Immediate Management of Ischaemic Stroke

Medicine > Neurology > Stroke and transient ischaemic attack (TIA)

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1 Background information

Quick info:

Scope:
• management of transient ischaemic attack (TIA) and acute stroke, including:
  • acute diagnosis and treatments, including stroke units and thrombolysis
  • aspects of rehabilitation
  • long-term care and support
  • secondary prevention
  • prevention of complications
  • management of carotid artery disease

Out of scope:
• primary prevention of stroke
• diagnosis and management of stroke in children
• management of subarachnoid haemorrhage
• immediate management of intracerebral haemorrhage
• ongoing management of ischaemic stroke

Definition:
• TIA inclusive of:
  • rapid onset of global or focal impairment of brain function
  • due to vascular pathology
  • lasts less than 24 hours
• stroke inclusive of:
  • a medical emergency requiring immediate response
  • clinical syndrome of rapid onset of global or focal impairment of brain function
  • due to vascular pathology
  • lasts more than 24 hours or results in death
• ischaemic stroke:
  • an episode of neurological dysfunction caused by focal cerebral, spinal or retinal infarction
• intracerebral haemorrhage:
  • a focal collection of blood within the brain parenchyma or ventricular system that is not caused by trauma
• stroke caused by intracerebral haemorrhage:
  • rapidly developing clinical signs of neurological dysfunction attributable to a focal collection of blood within the brain parenchyma or ventricular system that is not caused by trauma

Risk factors:
• non-modifiable:
  • Increasing age
  • history
  • gender
  • Maori and pacific islanders
• modifiable:
  • hypertension
  • diabetes mellitus (DM)
  • atrial fibrillation (AF)
  • previous history of stroke or ischaemic heart disease
  • high cholesterol
  • smoking
  • carotid stenosis
• excessive alcohol consumption
• obesity
• lack of exercise
• a diet that is:
  • high in saturated fats
  • high in salt
  • low in fresh fruit and vegetables
• congenital heart disease

Incidence and prevalence:
Stroke is the second most common cause of death worldwide and the most common cause of long term adult disability in developed countries (Johnston, Mendis & Mathers, 2009; Rothwell, 2001). Stroke’s cost New Zealand over $450 million every year (Brown, 2009). If current trends in stroke incidence and mortality continue (Anderson, Carter, Hackett, et al, 2005), the number of stroke survivors will reach 50,000 by 2015 (AUT University, 2009) with overall annual costs of >$700 million. Reducing the burden of stroke is a key goal for health service planning (Feigin & Howard, 2008):
• every day about 24 New Zealanders have a stroke; a quarter occur in people under 65
• stroke is the major cause of serious adult disability in New Zealand
• stroke is largely preventable, yet about 9000 New Zealanders every year have a stroke
• there are an estimated 60,000 stroke survivors in New Zealand, many are disabled and need significant daily support. However, stroke recovery can continue throughout life

2 Information resources for patients and carers

Quick info:
Print/email this list of resources for patient, family and/or carer.
Stroke Foundation NZ website:
• frequently asked questions
• free resources
• books and DVD’s
• services in the community
Neurological Foundation of New Zealand website:
• brain health
• resources
Health Navigator NZ website
Heart Foundation website

Provide information to carers and patients [1,2,5,6]:
• each patient should be individually assessed on his or her readiness to receive information
• information provision should be freely available and tailored to the needs of each individual and aimed at assisting patients and their carers in adapting to their new role
• provide information in a variety of languages and formats specific to the patients impairment, cultural, and language requirements
• the needs of the carers should be considered from the outset in the domains of:
  • information provision
  • planning and decision making
  • professional support, e.g. psychosocial, health
• stroke services must be alert to the likely stress on carers, specifically recognising the stress associated with ‘hidden’ impairments such as:
  • cognitive loss
  • urinary incontinence
  • sexual dysfunction
• irritability
• information should be given to carers on:
  • the nature of stroke and its manifestations
  • relevant local and national services
• ensure there is support for family and carers to reduce distress
• the information for patients and carers should cover:
  • personalised plan on how to prevent future strokes
  • how to recognise further strokes and the appropriate emergency response
  • contact details for relevant rehabilitation services
  • information on how to access benefits and other financial support
  • information regarding driving eligibility
  • detailed information on prescription medication

3 Updates to this care map

Quick info:
Date of publication: November 2015

4 Hauora Maori

Quick info:
As a practitioner you will work with Maori whanau/families. Each Maori whanau is diverse with their own set of values and beliefs, inherited, practised and passed down from generation to generation.

