NATIONAL CLINICAL GUIDELINES

THE DIAGNOSIS & MANAGEMENT OF STROKE AND TRANSIENT ISCHAEMIC ATTACK

Ministry of Public Health

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المبادئ الإرشادية السريرية لدولة قطر
NATIONAL CLINICAL GUIDELINES FOR QATAR

وزارة الصحـــــة العامـــــة
Ministry of Public Health
State of Qatar • دولـــة قطـــر

Version History

Version	Status	Date	Editor	Description
1.0	Final	14th December 2016	Guidelines Team	Final Version for Publication.
1.1	Final	19th March 2017	Guidelines Team	Minor updates to Section 2.
2.0	Final	26th July 2020	Guidelines Team	Final Version for Publication.

Citation

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Abbreviations

The abbreviations used in this guideline are as follows:

ACE	Angiotensin converting enzyme
AF	Atrial fibrillation
ARB	Angiotensin receptor blockers
BMI	Body mass index
BP	Blood pressure
CBC	Complete blood count
CTA	Computed tomography angiogram
DASH	Dietary approach to stop hypertension
DVT	Deep vein thrombosis
ED	Emergency department
FAST	Face Arm Speech Test
GCS	Glasgow Coma Scale
ICH	Intracerebral haemorrhage
ICU	Intensive care unit
INR	International normalised ratio
MDT	Multidisciplinary team
MRA	Magnetic resonance angiogram
NGT	Nasogastric tube

PE	Pulmonary embolism
PPI	Proton pump inhibitors
SBP	Systolic blood pressure
TIA	Transient ischaemic attack
tPA	Tissue plasminogen activator

View Pathway

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1 Information about this Guideline

1.1 Objective and Purpose of the Guideline

The purpose of this guideline is to define the appropriate diagnosis and management of strokes and transient ischaemic attacks in adults. The objective is to improve the appropriateness of investigation, prescribing and referral of patients presenting to provider organisations in Qatar. It is intended that the guideline will be used primarily by physicians in primary care and specialist care settings.

1.2 Scope of the Guideline

Aspects of care covered in this guideline include the following:

- Assessment of transient ischaemic attack (TIA) and acute stroke.
- Indications for neuroimaging.
- Pharmacological management.
- Care in specialised stroke units.
- Secondary prevention of TIA and stroke.

Aspects of care not covered in this guideline include the following:

- Primary prevention of stroke or TIA.
- Detailed recommendations on neuro-surgical techniques.

1.3 Editorial Approach

This guideline document has been developed and issued by the Ministry of Public Health of Qatar (MOPH), through a process which aligns with international best practice in guideline development and localisation. The guideline will be reviewed on a regular basis and updated to incorporate comments and feedback from stakeholders across Qatar.

The editorial methodology, used to develop this guideline, has involved the following critical steps:

- Extensive literature search for well-reputed published evidence relating to the topic.
- Critical appraisal of the literature.
- Development of a draft summary guideline.
- Review of the summary guideline with a Guideline Development Group, comprised of practising healthcare professionals, subject matter experts and patient representatives, from across Qatar.
- Independent review of the guideline by the National Clinical Guidelines & Pathways Committee, appointed by the MOPH, from amongst stakeholder organisations across Qatar.

Whilst the MOPH has sponsored the development of the guideline, the MOPH has not influenced the specific recommendations made within it.

1.4 Sources of Evidence

The professional literature has been systematically queried using specially developed, customised, and tested search strings. Search strategies are developed to allow efficient yet comprehensive analysis of relevant publications for a given topic and to maximise retrieval of articles with certain desired characteristics pertinent to a guideline.

For each guideline, all retrieved publications have been individually reviewed by a member of the Editorial Team and assessed in terms of quality, utility, and relevance. Preference is given to publications that:

1. Are designed with rigorous scientific methodology.
2. Are published in higher-quality journals.
3. Address an aspect of specific importance to the guideline in question.

Further information about the literature search and appraisal process is included in the appendix.

1.5 Evidence Grading and Recommendations

Recommendations made within this guideline are supported by evidence from the medical literature and where possible the most authoritative sources have been used in the development of this guideline. In order to provide insight into the evidence basis for each recommendation, the following evidence hierarchy has been used to grade the level of authoritativeness of the evidence used, where recommendations have been made within this guideline.

Where the recommendations of international guidelines have been adopted, the evidence grading is assigned to the underlying evidence used by the international guideline. Where more than one source has been cited, the evidence grading relates to the highest level of evidence cited:

- **Level 1 (L1):**
  - Meta-analyses.
  - Randomised controlled trials with meta-analysis.
  - Randomised controlled trials.
  - Systematic reviews.

- **Level 2 (L2):**
  - Observational studies, examples include:
    - Cohort studies with statistical adjustment for potential confounders.
    - Cohort studies without adjustment.
    - Case series with historical or literature controls.
    - Uncontrolled case series.
  - Statements in published articles or textbooks.

- **Level 3 (L3):**
  - Expert opinion.
  - Unpublished data, examples include:
    - Large database analyses.
    - Written protocols or outcomes reports from large practices.

In order to give additional insight into the reasoning underlying certain recommendations and the strength of recommendation, the following recommendation grading has been used, where recommendations are made:

- **Recommendation Grade A (RGA):** Evidence demonstrates at least moderate certainty of a net benefit from the recommendation.
- **Recommendation Grade B (RGB):** Evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended.
- **Recommendation Grade C (RGC):** Evidence demonstrates potential harm that outweighs benefit; additional research is recommended.
- **Recommendation of the GDG (R-GDG):** Recommended best practice on the basis of the clinical experience of the Guideline Development Group members.

1.6 Guideline Development Group Members

The following table lists members of the Guideline Development Group (GDG) nominated by their respective organisations and the National Clinical Guidelines & Pathways Committee. The GDG members have reviewed and provided their feedback and approval of the guideline document. Each member has completed a declaration of conflicts of interest, which has been reviewed and retained by the MOPH.

Guideline Development Group members		
Name	**Title**	**Organisation**
Dr Naveed Akhtar	Consultant Neurologist	Hamad Medical Corporation
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[1] Dr Ahmed Babiker attended the MOPH in his capacity as a Clinical Pharmacist and advisor on the availability of medications in Qatar.

1.7 National Clinical Guidelines & Pathways Committee Members

The following table lists members of the National Clinical Guidelines & Pathways Committee (NCGPC), appointed by the MOPH. The NCGPC members have reviewed and provided their feedback and approval of the guideline document. Each member has completed a declaration of conflicts of interest, which has been reviewed and retained by the MOPH.

National Clinical Guidelines & Pathways Committee (NCGPC) Members		
Name	**Title**	**Organisation**
Ms Huda Amer Al-Katheeri	Chair of the NCGPC, Director of Strategic Planning & Performance Department	Ministry of Public Health
Shk Dr Mohammed Hamad J. Al Thani	Co-Chair of the NCGPC, Director of Public Health	Ministry of Public Health
Prof Anthony Akobeng	Chair Clinical Practice Guidelines Committee	Sidra Medicine
Dr Alshaymaa Mohammed A. M. Al-Motawa	Consultant Family Medicine	Qatar Petroleum
Dr Basil Bashqawi	Accreditation Coordinator, Dept of Health Professions	Ministry of Public Health
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Dr Ghassan Youseph Hommos	Consultant Endocrinology	Al Emadi Hospital
Dr Chris Kenny	Executive Director Clinical and Service Development, Office of the Chief Medical Officer	Hamad Medical Corporation
Dr Egon Toft	VP and Dean of College of Medicine	College of Medicine, Qatar University

