



**National Programme for Prevention and Control of Cancer,
Diabetes, Cardiovascular Diseases & Stroke (NPCDCS)**

Guidelines for Prevention and Management of Stroke



Directorate General of Health Services
Ministry of Health and Family Welfare

Government of India

2019



सबका साथ, सबका विकास, सबका विश्वास
Sabka Saath, Sabka Vikas, Sabka Vishwas



सत्यमेव जयते

डॉ हर्ष वर्धन Dr. Harsh Vardhan

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व पृथ्वी विज्ञान मंत्री, भारत सरकार

Union Minister for Health & Family Welfare,
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Message

The burden of Non-Communicable Diseases (NCDs) is increasing in our country over the past few years. As per estimates, these diseases now account for more than 62% of all deaths thereby surpassing communicable diseases, maternal and neo natal diseases in the country. Among NCDs, Stroke is one of the leading causes of mortality and disability.

2. National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases & Stroke (NPCDCS) is being implemented under National Health Mission for up to district level interventions. The objectives of the programme include awareness generation for prevention, screening, early detection and referral to an appropriate level institution for treatment. The programme has been scaled up significantly in past few years.

3. NCD Clinics at District and CHC level, Cardiac Care Unit and Day Care Centres at District level are set up under the programme. Implementation of population level intervention for prevention, control, screening and management for common NCDs such as hypertension, diabetes and oral, breast and cervical cancer and setting up of tertiary care institutions under different schemes provide upstream and downstream integration for NCD prevention and control interventions. NCD service delivery is one of the important components of services to be delivered by Health and Wellness Centres under Ayushman Bharat.

4. Guidelines have been issued in past for different interventions under NPCDCS and other initiatives. Present guidelines focus on primary and secondary prevention, programme management and clinical support for stroke care, with an objective to integrate stroke care at primary and secondary level.

5. I am sure that these guidelines will be very useful for the State & District level officials for strengthening of primary and secondary care to provide an effective stroke care in the Country.

(Dr. Harsh Vardhan)

New Delhi,
July 13, 2019

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MESSAGE

As a consequence of epidemiological transition, Non-Communicable Diseases (NCDs) are accounting for majority of disease burden in all of States and UTs. Stroke is 4th leading cause for death and 5th leading causes for Disability adjusted life years in India. Changes in lifestyles, behavioural patterns, demographic profile (aging population), socio-cultural and technological advancements are leading to increase in the prevalence of stroke. However, the disease by and large can be prevented by making simple changes in the way people live their lives.

In response to this increasing burden, National Programme for Prevention and Control of Cancer, Diabetes, CVD and Stroke (NPCDCS) is being implemented under National Health Mission, which has been scaled up in the past few years. Population level intervention for prevention, control, screening and management of five common NCDs has also been started and been scaled up. NCD service delivery is an important package of Health & Wellness Centres being set up under Ayushman Bharat. The guidelines for NPCDCS programme and other interventions have been issued from time to time. Considering the importance of stroke care and prevention, these guidelines are developed with a view to provide support for programme management and to build capacity of health care providers at different levels of primary and secondary healthcare. With these guidelines, healthcare providers will be able to make appropriate decisions regarding stroke care and referral to higher level of healthcare facilities. The guidelines include interventions for primary, secondary prevention and rehabilitation also.

I am sure these will be useful for integrating stroke care in primary and secondary healthcare settings with upstream connection with the tertiary care facilities.

(Ashwini Kumar Choubey)

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Government of India
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FOREWORD

Non Communicable Diseases (NCDs) such as diabetes, cardiovascular diseases, cancer, COPD and stroke account for more than 62% mortality in the country and contribute significantly to Disability Adjusted Life Years (DALYs). National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) is being implemented for interventions up to District level under the National Health Mission (NHM). Cardiac Care Units are being set up for managing cardiac emergencies. Population level intervention for prevention, control, screening and management of common NCDs is being implemented under NHM, while NCD service delivery is one of the important components of services to be delivered by Health and Wellness Centres under Ayushman Bharat. Guidelines have been issued for different components of the programme. The guidelines for Acute Stroke Care complement existing guidelines of the programme.

The guidelines include clinical and programme management components inter alia and have been prepared by an Expert Group. A chapter on rehabilitation is also included to make these comprehensive.