There are some important things that you should be mindful of when working with Maori individuals and their whanau from a holistic approach to working in a Whanau ora or family / whanau centred way.

Key enablers that you should be aware of when working with Maori whanau/families are:
  • building relationships and gaining trust
  • effective communication with whanau /families
  • understanding and involving whanau/ families in the treatment planning and care management
  • practical things to be mindful of when working with Maori whanau so that you do not breech Tikanga/Principles and practices that are important in Te Ao Maori/the Maori world
Common terms and definitions are noted here.

5 Pasifika

Quick info:
Our pasifika community:
• is a diverse and dynamic population
• more than 22 nations represented in New Zealand
• each with their own unique culture, language, history, and health status
• share many similarities which we have shared with you here in order to help you work with pasifika patients more effectively

The main Pacific nations in New Zealand are
  • Samoa, Cook Islands, Fiji, Tonga, Niue, Tokelau and Tuvalu

Acknowledging The FonoFale Model (pasifika mode of health) when working with pasifika peoples and families.

Acknowledging general pacific guidelines when working with pasifika peoples and families:
  • cultural protocols and greetings
  • building relationships with your pacific patients
  • involving family support, involving religion, during assessments and in the hospital
6 Stroke and transient ischemic attack (TIA) - clinical presentation

Quick info:
Symptoms and signs of stroke develop suddenly or rapidly, are usually focal (although they can be global), and include:

- **common:**
  - unilateral numbness: may be confined to face, arm, or leg only
  - unilateral weakness or paralysis – may be confined to face, arm, or leg only
  - problems with speech and comprehension
  - visual disturbances (characteristically a sudden visual loss in one half of the visual field, or visual loss in one quarter of the visual field, or visual loss in one eye)
  - coordination and balance problems
  - acute problems with swallowing

- **less common:**
  - disorder of perception
  - decreased level of consciousness or coma
  - confusion
  - acute headache with accompanying neurological symptoms and signs (as above) and/or vomiting

Focal and global cerebral ischaemia mimic, and are mimicked by, many conditions. All patients presenting with a sudden global or focal change in function need a careful and thorough clinical assessment, however suggestive of stroke the FAST score, ROSIER score and brain imaging have been [30].

*Be aware stroke mimics.*

7 History and examination

Quick info:
**Assess any history of [3]:**
- unilateral weakness or numbness of the face, arm, and/or leg
- problems with speech and comprehension
- problems with swallowing
- problems with walking, balance or coordination
- loss of vision
- confusion
- headache
- nausea and/or vomiting
- decreased level of consciousness or coma

**Perform full neurological examination, especially examination of [3]:**
- speech
- power
- visual fields
- cranial nerves
- sensation

**Perform cardiovascular examination [3]:**
- pulse and rhythm
- blood pressure (BP)
- heart sounds and murmurs
8 Perform standardised assessment

Quick info:
For patients admitted to Emergency Department, Recognition of Stroke in the Emergency Room (ROSIER) assessment is most commonly used to [1,3,4,5]:

- increase the accuracy of the initial stroke diagnosis
- assist with more rapid diagnosis
- assess factors, including:
  - blood pressure (BP) and blood glucose concentration
  - items on loss of consciousness and seizure activity
- physical assessment, including:
  - unilateral facial weakness
  - arm weakness
  - leg weakness
  - speech disturbance
  - visual field defects

For every patient admitted to hospital the clinical team should undertake medicines reconciliation and continue all necessary medications unless contraindicated [1].

