document). The way the group works together can have a significant effect on the outcome of the process.

For stroke care, healthcare professionals from the following disciplines should be considered for participation in guideline development: medicine (neurology, internal medicine, emergency, primary care, Physiatry), nursing, rehabilitation (physiotherapy, occupational therapy, speech-language pathologists, rehab assistants), social work, psychology, and pharmacy. Other disciplines and system leaders may be relevant as well, depending on the phase(s) of the continuum being included in the guideline. It is important to include stroke survivors and carers in the group as well.

Practical notes:

- Keep a list of people involved in the process
- Contact any professional organization and ask for recommendations for a representative from that profession with expertise in stroke
- Make sure you think about all the stakeholders involved in stroke care e.g. Primary care doctor, hospital administrator etc.
- Development groups should be kept to a manageable size (6 – 10 people) where possible.
- Expertise in stroke guideline development is available in other jurisdictions. You may consider contacting the World Stroke Guidelines Committee Chair for referrals to stroke guideline experts in your country or region if additional expertise is required by your group.

2.0 Define scope and topics

The group will normally have a good idea what topics they want included in the guideline. It is important for the group to agree on exactly which questions/topics to be addressed as this decision will direct the searching and appraisal steps.

Stroke care encompasses the full continuum of care from primary prevention to long term recovery and reintegration into the community. The scope of any guideline could cover a few distinct segments of the continuum or they can be more comprehensive and incorporate much more of the continuum.

Practical notes:

- Review existing stroke guidelines and identify ones that most closely fit with the topics you have identified and start with those and work to adapt them.
- The more topics are included the more work it takes to develop a guideline.
- Make sure the group understands the resources and timeframes and agrees only on the KEY topics to include.
- Look to existing guidelines to see what topics are commonly included to be able to draw on the evidence summaries (Refer to Appendix 2 for a list of the critical topics to address at each segment of the continuum).
- Decide on the breadth and depth of content to be included for each topic (level of granularity and amount of detail for each recommendation)
- Links are provided in Appendix One for existing stroke guidelines.

3.0 Find the best evidence

Like most research, the quality and trustworthiness of a guideline is based on the methods used to reduce any bias. Finding and appraising the best and most current evidence is possibly the most important part of guideline development and requires a systematic approach.

When searching for evidence, it is strongly recommended that this process be done with the help of an expert in the area of literature searching. To complete this step the working group should carefully develop questions they want answered and articulate the topics they plan to address in the guideline. Questions generally focus on the effects of a specific intervention and are developed in three parts: the intervention, the population and the outcomes. An example is "What is the effect of anticonvulsant therapy on reducing seizures in people with post-stroke seizures?" In this example, anticonvulsant therapy is the intervention, reduction of post-stroke seizures is the outcome, and the population is people with post-stroke seizures.

The more specific the questions and phrases the easier it will be for the information specialist to identify relevant studies. Searching for studies should include:

a)Electronic databases (e.g. Cochrane, MEDLINE, CINAHL and EMBASE) –see links in Canadian Medical Association Handbook p14.
b)Contact with international experts in the field and specific topic areas of interest
c)Manual search in key journals and reference lists in articles and other stroke-related guidelines.

Search efforts could produce an extremely large number of research papers, especially for topics such as hypertension. Additional criteria should be identified to assist in narrowing down the articles that would undergo detailed appraisal.

Using Existing Searches as a Starting Point:
An alternate and simpler way of finding the best evidence, especially when resources are scarce, is to use the searches done by an existing guideline. Evidence summaries are normally produced by guideline development groups. Your guideline development group may choose to contact another guideline development group and ask for their search or evidence tables if not publically available. Alternatively, it may be decided to use such summaries but update the list by searching for subsequent studies since the last search date included in the previous effort. This approach considerably reduces time, effort and resource use without compromising quality.