I am sure these guidelines will be useful for programme managers at State and District level and medical officers, specialists and staff for setting up and managing stroke care facilities at primary and secondary level of Health care.

(Preeti Sudan)



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PREFACE

In India Non-Communicable Diseases (NCDs) are accounting for more than 62% of total deaths of which over 55% are premature. Cardiovascular Diseases and Cerebrovascular Diseases account for majority of the burden of NCDs. Stroke is one of the major component of these, posing public health challenge. National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) being implemented under National Health Mission (NHM) envisages to set up infrastructure and provide support for interventions for prevention and control of Cardiovascular Diseases & Stroke among others, up to District Level.

Primary prevention of stroke shares a number of approaches in common with other vascular diseases such as heart attack and renal or peripheral vascular diseases. Risk factors of common NCDs including stroke are common. Operational guidelines have been issued for NPCDCS covering major elements of the programme interventions. Population level intervention for prevention, control, screening and management for common NCDs such as hypertension, diabetes and oral, breast and cervical cancer is also being implemented under NHM. NCD service delivery package is one of important packages under Ayushman Bharat Health & Wellness Centres. These interventions have upstream, downstream and midstream integration with each other. Programmatic and clinical guidelines have also been issued for population level interventions and Health & Wellness Centres.

The instant guidelines are more focussed towards secondary prevention and identification of acute stroke as well as programmatic inputs for setting up and managing the facilities. Acute ischemic stroke management has seen major technological breakthrough in the form of mechanical removal of clot blocking the major brain arteries. Benefits of such breakthrough must reach the general public, through its application to needy patients throughout the country. It is also important to mention that simple interventions like control of fever, blood sugar, swallowing and blood pressure can also result in very good clinical outcomes in a number of patients. Patients who recover from acute stroke need rehabilitation and prevention of stroke recurrence. Control of risk factors and use of intervention like antiplatelets, anticoagulant and carotid intervention can play a major role in secondary prevention of stroke.

It is with the aim of improving the quality of stroke care including rehabilitation as well as secondary prevention that these guidelines have been developed. These guidelines intend to improve the quality of stroke care including rehabilitation as well as secondary prevention. The guidelines provide for setting up of infrastructure at district hospitals where the opportunities and challenges in improvement are large. I trust these guidelines will be useful for both programme managers and clinicians.


(Manoj Jhalani)

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Abbreviations

ACEI – Angiotensin Converting Enzyme Inhibitors
AF –Atrial Fibrillation
AMI – Acute Myocardial Infarction
ANM–Auxiliary Nurse Midwife
aPTT – activated Partial Thromboplastin Time
ASHA–Accredited Social Health Activists
ARB – Angiotensin Receptor Blocker (ARB)
CAS – Carotid Artery Stenting
CBAC – Community Based Assessment Checklist
CCU – Cardiac Care Unit
CEA – Carotid Endarterectomy
CLOTS trial – Clots in Legs OrsTockings after Stroke trial
CPAP – Continuous Positive Airway Pressure
CSCU – Cardiac and Stroke Care Unit
CSF – Cerebro Spinal Fluid
CTA – CT Angiography
CVD – Cardiovascular Disease
CVE – Cerebrovascular Event
DALY – Disability Adjusted Life Year
DBP – Diastolic Blood Pressure
DH – District Hospital
DVT – Deep Venous Thrombosis
ECG – Electrocardiography
ED –Emergency Department
ESUS – Embolic Stroke of Undetermined Source
FFP – Fresh Frozen Plasma
GCS – Glasgow Coma Scale
HbA1C – GlycatedHemoglobin
HIV – Human Immunodeficiency Virus
HDL – High-Density Lipoprotein
HSC – Health Sub Centre
HWC – Health Wellness Centre
ICH – Intra Cerebral Hemorrhage
ICP – Intracranial Pressure
INR–International Normalized Ratio
LDL – Low-Density Lipoprotein
LFT – Liver Function Test