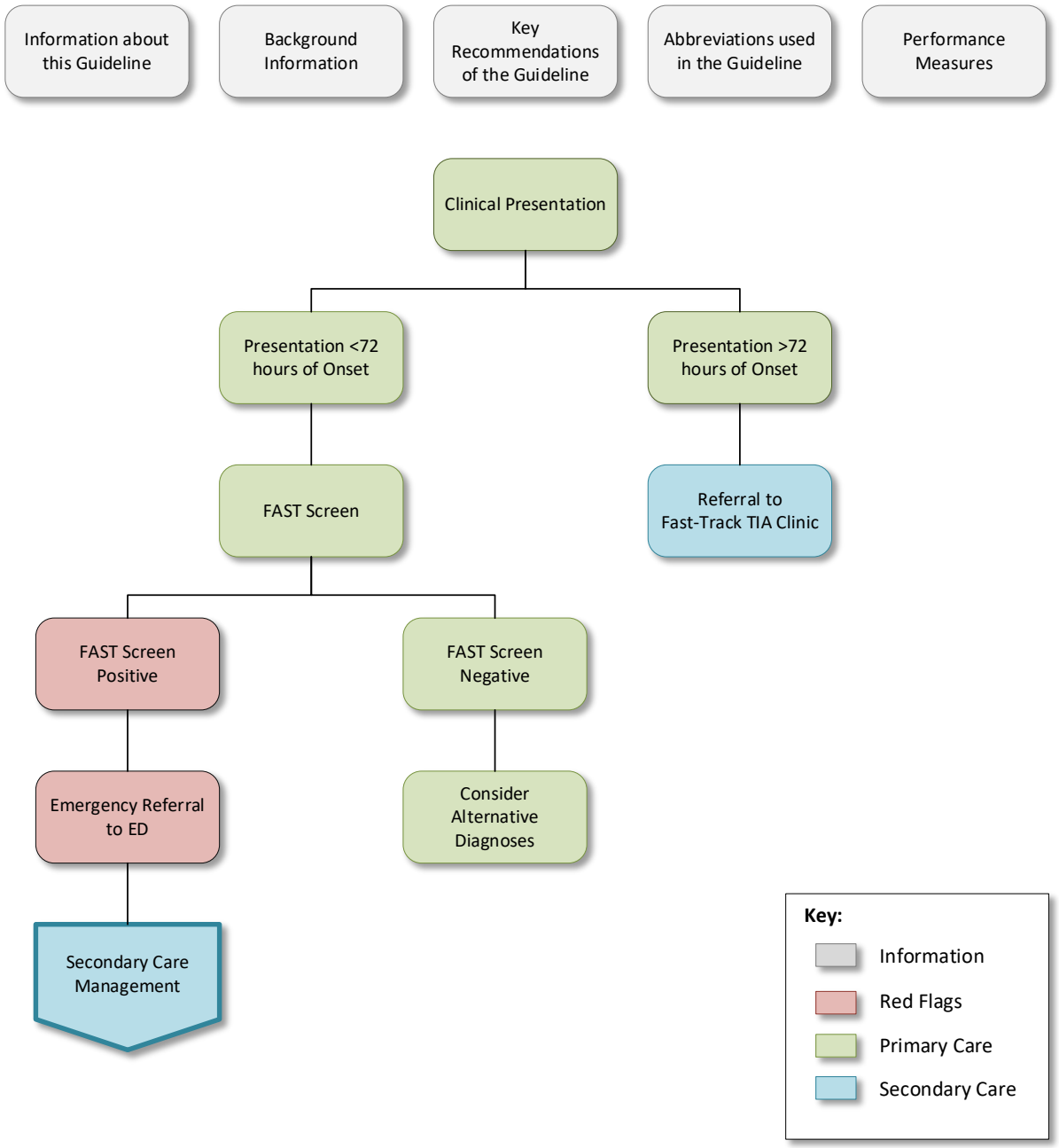
1.8 Responsibilities of Healthcare Professionals

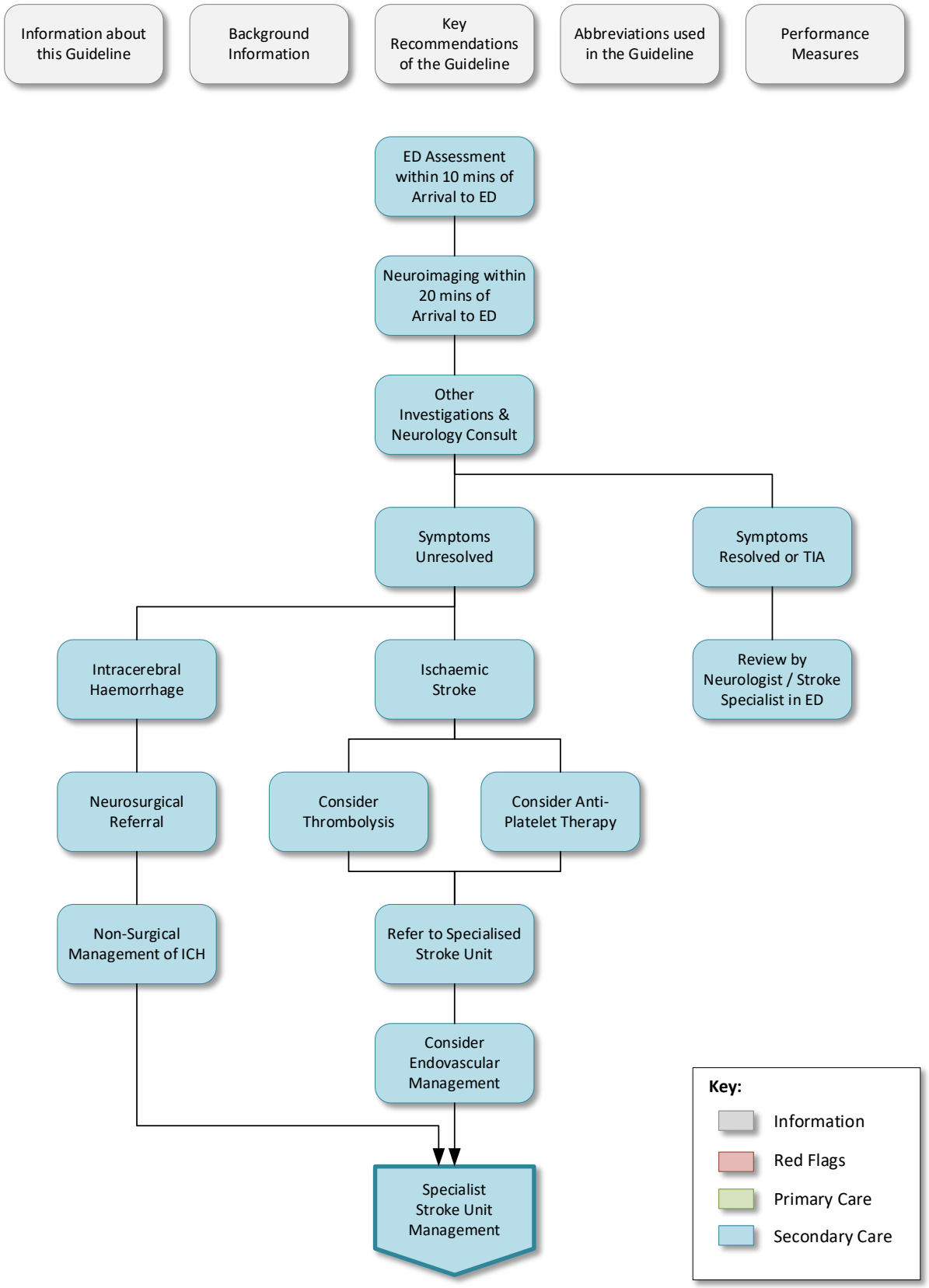
This guideline has been issued by the MOPH to define how care should be provided in Qatar. It is based upon a comprehensive assessment of the evidence as well as its applicability to the national context of Qatar. Healthcare professionals are expected to take this guidance into account when exercising their clinical judgement in the care of patients presenting to them.