When deciding to update and use searches done for previous guidelines, it is important that the searches you are drawing from have been carried out in a robust way. The AGREE tool is a measure that allows you to identify the quality of the process used to develop an existing guideline.[1] If you have multiple existing guidelines to draw upon, you can use the AGREE tool to choose which guidelines have followed the most systematic development process on which to base your own guideline (See Appendix 3 for a list of existing stroke guidelines). This process may also help you to identify other guidelines that more closely resemble your population or resource availability, making them more appropriate for adaptation or adoption.

Practical notes:

- If undertaking searches, employ an information specialist experienced in this area.
- Use existing good quality guidelines where possible to identify the key evidence for a particular topic. Contact previous developers for additional information and sharing of resources when possible.
- If a recent guideline exists a decision can be made to search for studies published subsequently or just use existing information and save time searching for other information.
- Regardless of approach, some effort should be made to ensure that emerging research which may significantly affect the content and direction of a recommendation is identified. This will reduce the risk of guidelines becoming outdated before they ever get finalized and implemented.
- Always aim to find and use the highest level of evidence (systematic reviews). Where these exist there is normally no need to search for further evidence.
- Have a preset list of inclusion criteria to keep the results of the search on target and manageable.

1. Brouwers M, Kho ME, Browman GP, Burgers JS, Cluzeau F, Feder G, Fervers B, Graham ID, Grimshaw J, Hanna S, Littlejohns P, Makarski J, Zitzelsberger L for the AGREE Next Steps Consortium. AGREE II: Advancing guideline development, reporting and evaluation in healthcare. Can Med Assoc J. 2010. Dec 2010; 182:E839-842; doi:10.1503/090449

4.0 Appraise and collate evidence

Once the key literature has been identified, the working group must review the evidence from the primary literature search and summarize the findings for each topic. As with identifying the evidence, it is strongly recommended that a systematic approach be followed to appraise the evidence. The working group should agree at the start which approach to use to guide grading the evidence and forming recommendations. Members of the group should be familiar with and have some training in the grading system chosen. Most of the stroke guideline developers use a similar process as that outlined by the Scottish Intercollegiate Guidelines Network (SIGN) –see link to SIGN guideline handbook in the resource section.

Several databases also have evidence summaries available on selected topics. Some examples include:
www.effectivestrokecare.org
www.strokengine.org
www.ebrsr.com

Practical notes:

- Evidence summaries from existing guideline/s can be used to allow for easy collation of the evidence for specific topics.
- Use existing evidence appraisal and summary resources where possible.
- Levels of evidence may be assigned differently by different guideline development groups. Choose your preferred method and be consistent in the approach to evidence grading for all research your group reviews or chooses to include.

5.0 Select recommendations and modify as required for local context

Once the evidence has been found and summarised the working group must carefully draft the recommendations for each topic. It is important that recommendations are as clear as possible and that it is easy to see the link between the recommendation and the evidence. Grading the strength of the recommendations is also useful and various systems are used around the world (see various handbooks for more details).

Research suggests that a formal process of forming conclusions/recommendations is better than an informal consensus processes (i.e. it minimises potential bias for strong opinions from one or two members of the group). Two common formal consensus approaches are the nominal group technique and the Delphi approach. More information on these approaches can be found in the guideline development resources.

- Where existing guidelines have been used to identify and summarise the evidence, the ADAPTE approach suggests[2] you can:
- accept an entire guideline and recommendations;
- accept the evidence summaries only and write your own recommendations;
- accept specific recommendations but not others;
- modify specific recommendations.

It is important to make sure you reference the sources and process used. When adapting an existing guideline it is important and helpful to contact the original guideline development group in order to obtain permission to use the guideline, to discuss any modifications to the actual recommendations (to make sure it still accurately reflects the evidence as applied to the local setting), and to gain helpful suggestions and lessons learned form professionals who have experience with the guideline development process.