LMWH –Low Molecular Weight Heparin
MAP – Mean Arterial Blood Pressure
MCA – Middle Cerebral Artery
MRA – MR Angiography
MRI – Magnetic Resonance Imaging
MRV – Magnetic Resonance Venography
NCCT – Non-Contrast Computerized Tomography
NCD – Non-Communicable Diseases
NIHSS – National Institute of Health Stroke Scale
NOAC – Newer Oral Anticoagulants
NPO – Nil Per Oral
NVAf – Non valvular AF
OSA – Obstructive Sleep Apnea
PCC –Prothrombin Complex Concentrate
PHC – Primary Health Centre
PR – Pulse Rate
PT – Prothrombin Time
RBS – Random Blood Sugar
rtPA – recombinant tissue Plasminogen Activator
SAH – Sub ArchnoidHemorrhage
SBE –Sub Acute Bacterial Endocarditis
SBP – Systolic Blood Pressure
SCD – Sickle Cell Disease
STEMI – ST-Elevation Myocardial Infarction
TIA – Transient Ischemic Attack
TNK – Tenecteplase
VDRL – Venereal Disease Research Laboratory
VHSNC – Village Health, Sanitation and Nutrition Committee (VHSNC)
VKA – Vitamin K Antagonists
WSO – World Stroke Organization

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1. Introduction

Stroke, a major Non-Communicable Disease (NCD), is responsible for 3.5% of disability-adjusted life year (DALY) in India. Apart from risk factors like hypertension, diabetes, heart diseases and positive family history, other lifestyle related factors such as unhealthy diet, obesity, lack of physical activity, stress and tobacco use account for its occurrence. Changes in lifestyles, behavioural patterns, demographic profile (aging population), socio-cultural and technological advancements are leading to sharp increases in the prevalence of stroke. The disease by and large can be prevented by making simple changes in the way people live their lives or simply by changing our lifestyle.

1.1. Magnitude of Stroke burden in India

Stroke is the second leading cause of death worldwide and was responsible for an estimated 6.5 million deaths and 113 million DALYs in 2013. More than 2/3 of these deaths occurred in developing countries. By 2050, more than 80% of the predicted global burden of new strokes of 15 million will occur in low and middle-income countries. In India, studies estimate that incidence of stroke population varies from 116 to 163 per 100,000 population. Recently, ICMR has come out with a report entitled “India: Health of the Nation’s States”, according to which stroke was 4th leading cause of death and 5th Leading cause of Disability Adjusted Life Years (DALY) in 2016.

1.2. National guideline for stroke management and prevention

This guideline has been prepared for health care providers involved in management of patients with stroke. The aim is to help them, at primary and secondary levels of health care delivery system to make the best decisions for each patient, using the evidence currently available. The focus is on the more common clinical questions faced in day-to-day practice.

1.3. Care provided at different levels of health care

In view of complex managements of stroke, the role of PHC (Primary Health Centre) is limited to risk assessment, early recognition of the symptoms, stabilization and quick referral to higher centres where facilities for managements are available.

- Primary health care –primary prevention, early recognition and referral, rehabilitation.

- Secondary health care – acute stroke management, secondary prevention and follow up, rehabilitation.
- Tertiary health care – complex and higher level management of acute cases, follow up of stroke for enablement and support services, rehabilitation of residual impairment.

1. Stroke definition:

In 1970, the World Health Organization defined stroke as ‘rapidly developed clinical signs of focal (or global) disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than of vascular origin’.

2. Transient Ischemic Attack (TIA) definition: AHA/ASA (2009)

A transient episode of neurological dysfunction caused by focal brain, spinal cord, or retinal ischemia without acute infarction.

Presenting features of stroke:

- Sudden numbness or weakness in the face, arm, or leg, especially on one side of the body
- Sudden confusion, trouble speaking, or difficulty understanding speech
- Sudden trouble seeing in one or both eyes
- Sudden trouble walking, dizziness, loss of balance, or lack of coordination
- Impairment or loss of consciousness

Presenting features of TIA:

- Transient weakness, numbness or paralysis of face, arm or leg, typically on one side of your body
- Transient slurred or garbled speech or difficulty understanding others
- Transient blindness in one or both eyes or double vision\
- Curtain like appearance in front of eye (Amaurosis fugax)
- Transient dizziness or loss of balance or coordination

2. Major risk factors of stroke

For prevention, it is important to identify risk factor for stroke.