The guidance does not override individual professional responsibility to take decisions which are appropriate to the circumstances of the patient concerned. Such decisions should be made in consultation with the patient, their guardians, or caregivers and should consider the individual risks and benefits of any intervention that is contemplated in the patient's care.

2 Stroke and Transient Ischaemic Attack Pathway

Click on a box below to see the relevant page of the Pathway.

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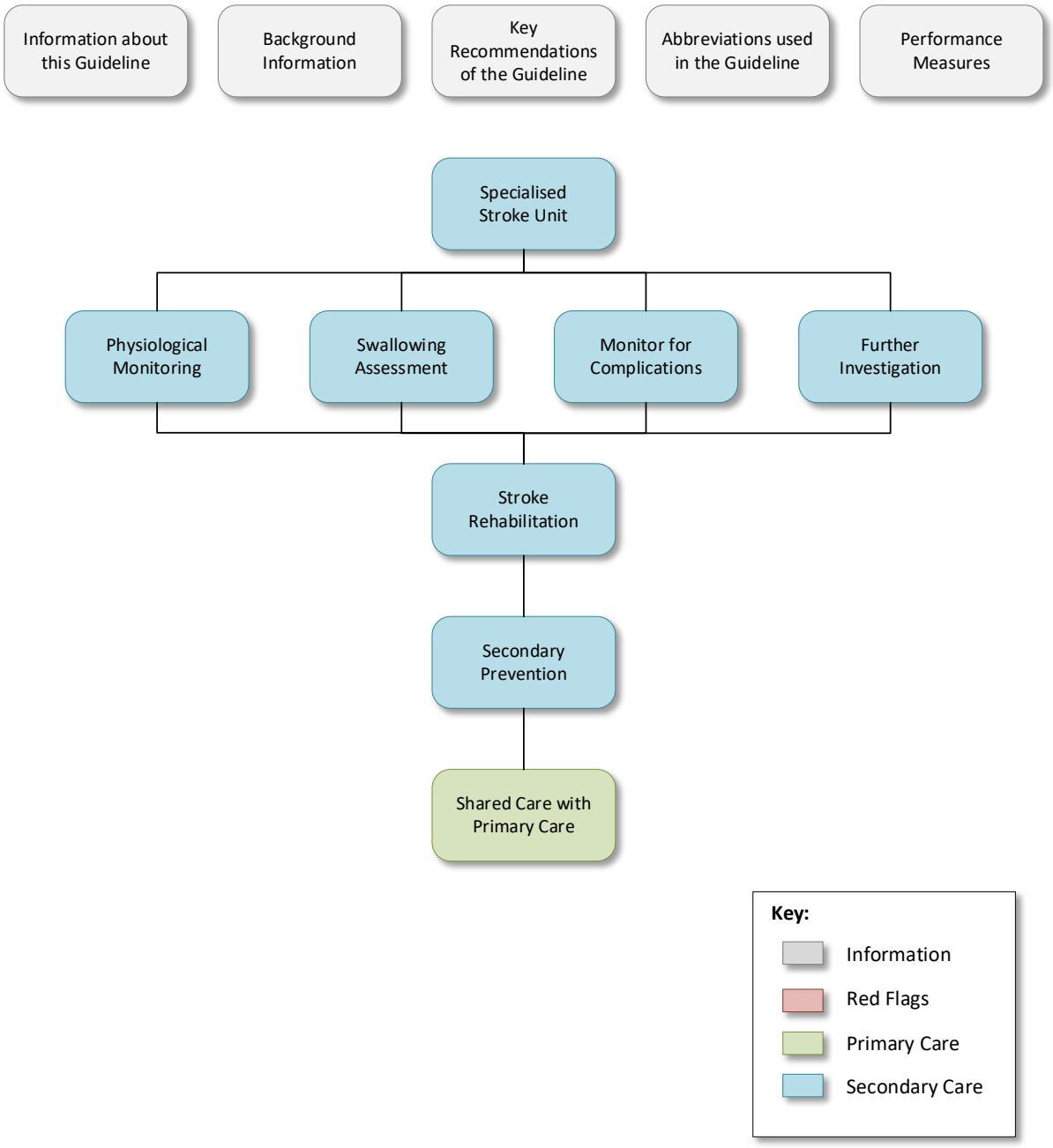
ED Assessment within 10 mins of Arrival to ED
Neuroimaging within 20 mins of Arrival to ED
Other Investigations & Neurology Consult
Symptoms Unresolved
Symptoms Resolved or TIA
Intracerebral Haemorrhage
Ischaemic Stroke
Review by Neurologist / Stroke Specialist in ED
Neurosurgical Referral
Consider Thrombolysis
Consider Anti-Platelet Therapy
Non-Surgical Management of ICH
Refer to Specialised Stroke Unit
Consider Endovascular Management
Specialist Stroke Unit Management
Key:
Information
Red Flags
Primary Care
Secondary Care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Key Recommendations of the Guideline
Abbreviations used in the Guideline
Performance Measures
Specialised Stroke Unit
Physiological Monitoring
Swallowing Assessment
Monitor for Complications
Further Investigation
Stroke Rehabilitation
Secondary Prevention
Shared Care with Primary Care
Key:
Information
Red Flags
Primary Care
Secondary Care

3 Key Recommendations of the Guideline

The key recommendations of this guideline are:

Screening in a Pre-Hospital Setting (see *Section 5*):

- The *Face, Arm, Speech Test* (FAST) is used to screen for possible stroke or TIA in a pre-hospital setting [1–3] .
- If the FAST test is positive [1–3] :
    - Call the ambulance immediately.
    - Record the time of symptom onset, where known.
    - Do not delay ambulance transfer for any reason.
    - Ensure the person is taken immediately to the nearest hospital with facilities for stroke thrombolysis.
- Hospitals with facilities and expertise for stroke thrombolysis (but not thrombectomy), should initiate thrombolysis and transfer the patient immediately to an endovascular unit for assessment (i.e. 'drip and ship') [2,4,5] .

Emergency Department Assessment and Management (see *Section 6*):

- Hospitals with the capabilities for stroke thrombolysis should follow the guidelines outlined in *Section 6*. Other hospitals without thrombolysis capability should immediately transfer the patient to an appropriate stroke centre [**R-GDG**].
- Tele-stroke services can be used to remotely discuss the management of patients with stroke specialists if stroke services are unavailable at the receiving hospital [**R-GDG**].
- Initial assessment will include the following [2] :
    - Confirmation of focal neurological deficit.
    - Exclusion of hypoglycaemia.
    - Determining the time of onset of symptoms.
    - Arranging urgent CT scanning.
    - Informing the stroke team for assessment (on-site or via tele-stroke).
- Adults presenting at an ED with acute stroke should be admitted to a specialist acute stroke unit within 4 hours of arrival [6] .
- Patients who are not eligible for thrombolysis/endovascular intervention, should still be assessed by a neurology stroke team within 24 hours of onset of symptoms [2] [**L1, RGA**].
- Patients who present within 72 hours of onset of acute symptoms, but in whom symptoms have resolved, should be assessed in the ED by a neurologist or stroke expert [**R-GDG**].
- Patients who present after 72 hours, should be assessed in a fast-track TIA outpatient clinic where available [**R-GDG**].
- If fast-track TIA clinics are not available, the patient should be risk-stratified for their risk of subsequent stroke. Validated scoring systems such as ABCD^2 can help to risk stratify patients but do not perfectly predict the risk of stroke [1,2] :

Neuroimaging (see *Section 6.3*):

- Patients with the following should receive imaging immediately upon arrival at hospital [1] :
    - Indications for thrombolysis or early anticoagulation treatment.
    - Current anticoagulant treatment.
    - A known bleeding tendency.
    - A depressed level of consciousness (Glasgow Coma Score below 13), unexplained progressive, or fluctuating symptoms.
    - Papilloedema, neck stiffness, or fever.
    - Severe headache at onset of stroke symptoms.