2. ADAPTE: manual for guideline adaptation. ADAPTE Group; 2007. http://www.adapte.org

Practical notes:

- Each recommendation statement should be clear, concise and only address one topic, action or intervention.
- Avoid ambiguity.
- Include recommendations on what not to do (e.g., Procedure xx is NOT recommended)
- It is good to include a brief summary of the evidence for each topic as well as the recommendation/s.
- Specifically link the recommendations to the evidence (where possible note the type or level of evidence and the recommendations strength).
- Where possible and appropriate, align wording of recommendations with those included in stroke-related recommendations produced by other disease groups in your jurisdiction (such as diabetes group, hypertension group, and local guidelines related to primary prevention)
- Including suggested performance indicators can also encourage sites to monitor their adherence to the guidelines.
- Clearly reporting what was done increases transparency and trust in the guideline.
- Present each recommendation with supporting documentation including: rationale, system implications, performance measures and summary of the evidence.

6.0 Consultation and External Review

It is important to seek feedback from all those expected to use the guidelines (clinicians, administrators, professional bodies etc) prior to final public release of a guideline. This process can improve the wording of recommendations, allow wide buy-in and improve uptake once finalized. It also provides face and content validity and provides an opportunity to identify potential areas of controversy prior to release so that the guideline development group can be prepared to respond to these potential issues. It is important that all feedback is reviewed systematically and a summary of final changes recorded in the process report. Once all consultation and updates are completed the final document can be submitted to relevant health authorities and professional bodies for endorsement. Endorsement has been shown to improve acceptance and uptake of.

Practical notes:

- Consult as widely as possible. This alerts people to the fact that the guideline is being developed and will soon be available. It also ensures that key professional groups do not get inadvertently excluded from the process.
- Transparency in the external review process also increases the credibility of the guideline development process.
- Seek consultation from individuals who were not directly involved in the development process, even if other members of their peer group or professional body were formally engaged in eth process.
- It is useful to contact the relevant authorities and professional bodies as early as possible in the whole process. The authorities may have requirements that must be considered during the development process.
- Publicly acknowledging such endorsements and including them within the guideline documentation may increase acceptance and uptake of guidelines.

7.0 Dissemination and Implementation

Once complete, the guideline must be made as widely available as possible. A dissemination strategy should be developed and launched as soon as the guideline is available for public release. A master list of all relevant stakeholders should be created as well as a mechanism for dissemination of the guideline to these stakeholders

Often organizations will produce a dissemination package that may include a summary document along with summary slides to supplement the full document but provide an overview of the guideline. Electronic copies of any resource should be circulated to all relevant organizations and health professional networks. You may choose to publish a summary of the guidelines in a relevant journal.

Development of a quality guideline does not automatically equate to greater use and most strategies to implement guidelines produce only modest effects at best. An implementation plan should be developed simultaneously to developing the content of the guideline, and executed as soon as possible. Guidelines should be implemented along with other strategies to encourage their uptake, such as professional education, audit and feedback, and where possible, accreditation. The challenge is to use a systems approach that links guidelines to quality data collection, effective multi-pronged implementation, and a mechanism for evaluation. There are many opportunities to learn from other countries that routinely develop and use guidelines.

Strategies to promote uptake of guidelines are discussed in many existing guideline handbooks (e.g. see p45 of the SIGN guideline) and in the reference section of this handbook.

Practical notes:

- Use the links and networks of your working group to disseminate and promote the guidelines.
- Considering implementation early in the process as this will help you focus on how you write the recommendations and improve their uptake.

8.0 Evaluation

Evaluation of stroke care delivery is an essential component to include in planning and implementation. Collecting key data on stroke care and patient outcomes in a systematic way enables ongoing improvements in care delivery, and as well provides data for developing business case and advocacy materials to expand and further develop stroke services and resources. The goal of the information contained in this manual is to increase consistency and standardization of measuring stroke care performance, and allow for cross-group comparisons and the development of validated benchmarks for appropriate peer groups.

Practical notes:

Work in tandem with data analysts and evaluation specialists to develop appropriate audit and feedback processes. These can be very basic or more complex.

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APPENDIX 2

CORE ACUTE STROKE CASE DEFINITIONS

Evaluation of stroke care delivery is an essential component of any organized stroke care system, no matter how big or small. Considerations for evaluation should be made early on in the planning process so that mechanisms for data collection can be established as part of the stroke services and guideline implementation plan.