Some recognized risk factors are:

1. Well documented Modifiable Risk Factors:

- Hypertension
- Diabetes Mellitus
- Dyslipidemia
- Obesity and Body fat distribution
- Physical inactivity
- Tobacco use
- Structured cardiac diseases such as rheumatic valve disease
- Atrial fibrillation
- Sickle cell disease
- Carotid stenosis
- Excessive Alcohol consumption
- Unhealthy diet and nutrition

2. Less – well documented Modifiable Risk Factors:

- Migraine
- Metabolic Syndrome
- Drug Abuse
- Obstructive Sleep apnea
- Hyperhomocysteinemia
- Hypercoagulability
- Elevated Lp (a)
- Inflammation and Infection

3. Non-modifiable risk factors:

- Genetic factors
- Increasing age
- Low birth weight
- Race/ethnicity
- Low socio-economic status
- Male gender

3. Primary prevention of stroke

1. Goal: Primary Stroke prevention aims at reducing the likelihood of having a stroke by either reducing the chances of developing risk factors or controlling various risk factors that increase the chance of having a stroke.

2. Methods of Primary Prevention of Stroke:

2.1 Mass (population-wide) strategy

2.2 High Risk Strategy

3. What are the Gaps in Primary Stroke/ cardiovascular disease (CVD) prevention?

- Lack of awareness
- Under usage of population-wide strategies
- False reassurance of low risk
- Management of blood pressure
- Lack of local stroke/CVD prediction algorithms: Most the currently used CVD/stroke prediction algorithms are based on the Framingham study of a primarily white population of North America, which may not be accurate enough for other racial/ethnic groups.
- Cost Barrier

4. Assessing the Risk of First Stroke:

An ideal stroke risk assessment tool that is simple, widely applicable and accepted, and takes into account the effects of multiple risk factors does not exist. Based on some Indian studies, Framingham Risk Scoring – Cardiovascular Disease (FRS-CVD) may be used to predict risk for stroke over 10-20 years for an individual, subject to further validation in Indian patients with stroke. Research is needed to validate risk assessment tools across age sex, and regional groups; to evaluate whether any of the more recently identified risk factors add to the predictive accuracy of existing scales; and to determine whether the use of these scales improves primary stroke prevention.

5. Recommendations

5.1 Hypertension and diabetes mellitus

Please refer to *Operational Guidelines: Prevention, Screening and Control of Common Non-Communicable Diseases: Hypertension, Diabetes and Common Cancer (Oral, Breast, Cervix) [part of Comprehensive Primary Health Care]*, Ministry of Health & Family Welfare, Govt. of India.

5.2 Tobacco use:

- Counselling, in combination with drug therapy using nicotine replacement or Bupropion is recommended for active smokers to assist in quitting.
- Abstinence from cigarette smoking is recommended for persons who have never smoked.
- Community wide or state-wide bans on smoking in public places are reasonable for reducing the risk of stroke and MI.

5.3 Atrial Fibrillation:

- For patients with *valvular AF* at high risk for stroke, long-term oral anticoagulant therapy with warfarin at a target INR of 2 to 3 is recommended.
- For patients with *non-valvular AF*, a CHA₂DS₂-VASc score (*Annexure I*) of > 2 and acceptably low risk for hemorrhagic complications, oral anticoagulants (either vitamin K antagonists or newer anticoagulants) are recommended.
- Screening for AF in the primary care setting in patients >65 years of age or persons of any age with irregular pulse followed by ECG as indicated can be useful.
- For patients with non-valvular AF and CHA₂DS₂-VASc score of 0, it is reasonable to omit antithrombotic therapy.
- For patients with non-valvular AF, a CHA₂DS₂-VASc score of 1, aspirin therapy may be considered.

5.4 Mitral stenosis

- Anticoagulation is indicated in patients with mitral stenosis and a prior embolic event, even in sinus rhythm.
- Anticoagulation is indicated in patients with mitral stenosis and left atrial thrombus.

5.5 Asymptomatic carotid artery stenosis:

- Patients with asymptomatic extracranial carotid artery stenosis (>50%) should be prescribed daily aspirin and a statin. Patients should also be screened for other treatable risk factors for stroke and appropriate medical therapies and lifestyle changes should be instituted.
- Asymptomatic patients who have >70% stenosis of the internal carotid artery should be referred for evaluation to consider need (or otherwise) of carotid intervention to a centre with risk of peri-procedural stroke, myocardial infarction and death <3%.