- Patients who present within 8 hours of onset of a suspected acute stroke [**R-GDG**]:
    - Should receive neuroimaging within 20 minutes of arrival at the hospital.
- Patients who present >8 hours of onset and have suspected large vessel occlusion:
    - Non-invasive vascular imaging (to exclude large vessel occlusion), should be obtained as early as possible [7].
- Patients who present >8 hours of symptom onset and do not have suspected large vessel occlusion, should receive neuroimaging within 12 hours of arrival at the hospital, but as early as possible [1] .
- Patients who present with suspected acute stroke on waking up, or have symptoms from an unclear time of onset (>4.5 hours from last known well or at baseline state):
    - Neuroimaging can be useful for selecting those who can benefit from mechanical thrombectomy.
    - Neuroimaging options include:
        - CT Perfusion/CT Angiogram.
        - MRI (to identify diffusion-positive FLAIR-negative lesions).
        - Mechanical thrombectomy is only applicable when patients meet other eligibility criteria in this extended time window [7].
- If a haemorrhagic stroke is suspected:
    - CT scan should be the initial imaging modality [**R-GDG**].
- Evaluation of suspected TIA patients in the ED, presenting within 72 hours of onset, should also include neuroimaging [**R-GDG**].

Aspirin and Anticoagulants (see *Section 7.1.2*):

- Administer aspirin to all patients presenting with acute stroke (after intracerebral haemorrhage has been excluded by CT brain scanning) [1,2,8] .
- NB: Anticoagulation treatment should not be routinely used in the treatment of acute stroke [1,2,9] , unless clinically indicated [1,2] .

Thrombolysis (see *Section 7.1.1*):

- Thrombolysis with intravenous tissue plasminogen activator (IV tPA) [2,10–12] :
    - Should be offered and may be given to selected patients with acute ischaemic stroke within 4.5 hours after stroke onset, who satisfy the inclusion/exclusion criteria [10,12] [**L2, RGA**]:
        - IV tPA can be administered by the ED physicians in consultation with stroke specialists using the Tele-stroke service if the hospital does not have an on-site stroke team [**R-GDG**].
        - If IV tPA is administered in a non-stroke centre, the patient should be transferred immediately to a stroke centre for further evaluation and possible endovascular intervention [**R-GDG**].

Endovascular Intervention (see *Section 7.2*):

- The following patients are eligible for endovascular intervention [13,14] :
    - All patients who present within 16 hours of symptom onset with [7]:
        - Large vessel occlusion on computerised tomography/magnetic resonance angiography (CTA/MRA); and
        - Evidence of significant salvageable brain tissue on imaging.
        - Irrespective of whether thrombolysis has been administered.
- In case of transfer from another hospital, neuroimaging will be repeated prior to any intervention [**R-GDG**].

Intracerebral Haemorrhage (see *Section 7.3*):

- The following patients should be considered for a neurosurgical opinion [1,2] :
  - Posterior fossa bleeds.
  - ICH with mid-line shift of >5 mm.
  - ICH with intra-ventricular extension.
  - ICH with hydrocephalus.
  - ICH with underlying brain tumours or vascular malformations.
  - ICH with decreased level of consciousness (GCS below 13).
- All other patients should preferably be admitted to a stroke ward within 4 hours of arrival to the ED for ongoing monitoring [**R-GDG**].

Care in a Specialised Stroke Unit (see *Section 8*):

- Care should preferably be provided in a specialised stroke unit comprised of a multidisciplinary team of professionals [2,15] .
- Care should comprise of the following [2] :
  - Appropriate nursing care and physiological monitoring.
  - Access to speech and language therapy, including assessment and management of swallowing.
  - Further investigation of the aetiology and risk factors for the stroke.
  - Access to physiotherapy and occupational therapy.
  - Access to dietetic services, including nutrition screening.
  - Providing monitored care for stroke patients who require enhanced monitoring or who develop complications.
  - Prompt access to support from specialist critical care colleagues [**R-GDG**].
  - Good communications with patients, their families, and the patient's primary care physician.
  - Regular MDT assessment and discussion as a key component of patient care.

Stroke Rehabilitation (see *Section 8.5*):

- Should be provided by a specialised rehabilitation team skilled in the care of stroke patients. The rehabilitation team should be part of the Stroke Multidisciplinary Team (MDT) [2,16] .
- Patients with neurological deficits from acute stroke, should be assessed by the rehabilitation team within a specialised stroke unit [2,16] .
- All patients with neurological deficits should be transferred to a rehabilitation facility as soon as investigation of stroke aetiology and acute care is complete [**R-GDG**].

Secondary Prevention (see *Section 9*):

- For every patient, an individualised and comprehensive secondary prevention strategy for stroke should be implemented as soon as possible following a TIA or stroke and prior to discharge from the hospital [2] . This should comprise of the following:
  - Patient information.
  - Lifestyle advice.
  - Glycaemic control in diabetic and pre-diabetic patients.
  - BP management.
  - Lipid management.
  - Anti-thrombotic therapy.
  - Anticoagulation in selected patients.

4 Background Information

4.1 Definitions

Stroke:

- Stroke is defined as a syndrome with a rapid onset of focal neurological deficit of vascular origin[17].

Ischaemic Stroke:

- Ischaemic stroke is defined as an episode of neurological dysfunction caused by focal cerebral, spinal, or retinal infarction [17] [**L2**].

Transient Ischaemic Attack:

- Transient ischaemic attack (TIA) is defined as a brief episode of focal neurologic dysfunction caused by ischemia, typically lasting less than one hour and without evidence of acute infarction [1,17] [**L2**].

Intracerebral Haemorrhage:

- Stroke caused by intracerebral haemorrhage is defined as a focal collection of blood within the brain parenchyma or ventricular system that is not caused by trauma [17] [**L2**].

4.2 Aetiology

Ischaemic stroke or embolic TIA [18,19] :

- Arterial blood supply can be restricted or occluded by atherosclerosis and atherothrombosis.
- When vascular endothelium becomes damaged and weak, atherosclerotic plaques activate a cascade in which clot formation and emboli may be generated.
- The most common causes of damage to arterial endothelium are [18,19] [**L2**]:
    - Increased low-density lipoproteins.
    - Smoking.
    - High blood pressure.
    - Diabetes mellitus.

Specific causes of intracerebral haemorrhage include [20] [**L1**]:

- Arteriovenous malformations.
- Tumours.
- Enlarged vessels.
- Aneurysm.

The TOAST classification of ischaemic stroke aetiology is as follows [21] :

- Large artery atherosclerosis:
    - Extracranial or intracranial disease.
- Small artery occlusion.
- Cardioembolism:
    - Higher or lower risk cardiac lesions.
- Other demonstrated cause:
    - Non-atherosclerotic vasculopathies.
    - Prothrombotic disorders.
- Undetermined cause (cryptogenic):
    - Incomplete evaluation for cause.
    - Diagnostic studies were negative.
    - ≥2 conflicting causes found.

4.3 Risk Factors

The following factors are associated with an increased risk of stroke [22–24] :

- Increasing age – stroke typically presents at an earlier age in Qatar.
- Hypertension.
- Dyslipidaemia.
- Diabetes mellitus.
- Smoking.
- Atrial fibrillation.
- Previous history of stroke or ischaemic heart disease.
- Women taking oral oestrogen is associated with a small increase in the risk of venous stroke [24] [**L2**].
- Obesity.

5 Clinical Presentation

5.1 Symptoms and Signs of Acute Stroke

Features of ischaemic or haemorrhagic stroke develop rapidly, are focal and include the following [1,2,17,25] :

- Unilateral numbness, weakness or paralysis of the face, arm or leg.
- Problems with speech and comprehension, e.g. aphasia or slurred speech.
- Problems with swallowing.
- Monocular symptoms:
    - Sudden onset vision loss.
    - Blurred vision.
- Acute new onset, severe headache.