Acute Stroke Unit Guidelines

9 Consider time since symptom onset

Quick info:
Treatment of ischaemic stroke should be delayed as little as possible [10]:

- all patients with suspected stroke should have brain imaging in the next available slot or within 1 hour if thrombolysis is being considered, but always within 12 hours [1]
- thrombolysis can only be performed if transfer, imaging, and initial treatment is carried out within 4.5 hours of onset of symptoms [6]
- thrombolysis up to 4.5 hours is currently licensed [11]:
  - every effort should be made to shorten the delay in initiation of thrombolytic treatment [12]
  - prompt treatment can restore blood flow before major brain damage has occurred [13]
- barriers to timely assessment include [5]:
  - patient or family not recognising symptoms of stroke or delay seeking help
  - patient or family calling GP first
  - failure to suspect stroke [6]
  - incorrect triage
  - delays in neuroimaging
  - delays in following in-hospital pathways
  - delay in obtaining consent
  - physician unfamiliarity with recombinant tissue plasminogen activator (rt-PA) use

12 Consider urgent thrombolysis - fast track investigations

Quick info:
**Indications for thrombolysis:**

- consider intravenous (IV) recombinant tissue plasminogen activator (rt-PA) alteplase if:
  - onset of symptoms is definitely within 4.5 hours of thrombolysis [6]
  - imaging has excluded an intracranial haemorrhage [1,2,4]
• the hospital has high-quality protocols and policies in place regarding administration of thrombolysis for stroke patients, as well as managing post-thrombolysis complications - checklist completed in ED and then transferred to CCU (refer to stroke unit guidelines)

• alteplase should only be administered within a well-organised stroke service with [1]:
  • staff trained in delivering thrombolysis and monitoring for any associated complications
  • nursing staff trained in acute stroke and thrombolysis
  • immediate access to imaging and re-imaging, and staff appropriately trained to interpret the images

If thrombolysis is given [4]:

• closely monitor blood pressure (BP) and neurological status
• monitor for development of bleeding complications
• do not give anticoagulant or antiplatelet agents within 24 hours of thrombolysis

NB: the IST3 trial showed that the known beneficial effect of intravenous thrombolysis is also seen in those with severe stroke and in patients of age 80 years and over [31].

NB: thrombolysis up to 4.5 hours is currently licensed [11].

NB: Before prescribing any medication, consult product information and drug reference guides to check indications, contraindications, cautions, and interactions [1].

NB: thrombolysis up to 4.5 hours is now licensed [11].

NB: benefits of thrombolysis are greater the earlier it is given – studies indicate administration after 4.5 hours is associated with an increased mortality risk [5,12].

13 Contraindications / exclusion criteria for thrombolysis identified

Quick info:
Thrombolysis is not recommended where the patient has [7]:

• symptoms that are mild or rapidly improving
• severely impaired conscious state
• persistent hypertension
• any evidence of bleeding or increased risk of bleeding, such as:
  • intracranial pathology, e.g. untreated congenital aneurysm
  • gastrointestinal or genito-urinary bleeding
  • coagulopathy
• recent trauma, surgery, lumbar puncture or arterial puncture
• pregnancy
• any exclusion criteria identified through thrombolysis checklist

If not appropriate for thrombolysis follow standard timing for investigations.

14 Investigations

Quick info:
Patients who have had a suspected stroke should have specialist assessment and investigation within 24 hours of onset of symptoms [1].

Acute stroke services provide, as a minimum [1,2]:

• 24-hour access to brain imaging
• expert interpretation and the opinion of a consultant stroke specialist
• thrombolysis for those who can benefit:
  • thrombolysis up to 4.5 hours is currently licensed [11]

All patients being considered for thrombolysis in acute stroke should be reviewed immediately by a stroke specialist [1]:

• identification of possible underlying cardiovascular causes
• localisation of the cerebral area likely to have been affected, and identification of treatable risk factors
• any clinical course that is unusual or inconsistent with the initial diagnosis of stroke [1]:
  • patient should be fully reassessed and investigated as appropriate for possible alternative diagnoses
• ECG reading – ECG is urgently required in all strokes [2]
• continuous cardiac telemetry – this is important for those with suspected paroxysmal arrhythmia [7]
• echocardiography may be required [6]

Other acute stroke patients should be reviewed as soon as possible and certainly within 12 hours.