5.6 Sickle Cell Disease (SCD):

- Transcranial Doppler (TCD) screening for children with SCD is indicated starting at 2 years of age and continuing annually.
- Transfusion therapy (target reduction of haemoglobin S, <30%) is effective for reducing stroke risk in those children at elevated risk.

5.7 Alcohol:

- Reduction or elimination of alcohol consumption in heavy drinkers through established screening and counselling strategies is recommended.

5.8 Antiplatelet Use for Primary Prevention of Stroke:

- Use of aspirin daily (50-100 mg) for cardiovascular events including stroke prophylaxis is reasonable for men whose risk is sufficiently high (10 year risk > 10%) for the benefits to outweigh the risks associated with treatment. A cardiovascular risk calculator to assist in estimating the 10 year risk can be used (<http://www.cvriskcalculator.com/> – Annexure II) but there is no India-specific calculator available. WHO calculator along with clinical judgment may be used for risk calculation. As aspirin is associated with increased risk for bleeding, its use should be cautious and selective. WHO calculator along with clinical judgment may be used for risk calculation. Ongoing Indian studies will develop risk calculator specifically for Indians in upcoming years. As aspirin is associated with increased risk for bleeding, its use should be cautious and selective.
- Aspirin (50 mg – 100 mg) daily, can be useful for the prevention of first stroke amongst post-menopausal women, including those with diabetes mellitus, whose risk

if sufficiently high for the benefits to outweigh the risk associated with treatment. Its use should be clinically monitored regarding bleeding tendency.

5.9 Life-style Management Recommendations:

- As mentioned above, healthy dietary habits, regular exercise schedule, yoga and avoidance of weight gain are recommended.

Population wide strategy

To operationalize this strategy, Population Based Screening has also been launched in 2017 in 100 districts (now expanded to 215 districts) for finding suspected cases of hypertension and diabetes at community level. All women and men over 30 years in the population would be screened. On a fixed day in a week at Village or Sub centre, depending upon the distance/terrain, the ANM, assisted by the ASHA and members of the Village Health, Sanitation and Nutrition Committee (VHSNC), would screen for hypertension and diabetes, two known risk factors for stroke.

With the launch of Ayushman Bharat in 2018, it is envisaged that all existing Health Sub Centres and Primary Health Centres would be upgraded as Health and Wellness Centres to deliver a comprehensive range of primary health care services. This includes preventive, promotive, curative and rehabilitative aspects of a wide range of services that encompass care for the entire population. The HWC at the SHC level would be staffed by an appropriately trained primary health care team, comprising of Multi-Purpose Workers (M and F), ASHAs and led by a Mid-Level Health Provider. A Primary Health Centre (PHC) would also be strengthened to serve as the HWC for the population in its geographical vicinity.

As the Health and Wellness centres are being operationalized, the screening, prevention, control and management of NCDs are being rolled out at HWCs, as a first step to expand the range of services. Key components include –

1. Population enumeration, community based risk assessment and mobilization for NCD screening by ASHAs at community level.
2. Provision of screening services at HSC/ HSC- HWC and PHC/ PHC- HWC level at the centre or at the village level, depending upon the context and availability of suitable venue for screening.

3. Referral of screened individuals to PHC / PHC- HWC for confirmatory diagnosis and initiation of treatment
4. Regular monthly check up and provision of medicines as per treatment plan at the SHC/ SHC- HWC level
5. Health Promotion to create awareness about risk factors and promote life style modification

Roles and responsibilities of the primary healthcare team in Prevention, Early detection and Management of Stroke