As part of the WSO Global Stroke Care Guidelines and Action Plan, International Classification of Diseases codes were selected to identify appropriate stroke cases to include in a stroke performance measurement strategy (see Table below). A core set of performance measures were then identified in tandem to the process to select core best practice recommendations. These key stroke quality indicators have been provided in this roadmap to increase focus, consistency and standardization of stroke care measurement across jurisdictions. In time it is hoped this information could be used to develop global benchmarks for delivery of stroke services at the minimum, essential and advanced levels of care, and help drive global stroke care improvement efforts through informed decision-making and system planning.

To develop effective local stroke care measurement strategy quality indicators, several elements should be addressed:

- Define stroke case definitions
- Define inclusion and exclusion criteria for target patient population of interest (stroke type, age, gender, setting, phase of care etc)
- Identify key stroke quality indicators from WSO list below, and add additional indicators to sufficiently cover scope of services being delivered and accountabilities
- Identify required data elements and method to ensure all required elements are collected to calculate identified quality indicators
- Develop data collection repository and methodology (who will record data, when, where, how and on which patients)
- Determine time frames for data collection, analysis and reporting
- Determine report structure and format (online dashboard report cards should be considered where possible)
- Establish dissemination and communication plan of results of data analysis to all levels of providers, decision-makers and patient population

At the local level, stroke care providers and/or stroke teams should hold discussions with local health data collection and reporting staff and come to agreement on how all stroke cases will be coded to ensure optimal data quality, completeness and accuracy.

Quality Definitions

Standards of care: are the bases of comparison in measuring or judging the capacity, quality, content, or extent of a particular object of activity. In the absence of evidence, standards may be informed by expert opinion. Standards can be considered as the basic requirements of a healthcare profession and are usually defined within policies, procedures, and standards of practice documents. Standards of care specify the minimum acceptable characteristics of what constitutes quality care.

They specify appropriate management based on strong scientific evidence and collaboration between healthcare professionals involved in the treatment of a given condition. Standards of care describe the level at which the average, prudent provider in a given community should practice and how similarly qualified practitioners would have managed the patient's care under the same or similar circumstances.

Quality Indicator: An objective measure of healthcare quality that has been developed to support self-assessment and quality improvement at the provider, hospital or systems level (ACC/AHA Performance Measures task force).

Benchmark: is the performance level which is recognised as the standard of excellence for a specific process of care or outcome and is used for comparisons across groups. Benchmarks provide standard values by which something can be measured, compared, or judged. Benchmarks can be identified through several techniques, including: validated research and statistical methods; identification of top performers; and the past performance of one's own organization.

Target: is the level of performance that an organization aims to achieve within a specified period of time. It is usually a value between the current actual level of performance and the benchmark, but could be equal to or greater than the benchmark. Target values take into account the resources and constraints with respect to meeting the standard of care.

Threshold: is the minimal acceptable level of performance. Performance rates that fall short of the threshold are considered poor performance and should result in corrective action.

*** Performance rates outside the threshold - either above or below as defined by the specific measure - are considered poor performance*