15 Consider differential diagnoses

Quick info:
There are several conditions with symptoms that mimic stroke, which need to be excluded [2] – consider differential diagnoses, e.g. [1,3,4]:
• subdural haematoma
• cerebral vein thrombosis
• intracranial mass, e.g. tumour
• metabolic disorders, e.g. hypoglycaemia
• seizures
• encephalitis
• global ischaemia
• labyrinthine disorders
• temporal arteritis
• migraine
• psychological disorders, e.g. anxiety or panic disorder
• multiple sclerosis (MS)
• disorders of the peripheral nerves
• transient global amnesia
• trauma

16 Blood tests

Quick info:
Assess the following [1,4,5]:
• blood glucose level – exclude hypoglycaemia as the cause of sudden-onset neurological symptoms
• full blood count (FBC)
• urea, electrolytes and creatinine
• other tests to consider include:
  • coagulation profile, especially if considering thrombolysis or if intracerebral haemorrhage is suspected
  • C-reactive protein (CRP) or erythrocyte sedimentation rate (ESR)
  • lipid profile
  • troponin, if ECG is abnormal or history of chest pain

17 Brain imaging

Quick info:
Brain imaging (CT scan) should be performed immediately (within the hour) for those with acute stroke if any of the following apply [1,4]:
• indications for thrombolysis or early anticoagulation treatment
• the patient is on anticoagulation therapy
• the patient has:
  • a known bleeding tendency
  • depressed level of consciousness (Glasgow Coma Scale below 10)
  • unexplained progressive or fluctuating symptoms
  • papilloedema, neck stiffness, or fever
  • severe headache at onset of stroke symptoms

If immediate imaging is not indicated, image as soon as possible and within 24 hours [1,4].

Consider MRI if [10]:
• CT is delayed
• diagnostic uncertainty after CT, e.g. suspected non-stroke pathology but unsure
• atypical clinical presentation including:
  • “young” stroke (under age 50 years)
  • strong clinical suspicion of vessel dissection
  • delayed clinical presentation (more than 7 days after symptom onset)

18  Vascular investigations

Quick info:
About 80% of transient ischemic attacks (TIAs) and non-disabling strokes require imaging of the carotid arteries [2,6]:
• high risk patients (ABCD² of 4 or more) should be imaged in less than 24 hours [6]
• all people with suspected non-disabling stroke or TIA, who after specialist assessment are considered as candidates for carotid endarterectomy, should have carotid imaging within one week of onset of symptoms [1]

Imaging of carotid arteries:
• consider any patient with a carotid artery territory TIA or stroke but without severe disability for carotid endarterectomy, and if agreed by the patient, perform [1,4,5,10]:
  • a carotid duplex ultrasound (Doppler ultrasound) urgently to estimate the degree of stenosis
  • any patient with a stenosis of greater than 50% should be considered for surgery [6]
  • a second urgent non-invasive imaging investigation to confirm the degree of stenosis, e.g.:
    • magnetic resonance angiogram (MRA)
    • CT angiogram (CTA)
    • carotid angiogram
  • the confirmatory test should also be carried out urgently to avoid delay [4]

20  Imaging suggests ischaemic stroke or transient ischaemic attack (TIA)

Quick info:
Image diagnosis of acute stroke or transient ischemic attack (TIA):
• the CT scan can be normal in acute ischaemic stroke, particularly if it is done soon after the onset of symptoms [10]
• acute infarction appears hypo-dense (or dark) compared with normal brain parenchyma [17] on CT scan [6]
• the higher spatial resolution of MRI is better for determining whether the diagnosis for TIA is correct and how large any infarction may be [2]

21  Imaging reveals abnormalities other than stroke or TIA

Quick info:
If CT scan suggests a diagnosis other than ischaemia or intracerebral haemorrhage, consider further investigation and manage appropriately [5,10]:
• differential diagnoses that might be suggested by CT scan include [1,3,4,5]:

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- extracerebral intracranial haemorrhage
- cerebral vein thrombosis (may be difficult to detect by CT scan – requires CT venography) [5]
- subarachnoid haemorrhage
- intracranial mass, e.g. tumour
- head injury from trauma

Management of alternative diagnosis is outside the remit of this care map.