<i>Activity</i>	<i>Role of ASHA</i>	<i>Role of ANM</i>	<i>Role of PHC team (MO, Lady health visitor, Laboratory Technician</i>
Early detection of risk factors for stroke	<ul style="list-style-type: none"> • Complete a Community Based Assessment Checklist (CBAC) for all women and men over 30 years in their population, as per NCD guidelines • Raise awareness and mobilize the community to attend weekly fixed day' NCD screening at the HWC/ village States 	<ul style="list-style-type: none"> • Derive the score based on CBAC to highlight risk factors • Undertake blood pressure and blood glucose measurement; • Refer cases with high BP and blood glucose to the appropriate facility for confirmation and initiation of treatment plan. • Provide follow-up management for patients (monthly drug supply, periodic BP/ blood sugar measurement, referral for complications) • Supportive supervision for ASHAs conducting NCD screening • Referring those who are suspected of any of the risk factors to MO of PHC 	<ul style="list-style-type: none"> • Technical support for the ANM/ ASHA • Maintain records, analyze and submit to district. • Supportive supervision on NCD Day. • Plan review of select cases during routine visits. • Confirmation of Diagnosis and initiation of a treatment plan for people with diabetes and hypertension at PHC/CHC/DH. • Provide one-three months' supply of drugs. • Manage and/or refer complications and cases requiring diagnostic work-up referred by the ANM • Consider annual referral to specialist for HT/diabetes • Referral of complicated cases of DM/HTN to CHC/DH.
Early identification of a possible stroke case in the community	<p>Identify warning signs of stroke and referral.</p> <p>In case of suspicion of stroke, refer the patient to nearest stroke-ready healthcare facility</p>	<p>Identify warning signs of stroke and referral.</p> <p>In case of suspicion of stroke, refer the patient to nearest stroke-ready healthcare facility</p>	<ul style="list-style-type: none"> • Urgent referral of suspected strokes to CHC/DC. • Communication to stroke-ready CHC/DH or any healthcare facility.

Prevention-IEC for stroke	Create awareness among the community on the warning signs of heart attack and stroke and including delivering the message that these are both preventable and treatable.	Create awareness among the community on the warning signs of heart attack and stroke and including delivering the message that these are both preventable and treatable.	<ul style="list-style-type: none"> Urgent referral of suspected strokes to CHC/DC
Prevention-IEC on risk factors for stroke and healthy lifestyle	<ul style="list-style-type: none"> Imparting education to women, men, adolescents, on what is stroke, what are the risk factors for stroke How can someone decrease one's risk of having a stroke Patient support groups facilitated by the ASHA/ASHA facilitator to improve motivation and share challenges and success Lifestyle counselling for people with diabetes and hypertension. Counseling on: Stop Smoking (all forms) Increase regular physical activity Dietary reduction of sodium intake Reduction of alcohol intake Weight management Individual and family counselling will be needed for those who are started on treatment for compliance to treatment and for lifestyle modifications 	<ul style="list-style-type: none"> Imparting education to women, men, adolescents, on what is stroke, what are the risk factors for stroke How can someone decrease one's risk of having a stroke Patient support groups facilitated by the ASHA/ASHA facilitator to improve motivation and share challenges and success Individual and family counseling will be needed for those who are started on treatment for compliance to treatment and for lifestyle modifications 	<ul style="list-style-type: none"> Raising awareness on stroke during planned IEC activities i.e. on VHSND
Those already with AF	<ul style="list-style-type: none"> Emphasize that if there are any signs of heart attack or stroke, she/he should seek immediate medical attention by a qualified health professional at the higher facilities. 	<ul style="list-style-type: none"> Emphasize that if there are any signs of heart attack or stroke, she/he should seek immediate medical attention by a qualified health professional at the higher facilities. 	<ul style="list-style-type: none"> Ensure that all patients on anticoagulation undergo monthly INR monitoring (available at district level).
Community based Physiotherapy for stroke survivors	<ul style="list-style-type: none"> To motivate the patient to comply with home exercise program as prescribed by physiotherapists. Encourage care givers to comply with safety instructions and prescribed home exercise program. Advice the patient and caregivers to maintain a diary for daily 	<ul style="list-style-type: none"> To motivate the patient to comply with home exercise program as prescribed by physiotherapists. Encourage care givers to comply with safety instructions and prescribed home exercise program. 	<ul style="list-style-type: none"> To monitor the improvement in physical activities, participation in self care and society. To identify appropriate patients to constrain the use of non affected upper limb and thereby

	<p>exercise and report any adverse event.</p> <ul style="list-style-type: none"> • Motivate the patient to use the affected side in activities of daily living. • Identify the barriers to indoor and outdoor mobility. • Identify the need of home modifications to facilitate patient's participation in self care and mobility. 	<ul style="list-style-type: none"> • Advise the patient and caregivers to maintain a diary for daily exercise and report any adverse event. • Motivate the patient to use the affected side in activities of daily living. 	<p>forced use of affected upper limb.</p> <ul style="list-style-type: none"> • To monitor physical activity status and any adverse events. • To identify the need of referral to higher center for revision of prescription for exercise and home modification.
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4. Early management of stroke and/or TIA