Acute Stroke Case Identification Codes, Update 2016*

Group	Acute Stroke Main Category	ICD-9	ICD-10 codes (v2015)
'Acute Stroke' – Updated Case Selection Definitions, August 2016 • all stroke categories listed below that have been submitted **as a 'Most Responsible Diagnosis' in DAD or as Main Problem in NACRS** are valid for inclusion in acute stroke cohorts for calculation of the HSF Stroke Key Quality Indicators, unless otherwise indicated [i] inclusion of stroke codes submitted to the DAD as Diagnosis Type1, Type 2, Type 3, Type W, X or Y or to NACRS as Other Problem will be dependent on the scope, purpose and target of the performance measures or analysis – in these cases, the analysis specifications should be clearly documented and communicated, to enable appropriate generalizability and comparability.			
a.	Subarachnoid Hemorrhage	430	I60 (including all sub-codes)
b.	Intracerebral Hemorrhage	431	I61 (including all sub-codes)
c.	Cerebral Infarction (Ischemic Stroke)	433	I63 (including all sub-codes)
d.	Stroke, not specified as hemorrhage or infarction	434	I64 [iii]
e.	Central Retinal Artery Occlusions (Ischemic Stroke)	436	H34.1
f.	Transient Cerebral Ischemic Attacks and Related Syndromes (Ischemic Stroke)	435	G45 [iv] (excluding sub-code G45.4)
g.	Transient Retinal Artery Occlusions (Ischemic Stroke)		H34.0
The following codes for cerebral venous thrombosis etiology may be included or excluded from the stroke case selection as part of acute stroke definitions *based on the purpose and population of interest for the analysis.*			
i.	Cerebral Infarction due to Cerebral Venous Thrombosis, Nonpyogenic		I63.6
j.	Nonpyogenic Thrombosis of Intracranial Venous System	437.6	I67.6
k.	Intracranial Phlebitis and Thrombophlebitis	325	G08
The following Z-codes (DAD) may be assigned as Most Responsible Diagnosis (MRDx, DAD) and should be included as part of acute stroke definitions when there is an accompanying acute stroke diagnostic code is assigned as an 'Other Diagnosis' with a Diagnosis Type 1, Type 2, Type 3 or Type W, X or Y.			
l.	Care Involving use of Rehabilitation Procedures	-	Z50 (excluding sub-codes Z50.2, Z50.3, Z50.4)
m.	Other Medical Care: Palliative Care	-	Z51.5 [vi, vii]
n.	Convalescence Following other Treatment	-	Z54.8
o.	Convalescence Following Unspecified Treatment	-	Z54.9

	NOTES regarding acute stroke code selection:
i	For most performance measures, the **primary focus** is on patients who experience a hemorrhagic or ischemic stroke or TIA while in the community and arrive at hospital as a result of their stroke. There are occasions when a patient already in hospital for another medical reason experience a stroke during hospitalization. Inclusion or exclusion of in-hospital stroke cases will depend on the purpose of the measure and target population
ii	Conditions in category **I62** Other non-traumatic intracranial hemorrhage are not considered an acute stroke and therefore should not be included for any acute stroke case definition, cohort identification or acute stroke data analysis.
iii	**I64** should not be used routinely for coding stroke cases. I64 should only be recorded when: • Diagnostic imaging has not yet been performed (patient dies or is transferred) • Diagnostic imaging is inconclusive • Patient is transferred in and the transfer information does not indicate the type of stroke Every effort should be made by clinicians to determine stroke type and document the type of stroke as hemorrhagic or ischemic for health record coders. Health record coders should review the body of the discharge summary, consultation reports and the conclusion on relevant diagnostic imaging reports for specificity as to type of stroke.
iv	When calculating stroke **mortality rates**, TIA should be excluded, or reported as a separate category and not combined with acute stroke codes.
v	**Special cases – Rehabilitation:** When a patient is treated for an acute stroke including rehabilitative care, there are circumstances where the ICD10 Z-code for rehabilitative care may meet the definition of most responsible diagnosis, depending on local coding practices. These cases should be included as part of an acute stroke cohort where appropriate. Stroke teams should hold discussions with local health data reporting groups and come to agreement on how all stroke coding cases will be handles to ensure optimal data quality, completeness and accuracy.
vi	**Special cases – Palliative Care:** Where acute stroke patients have a component of palliative care during their episode of care and in the same facility due to the severity of stroke and/or other clinical characteristics, ICD10 code Z51.5 Palliative care may be recorded if the patient meets the definition of palliation locally. These cases should be included as part of an acute stroke cohort where appropriate.
vi	**Mortality rates** for patients determined to be palliative care and receiving palliative care services are higher than the overall mortality for non-palliative care stroke cases. Therefore: • When calculating overall stroke mortality rates, cases where Z51.5 Palliative Care is the MRDx and stroke is listed as a secondary diagnosis, inclusion as part of a stroke cohort will be dependent on the scope and purpose of the planned analysis. When calculating stroke mortality rates for patients who have received active stroke care processes as a measure of effectiveness of care delivery, cases where Z51.5 Palliative care is the MRDx and stroke is assigned an additional Diagnosis code and did not receive active acute stroke care or treatment, should be EXCLUDED (such as very severe stroke patients admitted directly to palliative care without active acute treatment).