Consider a posterior circulation strokes in patients with vascular risk factors who present with a combination of the following sudden onset symptoms [26]:

- Dizziness and balance difficulties.
- Diplopia.
- Vomiting.
- Altered consciousness.

5.2 Face, Arm, Speech Test (FAST) Screen

The *Face, Arm, Speech Test* (FAST) is used to screen for possible stroke or TIA in a pre-hospital setting [1–3] :

- New onset facial weakness:
    - Ask the patient to smile or show their teeth.
    - The FAST test is positive if there is new facial asymmetry, e.g. the mouth or eye drooping.
- New onset arm weakness:
    - Raise the patient's arms to 90° if they are sitting, or 45° if they are lying.
    - Ask the patient to maintain the position when you let go.
    - The FAST test is positive if one arm falls or drifts down.
- Speech problems:
    - Assess patient's speech and determine whether it is slurred, or the person has difficulty finding the name for commonplace objects, e.g. cup, table, chair, keys, pen.
    - If they have difficulty seeing, place the objects in their hands.
    - If they have a companion, check whether this is a new problem.
    - The FAST test is positive if there is a new unexplained speech problem.

If the FAST test is positive [1–35]:

- Call the ambulance immediately.
- Record the time of symptom onset, where known.
- **Do not delay ambulance transfer for any reason.**
- **Ensure the person is taken immediately to the nearest hospital with facilities for stroke thrombolysis.**
- **Hospitals with facilities and expertise for stroke thrombolysis (but not thrombectomy), should initiate thrombolysis and transfer the patient immediately to an endovascular unit for assessment** (i.e. 'drip and ship').
- In the near future, it is expected that 'stroke ambulances' will be introduced in Qatar [**R-GDG**]:
    - Stroke ambulances are equipped for immediate portable CT-scanning and thrombolysis capability.
    - Once introduced, care pathways will be amended accordingly.

6 Emergency Department Assessment and Management

Hospitals with the capabilities for stroke thrombolysis should follow the guidelines below. Other hospitals without thrombolysis capability should immediately transfer the patient to an appropriate stroke centre [**R-GDG**].

Tele-stroke services can be used to remotely discuss the management of patients with stroke specialists if stroke services are unavailable at the receiving hospital [**R-GDG**].

6.1 Initial Assessment

Patients with suspected acute stroke should be assessed by a physician in the emergency department (ED) within 10 minutes of arrival [**R-GDG**].

Initial assessment will include the following [2] :

- Confirmation of focal neurological deficit.
- Exclusion of hypoglycaemia.
- Determining the time of onset of symptoms.
- Arranging urgent CT scanning.
- Informing the stroke team for assessment (on-site or via tele-stroke).

Adults presenting at an ED with acute stroke should be admitted to a specialist acute stroke unit within 4 hours of arrival [15]. Tele-stroke services can be used to remotely discuss the management of patients with stroke specialists [**R-GDG**].

Patients who are not eligible for thrombolysis/endovascular intervention, should still be assessed by a neurology stroke team within 24 hours of onset of symptoms [2] [**L1, RGA**].

6.2 Risk Assessment of Patients with TIA

Start 300mg aspirin daily, immediately to all patients with suspected TIA, if not contraindicated [1], and refer to a specialist within 24 hours of symptoms onset[1]. If a TIA is confirmed, secondary prevention is recommended in addition to aspirin [1] .

Patients who present within 72 hours of onset of acute symptoms, but in whom symptoms have resolved, should be assessed in the ED by a neurologist or stroke expert [**R-GDG**].

Patients who present after 72 hours, should be assessed in a fast-track TIA outpatient clinic where available [**R-GDG**].

ABCD[2] scoring system should **not** be used to evaluate the risk of subsequent stroke or to assess the urgency of referral in patients with suspected or confirmed TIA [1] **[L1, RGC]**.

People with any of the following are at high risk of recurrent events and should be referred urgently to the ED for assessment [**R-GDG**]:

- Crescendo stroke (2 or more TIAs in a week).
- Atrial fibrillation.

6.3 Neuroimaging

Patients with the following should receive imaging immediately upon arrival at hospital [1] :

- Indications for thrombolysis or early anticoagulation treatment.
- Current anticoagulant treatment.
- A known bleeding tendency.
- A depressed level of consciousness (Glasgow Coma Score below 13), unexplained progressive, or fluctuating symptoms.
- Papilloedema, neck stiffness, or fever.
- Severe headache at onset of stroke symptoms.

Patients who present within 8 hours of onset of a suspected acute stroke [**R-GDG**]:

- Should receive neuroimaging within 20 minutes of arrival at the hospital.

Patients who present >8 hours of onset and have suspected large vessel occlusion:

- Non-invasive vascular imaging (to exclude large vessel occlusion), should be obtained as early as possible [7].

Patients who present >8 hours of symptom onset and do not have suspected large vessel occlusion, should receive neuroimaging within 12 hours of arrival at the hospital, but as early as possible [1] .

Patients who present with suspected acute stroke on waking up, or have symptoms from an unclear time of onset (>4.5 hours from last known well or at baseline state):

- Neuroimaging can be useful for selecting those who can benefit from mechanical thrombectomy.
- Neuroimaging options include:
    - CT Perfusion/CT Angiogram
    - MRI (to identify diffusion-positive FLAIR-negative lesions).
- Mechanical thrombectomy is only applicable when patients meet other eligibility criteria in this extended time window [7].

If a haemorrhagic stroke is suspected:

- CT scan should be the initial imaging modality [**R-GDG**].
- A history of bleeding tendency, depressed consciousness, neck stiffness, progressive symptoms and papilloedema all raise the possibility of a haemorrhagic rather than ischaemic stroke [**R-GDG**].

Evaluation of suspected TIA patients in the ED, presenting within 72 hours of onset, should also include neuroimaging [**R-GDG**]:

- Unless an MRI is unavailable or an alternative diagnosis is suspected, CT scanning is not recommended for patients with suspected TIA [1] **[L1, RGC]**.
- If a CT scan has been performed, an MRI can be offered to evaluate the territory of ischaemia, or to detect haemorrhage [1] **[L1, RGA]**.

6.4 Other Investigations

Other investigations to be performed at initial assessment include [1,2,16,27] :

- ECG.
- Chest radiograph.
- Blood glucose level.
    - NB: Hypoglycaemia can mimic a stroke and must be excluded in those with sudden onset of neurological symptoms.
- Complete blood count (CBC).

- Urea, electrolytes, and creatinine.
- Coagulation profile, especially if considering thrombolysis or if intracerebral haemorrhage is suspected.
- Lipid profile.
- Liver function tests.
- HBA_{1C}.
- Troponin-T.

7 Specialist Management of Acute Stroke

The following sections describe management of acute stroke by neurologists.

7.1 Pharmacological Treatment of Acute Ischaemic Stroke

7.1.1 Thrombolysis

Thrombolysis with intravenous tissue plasminogen activator (IV tPA) [2,10–12] :

- Should be offered and may be given to selected patients with acute ischaemic stroke within 4.5 hours after stroke onset, who satisfy the inclusion/exclusion criteria [10,12] [**L2, RGA**]:
    - The risk of intracranial and systemic haemorrhage should be considered when deciding whether to offer IV tPA [**L2, RGA**].
    - IV tPA can be administered by the ED physicians in consultation with stroke specialists using the Tele-stroke service if the hospital does not have an on-site stroke team [**R-GDG**].
    - If IV tPA is administered in a non-stroke centre, the patient should be transferred immediately to a stroke centre for further evaluation and possible endovascular intervention [**R-GDG**].
- **Patients with an acute ischaemic stroke who are treated with thrombolysis should only be considered for antiplatelet treatment 24 hours after presentation once significant haemorrhage has been excluded.**

Informed consent [11] :

- Shared decision-making between the patient (and/or his or her surrogate) and a member of the health care team, should include a discussion of potential benefits and harms prior to the decision whether to administer IV tPA [**L3, RGB**].
- If the patient is unable to consent and no family member or surrogate is immediately available, then two treating physicians (at least one should be a neurologist) can provide consent for thrombolysis as it is the standard of care following best medical practice [**R-GDG**]:
    - If the patient is assessed using the tele-stroke system, the consent process should be initiated and signed by the ED physicians who are attending the patient, in agreement with the neurologist on tele-stroke.
    - Once the patient reaches the stroke centre, the neurologist will co-sign the consent form on behalf of the patient.