- Patients who are first seen after fully resolved (TIA) or rapidly resolving neurological symptoms need diagnosis to determine whether in fact the cause is vascular (about 50% are not) and then to identify treatable causes that can reduce the risk of stroke (greatest in first 2 to 14 days).
- Any patient who presents with transient symptoms suggestive of a cerebrovascular event should be considered to have had a TIA, unless neuroimaging reveals an alternative diagnosis.
- All such patients except those with transient monocular blindness should be referred for imaging of brain, either CT scan or MRI with vascular imaging using CT angiography (CTA) or MR angiography (MRA) or carotid ultrasound.
- Patients presenting with transient monocular blindness (amaurosis fugax) must have a complete ophthalmological examination to exclude primary disorders of the eye before diagnosis of TIA.
- All patients with diagnosis of TIA should be started on aspirin 150mg daily and clopidogrel (300 mg loading dose and 75mg daily dose) for first three weeks followed by either aspirin 75mg daily or clopidogrel 75mg daily and should be assessed as early as possible by a specialist physician.
- Patients with crescendo TIA (two or more TIAs in a week) should be treated as being at high risk of stroke, and should be assessed as soon as possible within 24 hours.
- Patients who have had a TIA but who present more than one week after their last symptom has resolved should be assessed as soon as possible but not later than one week by a specialist physician.
- All patients with TIA should be managed promptly as indicated on the lines of ‘Secondary Prevention’ (see the section on secondary prevention).
- “Dekhna, dikhna, hath, paer, bol, chal” – could be an easy mnemonic. Any sudden onset disturbance in dekhna, dikhana, hath, pair, bol or chal should raise suspicion of Cerebrovascular event, and indicate prompt medical consultation.
- Another commonly used acronym for stroke is FAST (F – Face drooping, A – Arm numb/ weak, S – Speech slurred, T – Time) [Time not to be wasted, should act fast for the treatment]

5. Management of established acute stroke care

The aims of emergent evaluation are to:

- (a) Distinguish stroke (a vascular event) from other causes of rapid-onset neurological dysfunction (stroke mimics);
 - (b) To determine its pathology (hemorrhage vs. ischemia)
 - (c) Obtain clues about the most likely etiology
 - (d) Predict the likelihood of immediate complications, and
 - (e) Plan appropriate treatment.
- It should be recognized that ‘stroke’ is primarily a clinical diagnosis and that the diagnosis should be made with special care
 - i. In the young
 - ii. If the sensorium is altered in the presence of mild to moderate hemiparesis,
 - iii. If the history is uncertain, or
 - iv. If there are other unusual clinical features such as gradual progression over days, unexplained fever or papilloedema.

1. Admission to Hospital

Most patients with acute stroke should be admitted to a hospital to:

- (i) Perform urgent CT scan of brain
- (ii) Detect worsening and perform urgent intervention and management.
- (iii) Evaluate, monitor and control risk factors for hemorrhage and ischemia
- (iv) Prevent and treat non-neurological complications like aspiration pneumonia
- (v) Plan rehabilitation
- (vi) Educate the caregiver

Generally, patients with acute stroke (onset within last 72 hours or altered consciousness due to stroke) should be admitted to hospital for initial care and assessment. Circumstances where a physician might reasonably choose *not to* admit selected patients with stroke include the following:

- a) Individuals with severe pre-existing irreversible disability (e.g. severe untreatable dementia), or terminal illnesses (e.g. cancer), who or whose caregivers opt to be cared at home or at lower level healthcare facility. They may be treated for general conditions like diabetes, hypertension and any other co-morbidity.
- b) Alert patients with mild neurological deficits (not secondary to ruptured saccular aneurysm) who present more than 72 hours after onset of symptoms, who can be

evaluated and treated expeditiously as outpatients, and who are unlikely to require surgery, invasive radiological procedures, or anticoagulation;

2. Stroke Unit

There is strong evidence to support a geographically defined (minimum fourbeds) unit in the hospital where patients with stroke are managed by a multidisciplinary team (minimum two physicians/doctors trained in stroke care, four nurses and a physiotherapist) with written standard protocols.