22 Imaging reveals intracerebral haemorrhage

Quick info:
Excluding intracranial haemorrhage influences management, particularly in patients already on antiplatelet or anticoagulant therapy [5]:
- acute haemorrhage on CT appears hyper-dense (or white) [14]

Complications of intracerebral haemorrhage include:
- expansion of haematoma [4]
- hydrocephalus [4]
- intraventricular haemorrhage [6]

Every patient diagnosed as having a subarachnoid haemorrhage should [1]:
- be immediately referred to Wellington Neurosurgical Team
- be started on nimodipine 60mg orally every four hours unless there are specific contraindications
- not be given anti-fibrinolytic agents or steroids

24 Immediate assessment and treatment

Quick info:
All patients should be assessed within a maximum of 4 hours of admission for their [1]:
- ability to swallow - nurse dysphagia screen (SLT)
- immediate needs in relation to:
  - positioning
  - mobilisation
  - moving
  - handling
- bladder control
- risk of developing skin pressure ulcers
- capacity to understand and follow instructions
- capacity to communicate their needs and wishes
- nutritional status and hydration
- ability to hear
- ability to see

25 Administer thrombolysis if appropriate

Quick info:
If thrombolysis is given [4]:
- closely monitor blood pressure (BP) and neurological status
- monitor for development of bleeding complications
- do not give anticoagulant or antiplatelet agents within 24 hours of thrombolysis
NB: the IST3 trial showed that the known beneficial effect of intravenous thrombolysis is also seen in those with severe stroke and in patients of age 80 years and over [31].

NB: thrombolysis up to 4.5 hours is currently licensed [11].

26 Administer aspirin if thrombolysis is inappropriate

Quick info:
Administer aspirin to all patients presenting with acute stroke who have had a diagnosis of primary intracerebral haemorrhage excluded by brain imaging [1,4]:

- give aspirin as soon as possible but certainly within 24 hours
- administer aspirin 100-300mg orally once daily
- administer uncoated aspirin per rectum if patient is unable to swallow
- aspirin should be continued until two weeks after the onset of stroke symptoms, at which time definitive long-term antithrombotic treatment should be initiated
- patients being discharged before two weeks can be started on long-term treatments earlier
- any patient with acute ischaemic stroke for whom previous dyspepsia associated with aspirin is reported should be given a proton pump inhibitor (PPI) in addition to aspirin
- use clopidogrel if the patient is intolerant to aspirin [35]
- anticoagulation treatment should not be routinely used in the treatment of acute stroke [1,4,16], unless clinically indicated [1,4]

27 Assess swallowing and hydration

Quick info:
Screen patient's swallowing before giving any oral food, fluid, or medication – dehydration is a particular problem among people with stroke because of complicating dysphagia [4].

A typical swallow screening procedure should include [17]:

- initial observations of the patient’s level of consciousness
- observations of the degree of postural control
- observations of oral hygiene
- observations of control of oral secretions
- if appropriate, a nurse dysphagia screen – only to be performed by trained staff [1,4,30]

Consider the following:

- exclude medications for pre-existing conditions where dysphagia could be a potential side effect [17]
- if swallow disorder is suspected following initial screen, refer for specialist Language Therapist (SLT) assessment within 24-72 hours [4]
- nil by mouth, if required obtain pharmacist/medical advice for appropriate administration of clinically essential medications [17]
- monitor fluid loss and fluid intake [4]
- intravenous (IV) fluids may be required [4]
- monitor weight and body mass index (BMI) at regular intervals [4]
- check electrolytes periodically, especially if hydrated parenterally [4]
- assess nutritional status using a validated assessment tool such as the Malnutrition Universal Screening Tool (MUST), and consider additional interventions where nutritional status is poor or high risk [4]
- screening for malnutrition and the risk of malnutrition should be carried out by healthcare professionals with appropriate skills and training [1]
- healthcare professionals should be aware nutrition will be affected by poor oral health and reduced ability to self-feed [1]

Oral feeding problems can lead to [3,30]:

- food, fluid, or saliva entering the lungs and causing aspiration pneumonia
- reduced food intake, which may lead to malnutrition or dehydration
- embarrassment when eating in social settings
28 Regular physiological monitoring

Quick info:
The patient should have regular neurological observations to detect any deterioration, along with observations of (follow CCU/ASU guidelines) [1,4]:

- blood pressure (BP) – reduction to 185/110mmHg or lower should be considered in people who are candidates for thrombolysis
- pulse rate
- respiratory rate
- oxygen saturation:
  - patients should receive supplemental oxygen only if their oxygen saturation drops below 95%
  - the routine use of supplemental oxygen is not recommended in people with acute stroke who are not hypoxic
- blood glucose level:
  - patients with acute stroke should maintain a blood glucose concentration between 4 and 11mmol/L
  - temperature

29 Assess and manage complications

Quick info:
Observe patients for the development of common early complications [3,4]:

- early neurological deterioration [6]
- hypo- or hyperglycaemia
- electrolyte disturbances
- aspiration pneumonia or other sepsis [6]
- deep vein thrombosis (DVT) or pulmonary embolism (PE)
- hypothermia or hyperthermia
- dehydration and malnutrition
- hypertension [6]
- pressure ulcers

Assess for and treat as appropriate:

- intracranial hypertension (furosemide or mannitol and hyperventilation may be used) [5,6]
- hydrocephalus [3,4]
- large middle cerebral artery (MCA) or cerebellar infarcts [3,4,5]:
  - consider decompressive hemicraniectomy within a maximum of 48 hours of symptom onset:
    - in patients age 60 years or under [1]
    - when clinical deficits suggestive of infarction in the territory of the MCA with a score on the National Institute of Health Stroke Scale (NIHSS) of above 15 [1]
    - when patient shows a decrease in the level of consciousness to give a score of 1 or more on item 1a of the NIHSS [1]
    - signs on CT of an infarct of at least 50% of the MCA territory [1]
    - infarct volume greater than 145cm\(^3\) as shown on diffusion-weighted MRI [1]

30 Start antiplatelet therapy 24 hours after thrombolysis

Quick info:
Administer aspirin 24 hours after thrombolysis [1,4]:

- administer aspirin orally
- administer uncoated aspirin per rectum if patient unable to swallow
- aspirin should be continued until two weeks after the onset of stroke symptoms, at which time definitive long-term anti-thrombotic treatment should be initiated
• patients being discharged before two weeks can be started on long-term treatments earlier
• any patient with acute ischaemic stroke for whom previous dyspepsia associated with aspirin is reported should be given a proton pump inhibitor (PPI) in addition to aspirin
• consider alternative antiplatelet therapy [15]:
  • clopidogrel
  • modified-release dipyridamole in combination with aspirin if stroke is suspected and clopidogrel is contraindicated or not tolerated
  • modified-release dipyridamole alone if stroke is suspected and clopidogrel and aspirin are contraindicated or not tolerated
Overview
This document describes the provenance of Whanganui Regions Stroke Pathways. The localised pathways were last updated in March 2017.

The purpose of implementing the CCP Programme in our District is to:
- Enhance accuracy of referrals
- Use best practice guidelines
- Have all information found in one place
- Enhance partnerships and collaboration across services
- Improve patient outcomes through seamless care across primary and secondary care

To cite this pathway, use the following format:

Editorial methodology
This care map has been based on a Map of Medicine Care Map developed according to the Map of Medicine editorial methodology. The content of the Map of Medicine care map is based on high quality guidelines and practice-based knowledge provided by contributors with front-line clinical experience (see contributors section of this document). This localised version of the evidence-based, practice informed care map has been peer-reviewed by the WDHB and WRHN Collaborative Clinical Directors and Leaders Forum and with stakeholder groups.

Consumer engagement
Development of the Whanganui Collaborative Clinical Pathways focuses on person-centred care and an experience based co-design approach where consumers are invited to consult with the Health Promoter / Community Developer (who sits on each pathway working group). Consumers are asked prior if possible, or if not at the very start of the pathway process to share their experiences to assist in designing services that work for them and their families, critiquing and feeding back on suitable consumer information and resources which can then be incorporated into the pathways. Feedback obtained ensures we address consumer challenges and needs within the pathway and provide suitable services, information and resources for consumers. Additional information on patient centred care is provided by following this link and experience based co-design of health care services at http://www.kingsfund.org.uk/projects/ebcd.

References

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