7.1.2 Acute Anti-Platelet Therapy

Administer aspirin to all patients presenting with acute stroke (after intracerebral haemorrhage has been excluded by CT brain scanning) [1,2,8] :

- Give aspirin as soon as possible but ideally within 24 hours.
    - Administer aspirin 300 mg once as first dose.
    - Follow by aspirin 100 mg once daily for lifetime use.
    - Administer aspirin orally, if the patient has completed and passed a swallow assessment.
- If aspirin cannot be given, use clopidogrel [28] :
    - Administer clopidogrel 300 mg once as loading dose
    - Followed by 75 mg daily for lifetime use.
- If clopidogrel is not tolerated, use either [2] :
    - Modified-release dipyridamole in combination with aspirin; or if not tolerated
    - Modified-release dipyridamole alone.
- Patients with acute ischaemic stroke and a history of dyspepsia should be treated with a proton pump inhibitor (PPI):
    - Esomeprazole and omeprazole should not be prescribed with clopidogrel.

For minor strokes and TIAs:

- Clopidogrel and aspirin can be combined for 3 weeks followed by continued antiplatelet monotherapy for life [28] .

NB: Anticoagulation treatment should not be routinely used in the treatment of acute stroke [1,2,9] , unless clinically indicated [1,2] .

7.2 Endovascular Management of Acute Ischaemic Stroke

Eligibility for endovascular intervention [13,14] :

- All patients who present within 16 hours of symptom onset with [7]:
  - Large vessel occlusion on computerised tomography/magnetic resonance angiography (CTA/MRA); and
  - Evidence of significant salvageable brain tissue on imaging.
  - Irrespective of whether thrombolysis has been administered.
- Endovascular intervention is not routinely performed in the following patients but may be considered on an individual basis [**R-GDG**]:
  - Patients who present beyond 8 hours of symptom onset.
  - Patients with an unknown time of onset.
  - Strokes on waking (wake-up strokes).
- In case of transfer from another hospital, neuroimaging will be repeated prior to any intervention [**R-GDG**].

Informed consent [17] :

- Informed consent is required for all cases, except where the patient and their family are unable to provide consent.
- Shared decision-making between the patient (and/or his or her surrogate) and a member of the health care team, should include a discussion of potential benefits and harms of endovascular intervention.
- If the patient is unable to consent and no family member or surrogate is available, then an interventionist and a neurologist can provide consent.

7.3 Management of Intracerebral Haemorrhage

7.3.1 Neurosurgical Referral

The following patients should be considered for a neurosurgical opinion [1,2] :

- Posterior fossa bleeds.
- ICH with mid-line shift of >5 mm.
- ICH with intra-ventricular extension.
- ICH with hydrocephalus.
- ICH with underlying brain tumours or vascular malformations.
- ICH with decreased level of consciousness (GCS below 13).

All other patients should preferably be admitted to a stroke ward within 4 hours of arrival to the ED for ongoing monitoring [**R-GDG**].

View Pathway

7.3.2 Non-Surgical Management of Intracerebral Haemorrhage

Blood pressure control [1,20] :

- Anti-hypertensive treatment in acute stroke is recommended if there is a hypertensive emergency (i.e. systolic BP >200mmHg or diastolic BP >120mmHg) with one or more of the following serious concomitant medical issues:
    - Hypertensive encephalopathy.
    - Hypertensive nephropathy.
    - Hypertensive cardiac failure/myocardial infarction
    - Aortic dissection.
    - Pre-eclampsia/eclampsia.
    - Intracerebral haemorrhage.
- Blood pressure reduction to 185/110 mmHg or lower should be considered in people who are candidates for thrombolysis [1] .
- If not contraindicated, rapid BP lowering should be offered to ICH patients who present within 6 hours of symptoms onset and who have a systolic BP between 150-220 mmHg or >220 mmHg [1] . The aim is to restore the systolic BP to 130-140 mmHg with 1 hour of treatment initiation and to maintain this level for at least 7 days [1] .
    - Contraindications involve [1] :
        - GCS score less than 6.
        - Referral to early neurosurgery to evacuate the haematoma.
        - Large haematoma with poor prognosis.
        - Structural conditions such as cancer or aneurysm.

It is preferable for patients with ICH to have BP and cardiac monitoring for at least 48 hours, on a stroke ward [**R-GDG**].

- Patients who require intubation or arterial BP monitoring should be admitted to an intensive care unit (ICU).

8 Care in the Specialised Stroke Unit

Care should preferably be provided in a specialised stroke unit comprised of a multidisciplinary team of professionals [2,15].

Care should comprise of the following [2]:

- Appropriate nursing care and physiological monitoring.
- Access to speech and language therapy, including assessment and management of swallowing.
- Further investigation of the aetiology and risk factors for the stroke.
- Access to physiotherapy and occupational therapy.
- Access to dietetic services, including nutrition screening.
- Providing monitored care for stroke patients who require enhanced monitoring or who develop complications.
- Prompt access to support from specialist critical care colleagues [**R-GDG**].
- Good communications with patients, their families, and the patient's primary care physician.
- Regular MDT assessment and discussion as a key component of patient care.

Optimal head positioning and early mobilisation are recommended for patients with acute stroke, providing no high-intensity mobilisation occurs within the first 24 hours of symptoms onset [1].

8.1 Physiological Monitoring

The patient should have physiological monitoring to detect any deterioration including [1,2] :

- BP:
  - BP should not be managed aggressively in an acute stroke for the first 3-4 days.
- Pulse rate:
  - Monitor for arrhythmias including atrial fibrillation.
- Respiratory rate.
- Oxygen saturation:
  - Provide supplemental oxygen only if the patient's SpO_2 is <95% on air.
  - The routine use of supplemental oxygen in patients with normal peripheral oxygen saturations is not recommended.
- Blood glucose level:
  - Maintain a blood glucose concentration between 4-11 mmol/L.
- Temperature:
  - Monitor and treat febrile illness.
- Neurological observations [**R-GDG**]:
  - Monitor every 4 hours for the first 48 hours and according to the patient's requirements.
  - Physician review should occur at least on a daily basis.

8.2 Swallowing Assessment

Aspiration is a particular problem among people with stroke because of complicating dysphagia [1] . Keep the patient nil by mouth (including oral medication), until swallow screening is performed [2] .

Consider the following [1,2,20,29] :

- If swallow disorder is suspected following initial screen, refer for specialist assessment, as soon as possible but within 24 hours.
- Provide medication by non-oral routes including nasogastric tube (NGT) or rectal.

- Patients may benefit from intravenous normal saline to maintain hydration.
- Do not use hypotonic fluids in patients with acute stroke.
- Screening for malnutrition should be carried out by appropriately trained individuals.
- Healthcare professionals should be aware nutrition will be affected by poor oral health and reduced ability to self-feed.
- Monitor weight and body mass index (BMI) at regular intervals.

8.3 Assess for and Manage Complications

Observe patients for the development of common early complications including [1,3] :

- Risk of falling.
- Early neurological deterioration.
- Hypo- or hyperglycaemia.
- Electrolyte disturbances.
- Aspiration pneumonia or other sepsis.
- Deep vein thrombosis (DVT) or pulmonary embolism (PE):
    - Use both of the following for VTE prophylaxis:
        - LMWH or subcutaneous unfractionated heparin; and
        - Pneumatic compression of the legs.
- Hypothermia or hyperthermia.
- Dehydration and malnutrition.
- Hypertension.
- Pressure ulcers.