Sources:
Heart and Stroke Foundation of Canada Quality of Stroke Care in Canada Stroke Key Quality Indicator and Case Definitions Manual 2016 (www.strokebestpractices.ca); and, Valery Feigin et al Global Burden of Disease stroke case definitions (Lancet 2015;385(9963):117-171. Online supplement page 280).

Select Stroke Related Investigation Codes*

Stroke Investigations	Intervention Codes for ICD9	Intervention Code (v2015) (for ICD10)
CT Scan	87.03	3AN20 Brain 3ER20 Head
MRI	88.91	3AN40 Brain 3ER40 Head
Chest X-ray	87.39, 87.44, 87.49	3GY10
ECG- 12 Lead	89.52	2HZ24.JA-KE
Prolonged Cardiac Monitoring (with Loop recorder or implantable cardiac monitor)	-	2.HZ.24.GP-XJ (Cardiac Catheterization) 2.HZ.24.HA-XJ (Subcutaneous)
Holter monitor		2.HZ.24.JA-KH
Carotid Doppler	88.71	3JE30
Leg Doppler	88.77	3KG30
Echocardiogram (2D) Echocardiogram (TEE)	88.72	3IP30
tPA Administration	99.10	1ZZ35HAC1 (IV) 1JW35HAC1 (IA)
Carotid Endarterectomy Surgical Procudure	50.12	1.JE.57.LA

Acute Stroke Case Identification Codes, Update 2016*

Stroke Related Investigations or Procedures	Intervention Code Title Description	Intervention Code (v2015) (for ICD10)
Alteplase (tPA) Administration		
Alteplase (tPA) Administration - Intravenous	Pharmacotherapy, total body, percutaneous approach [intramuscular, intravenous, subcutaneous, intradermal], using thrombolytic agent.	1.ZZ.35.HA.1C
Alteplase (tPA) Administration - Intra-arterial	Pharmacotherapy (local), intracranial vessels percutaneous injection approach using thrombolytic agent	1.JW.35.HA.1C
*The following subset of investigations and procedures should be consistently applied for acute stroke patients undergoing acute endovascular procedures for large vessel occlusions. Significant coding variations have been found for this relatively new procedure. If your organization provides acute endovascular procedures for large vessel occlusions, you should develop a policy or best practice protocol for consistent coding of all procedures using the most appropriate code among those provided below.**		
Cerebral Endovascular Thrombectomy (Clot Retrieval)*	Extraction, carotid artery using percutaneous transluminal approach. Includes mechanical thrombectomy.	1.JE.57-GQ-^^
	Extraction, intracranial vessels using percutaneous transluminal approach and device NEC. Includes mechanical thrombectomy.	1.JW.57.GP-GX
	Extraction, other vessels of head, neck and spine NEC, using percutaneous transluminal approach and device NEC	1.JX. 57.GP-GX
Cerebral Endovascular Dilation	Dilation, intracranial vessels using percutaneous transluminal approach and device NEC. Excludes: that with extraction (see 1.JW.57.GP-GX)	1.JW.50.GP-^^
	Dilation, other vessels of head, neck and spine NEC using percutaneous transluminal approach Excludes: that with extraction (see 1.JX.57.GP-GX)	1.JX.50.GP-^^
	Dilation, carotid artery using percutaneous transluminal arterial approach. Excludes: that with extraction (e.g. endarterectomy) (see 1.JE.57.GQ-^^)	1.JE.50.GQ-^^
Carotid Endovascular Dilation and Stenting	Dilation, carotid artery using percutaneous transluminal approach balloon dilator with (endovascular) stent (insertion)	1.JE.50.GQ-OA

Sources:
Heart and Stroke Foundation of Canada Quality of Stroke Care in Canada Stroke Key Quality Indicator and Case Definitions Manual 2016 (www.strokebestpractices.ca)

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.

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