NB [30] :

- Restraints should not be used.
- Routine use of Foley catheters should be discouraged and only used if there is documented urinary retention.

8.4 Further Investigation

Carotid artery imaging [1,2,31] [**R-GDG**]:

- All people with suspected anterior circulation stroke or TIA, who after specialist assessment are considered as candidates for carotid endarterectomy.
- Carotid duplex ultrasound should be performed within 24-48 hours.
- High risk patients ($ABCD^2$ of ≥3) should have carotid imaging in <24 hours.
- Carotid endarterectomy should be considered where carotid stenosis is ≥70-99%.
- In selected patients, carotid endarterectomy can also be performed in patients with stenosis of 50-70%.
- Other revascularisation procedures can be considered in younger patients.

Confirmatory imaging investigation is necessary to confirm the degree of stenosis including [1,17] [**L1**]:

- Conventional four-vessel cerebral angiogram.
- MRA.
- CTA.

Vertebral artery imaging [32] :

- Can be performed by duplex ultrasound in patients with posterior circulation stroke or TIA.
- Further management may be addressed on an individual basis.

Echocardiogram [33] :

- Patients with ischaemic stroke or TIA should not routinely undergo transthoracic echocardiogram in the acute setting.
- In younger patients, transoesophageal echocardiogram may be considered to identify underlying cardiac pathology.

Holter monitoring [34] :

- Should be performed in all patients with ischaemic stroke or TIA for 24-48 hours to identify underlying arrhythmia as a possible cause of the stroke.
- Prolonged monitoring for up to 6 weeks (with weekly trace interpretation) will be introduced in Qatar in due course [**R-GDG**].

Screening for thrombophilic state [35] :

- May be appropriate for younger patients (age <50 years) with no other risk factors identified for ischaemic stroke or TIA.

8.5 Stroke Rehabilitation

Stroke rehabilitation [2,16] :

- Should be provided by a specialised rehabilitation team skilled in the care of stroke patients. The rehabilitation team should be part of the Stroke Multidisciplinary Team (MDT).
- Patients with neurological deficits from acute stroke, should be assessed by the rehabilitation team within a specialised stroke unit.
- All patients with neurological deficits should be transferred to a rehabilitation facility as soon as investigation of stroke aetiology and acute care is complete [**R-GDG**].

9 Secondary Prevention of Stroke and TIA

For every patient, an individualised and comprehensive secondary prevention strategy for stroke should be implemented as soon as possible following a TIA or stroke and prior to discharge from the hospital [2] .

9.1 Provide Information Regarding Stroke

Information about stroke/TIA and risk factors should be [2] :

- Provided to patients in the hospital setting.
- Provided in an appropriate format for the patient.

All patients receiving medication for secondary prevention should [2] :

- Be given appropriate written and verbal information about the medication including dosage, timing and side effects.
- Have compliance aids (e.g. large-print labels and non-childproof tops) provided according to their individual needs and compatibility with safety in the home environment.

9.2 Lifestyle Advice

Lifestyle advice should include the following [2,15,36–39] :

- Cessation of smoking.
- In those who consume alcohol, excessive intake should be discouraged.
- Appropriate lifelong physical activity and/or exercise [15,36] [**L1, RGA**]:
    - Aim for 30 minutes of moderate intensity aerobic activity at least 5 days per week.
- Reducing body weight for overweight or obese patients [36] [**L1**].
    - Minimising saturated fat intake and eating a balanced diet, including:
        - Mediterranean/diet approach to stop hypertension (DASH) diet.
            - Low fat/dairy intake.
            - High fish, olive oil and nuts.
            - Eating ≥5 portions of fruit and vegetables a day.
            - Lower dietary salt intake to <2400 mg/day.
            - Reducing animal protein intake.

9.3 Glycaemic Control in Diabetic and Pre-Diabetic Patients

Ensure good glycaemic control in all diabetic and pre-diabetic patients [36] [**L1, RGA**]:

- Check HBA_{1C}.
- Consider altering hypoglycaemic medication and/or insulin.
- Provide education and support.

The target for glycaemic control is to keep HBA_{1C} <7.0%, if this can be achieved without problematic hypoglycaemia [40] . Less stringent control may however be appropriate in elderly patients [**R-GDG**].

9.4 Blood Pressure Management

BP management in secondary prevention [2,41] :

- Initiate antihypertensive therapy in the acute setting for all patients following ischaemic stroke or TIA with a systolic BP (SBP) of ≥200 mmHg or a diastolic BP (DBP) of ≥120 mmHg.
- For patients with carotid artery stenosis of ≥60%, who are not appropriate for intervention, or who are awaiting intervention:
    - A target SBP of 140-150 mmHg is appropriate.
    - Sudden lowering of BP is not appropriate in these patients.

NB: Consider starting an angiotensin converting enzyme (ACE) inhibitor or an angiotensin receptor blockers (ARBs) in all patients following ischaemic stroke or TIA (at discharge from the stroke unit) unless contraindicated, as an independent secondary prevention strategy [**R-GDG**].

9.5 Lipid Management

Lipid management [36,42,43] :

- High-intensity statin therapy should be initiated in all patients following ischaemic stroke or TIA, within 24 hours, irrespective of baseline lipid levels e.g.:
    - Atorvastatin 40-80 mg.
    - Rosuvastatin 20-40 mg.
- Targets for treatment in ischaemic stroke or TIA:
    - Aim for a reduction in LDL-C of ≥50% from the untreated baseline level; or
    - An absolute level of LDL-C of <1.8 mmol/L (if the baseline is unknown).
- In patients admitted with ICH [**R-GDG**]:
    - Initiation of statin therapy can be delayed until 2-4 weeks after the haemorrhage.
    - Any prior statin use can be stopped and reinitiated at 2-4 weeks after the haemorrhage.

9.6 Anti-Platelet Therapy

Antiplatelet therapy after acute treatment [1,8,40,44,45] :

- Aspirin should be continued for lifetime use at a dose of 100 mg once daily.
- If aspirin is not tolerated, use clopidogrel 75 mg once daily.
- If clopidogrel is not tolerated, use either:
    - Modified-release dipyridamole in combination with aspirin; or if not tolerated
    - Modified-release dipyridamole alone.
- Any patient with acute ischaemic stroke in whom previous dyspepsia is reported should be given a PPI in addition to the antiplatelet.
- Esomeprazole and omeprazole should not be prescribed with clopidogrel.

For minor strokes and TIAs [28] :

- Clopidogrel and aspirin can be combined for 3 weeks followed by continued antiplatelet monotherapy for life.

View Pathway

9.7 Anticoagulation in Stroke Prevention

The following patients should be treated or continued on long term anticoagulants to reduce the risk of further stroke or TIA [36] :

- All patients with atrial fibrillation (AF).
- Patients with mechanical heart valves.
- Patients with a left ventricular thrombus.

The target for treatment should be [46,47] :

- International normalised ratio (INR) of 2-3 (unless specific indications for a higher INR e.g. those with mechanical heart valves).
- All patients should be encouraged to monitor INR closely with their physician or warfarin clinic.

Depending on the risk of bleeding, initiation or re-initiation of anticoagulation can be delayed for 7-14 days, in patients who have had a sizeable infarction [**R-GDG**].

Patients with non-valvular AF may be started on newer anticoagulants in preference to warfarin, including[40]:

- Rivaroxaban.
- Dabigatran.
- Apixiban.

10 Key Considerations for Patient Preferences

Patient preferences refer to patient perspectives, beliefs, expectations, and goals for health and life, and to the steps employed by individuals in assessing the potential benefits, harms, costs, and limitations of the management options in relation to one another. Patients may have preferences when it comes to defining their problems, identifying the range of management options and selecting or ranking the outcomes used to compare these options.

It is important for healthcare professionals to develop an understanding of the patient as an individual and the unique way in which each person experiences a condition and its impact on their life.

The following recommendations are therefore made for physicians and other healthcare professionals regarding general principles of patient care in Qatar:

- **Respect Patients:** Treat patients with respect, kindness, dignity, courtesy and honesty. Ensure that the environment is conducive to discussion and that the patient's privacy is respected, particularly when discussing sensitive, personal issues. Ask the patient how they wish to be addressed and ensure that their choice is respected and used.

- **Maintain Confidentiality:** Respect the patient's right to confidentiality and avoid disclosing or sharing patients' information without their informed consent. In this context, students and anyone not directly involved in the delivery of care should first be introduced to the patient before starting consultations or meetings, and let the patient decide if they want them to stay.

- **Clarify Third-Party Involvement:** Clarify with the patient at the first point of contact whether and how they like their partner, family members or carers to be involved in key decisions about their care or management and review this regularly. If the patient agrees, share information with their partner, family members or carers.

- **Obtain Informed Consent:** Obtain and document informed consent from patients, in accordance with MOPH policy and guidance.

- **Encourage Shared Decision Making:** Ensure that patients are involved in decision making about their own care, or their dependent's care, and that factors that could impact the patient's participation in their own consultation and care including physical or learning disabilities, sight, speech or hearing impairments and problems with understanding, reading or speaking English are addressed.

- **Disclose Medical Errors:** Disclose errors when they occur and show empathy to patients.

- **Ensure Effective Communication:** Explore ways to improve communication including using pictures, symbols or involving an interpreter or family members. Avoid using medical jargon. Use words the patient will understand and confirm understanding by asking questions.

- **Ensure Continuity of Care:** Provide clear and timely sharing of patient information between healthcare professionals especially at the point of any transitions in care.

11 Performance Measures

A list of performance measures is given in the table below. Healthcare organisations are encouraged to monitor service performance using the indicator definitions below[48].

Number	Numerator	Denominator
ST01	Number of patients in the denominator who are assessed for stroke rehabilitation services.	Total number of patients diagnosed with ischaemic or haemorrhagic stroke in the past 12 months.
ST02	Number of patients in the denominator, who die within 90 days of admission of the index stroke or TIA.	Total number of patients admitted to hospital with a diagnosis of stroke or TIA in the past 12 months.
ST03	Number of patients in the denominator, who are readmitted to the hospital within 30 days of discharge.	Total number of patients diagnosed with a stroke or TIA in the past 12 months, who are admitted to hospital.

Table 11.1: Performance measures[48].

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Appendix: Detailed Description of the Literature Search

A systematic search for existing literature on stroke and TIA was performed in the period April 27th – May 12th, 2020.

All existing references were evaluated and where necessary and applicable, the latest version of the specific manuscript was used to update the guideline and replace the older reference. The search for clinical practice guidelines on stroke assessment and/or management was performed in the *PubMed* database and websites of relevant organisations and societies including the *American Heart Association/American Stroke Association,* the *MHRA,* the *Scottish Intercollegiate Guidelines Network,* and the *BNF.* The present guideline is primarily based on *UK NICE* and the *Royal College of Physicians* guidelines and is supplemented with other relevant studies.

Peer-reviewed scientific publications were found in PubMed and via *Google Scholar* Internet search engine. Non-peer reviewed studies were identified in *bioRxiv*. Books were checked on *Amazon* and via *Google* and *Google Scholar* search engines.

The included publications were identified using the terms "*Stroke*" and specified with the following terms in combinations:

guideline, definition, prevalence, aetiology, risk factor, presentation, symptoms, FAST, investigation, TIA, neuroimaging, ECG, radiograph, acute, management, specialist, thrombolysis, anti-thrombotic, endovascular, haemorrhage, intracerebral, swallowing, rehabilitation, prevention, secondary, lifestyle, diabetes, blood pressure, anticoagulation, treatment, aspirin, clopidogrel, follow-up.

Figure A.1 on the next page demonstrates graphically the results of the search and application of exclusion criteria.

View Pathway

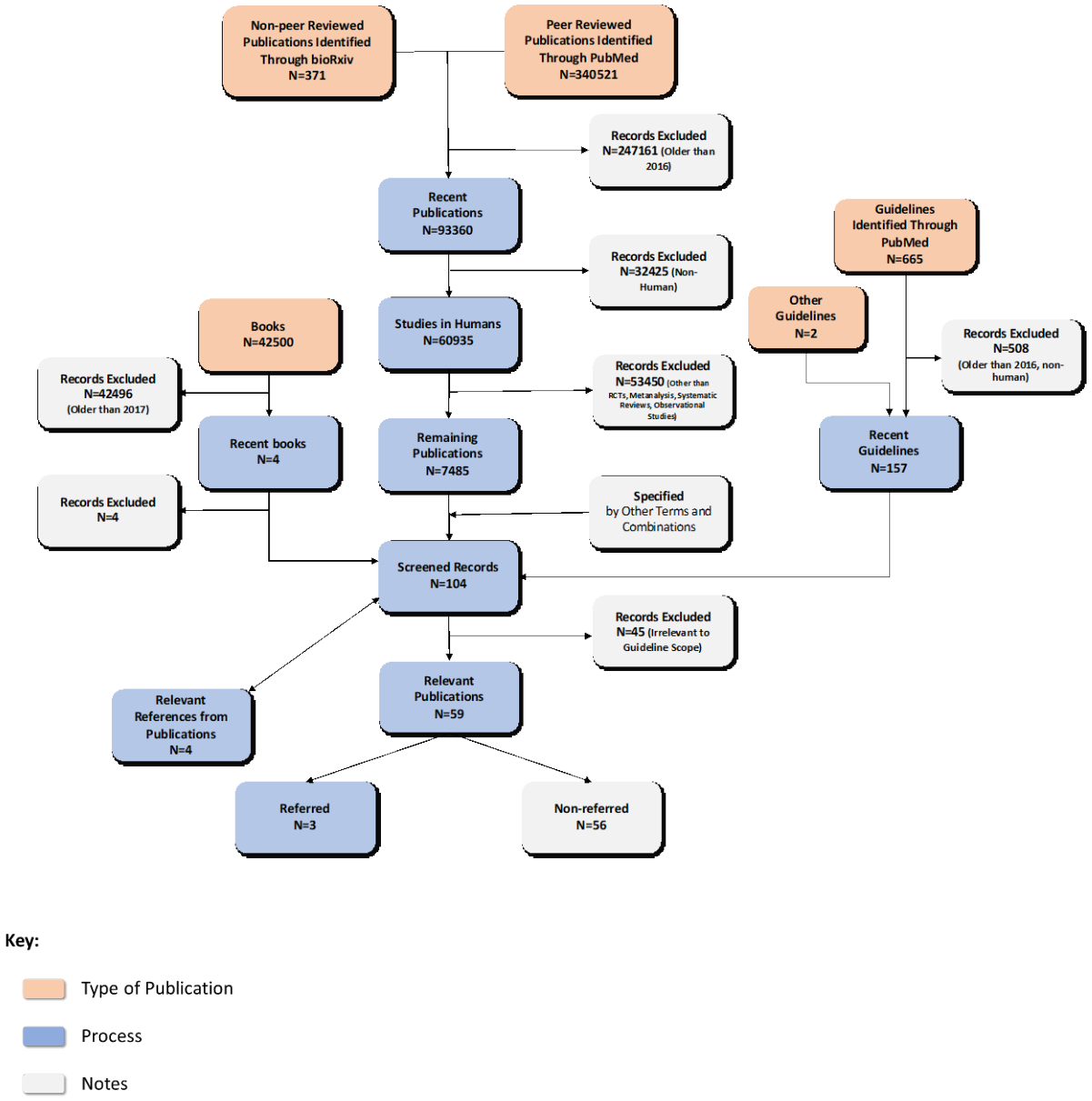

Fig A.1: Literature search results and application of exclusion criteria.

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