3. History, Physical Examination and common investigations

- History should follow usual routine. Special attention should be paid to time of onset of symptoms, recent stroke, myocardial infarction, seizure, trauma, surgery, bleeding, pregnancy, vegetarianism and use of anticoagulation/ insulin / antihypertensive, history of modifiable risk factors: hypertension, diabetes, smoking, non-smoking tobacco use, heart disease, hyperlipidemia, migraine, and history of headache or vomiting, recent child birth, risk of dehydration.
- Physical examination should be on usual lines with special attention to ABC (airway, breathing, and circulation), temperature, oxygen saturation, sign of head trauma (contusions), seizure (tongue laceration), evidence of petechiae, purpura or jaundice, carotid bruits, peripheral pulses and cardiac auscultation.
- Glasgow coma scale (GCS) score (separately for eye opening, best motor and best verbal responses) should be recorded for each patient. (Annexure III)
- Validated stroke scales like National Institute of Health Stroke scale (NIHSS) may be used to determine the degree of neurological deficit. (Annexure IV)
- All patients should have neuroimaging including vascular imaging, complete blood count including ESR, blood glucose, urea, serum creatinine, serum electrolytes, ECG and transthoracic echocardiography (in cryptogenic stroke transesophageal echocardiography should be done). Selected patients may require markers of cardiac ischemia, liver function tests, serum homocysteine, chest radiography, arterial blood gases, EEG, lumbar puncture, blood alcohol level, toxicology studies, or pregnancy test, anticardiolipin antibody. In patients with cryptogenic stroke, protein C, protein S, and anti-thrombin III should be tested three months after the onset of stroke. A list of indicative investigations is given at Annexure V.
- All patients should have their clinical course monitored and any patient whose clinical course is unusual for stroke should be reassessed for possible alternative diagnosis.

- Brain imaging should be performed urgently in all patients with suspected stroke to determine the type of stroke (ischemic or hemorrhagic), rule out stroke mimics like chronic subdural haematoma, brain tumors and to plan for treatment.
- Every district hospital should have CT scan facility available 24x7.

4. Immediate Specific Management of Ischemic Stroke

4.1 Immediate specific management depends on the time of arrival of the patients after onset of symptoms and severity of stroke.

- All patients with measurable neurological deficit after acute ischemic stroke who can be treated within 4.5 hours after symptom onset should be evaluated without delay to determine their eligibility for treatment with a thrombolytic agent (*please see Annexure VI*).
- Patients with acute ischemic stroke should be considered for combination intravenous thrombolysis and intra-arterial clot extraction (using stent retriever and/or aspiration techniques) if they have internal carotid or proximal middle cerebral artery occlusion causing a disabling neurological deficit and patient can be referred to a tertiary healthcare facility, where the procedure can begin (arterial puncture) within 24 hours of last known well.
- Patients with acute ischemic stroke and a contraindication to intravenous thrombolysis but not to thrombectomy should be considered for intra-arterial clot extraction (using stent retriever and/or aspiration techniques) if they have internal carotid or proximal middle cerebral artery occlusion causing a disabling neurological deficit and patient can be referred to a tertiary healthcare facility, where the procedure can begin (arterial puncture) within 24 hours of last known well.
- All acute stroke patients should be given at least 150 mg of plain aspirin immediately after excluding intracranial haemorrhage with neuroimaging (in patients receiving thrombolysis, aspirin should be delayed until after the 24-hour post-thrombolysis).
- Patients with acute ischemic stroke who are allergic to or intolerant of aspirin should be given an alternative antiplatelet agent (e.g. clopidogrel). (drug details given at *Annexure VII*)
- In patients with large hemispheric infarct [malignant middle cerebral artery (MCA) territory infarct], aspirin may be delayed until surgery. Aspirin may be started after decision is made not to operate.
- In dysphagic patients, Aspirin may be given by enteral tube.

- For non-cardio embolic stroke, aspirin (at least 75 mg) should be continued as indicated in ‘secondary prevention’.
- Any patient with acute ischemic stroke who is known to have dyspepsia with aspirin should be given a proton pump inhibitor in addition to aspirin (also see ‘secondary prevention’).
- Patients with indication for neurosurgery should be referred to a centre with neurosurgical facility.

4.2 Indication of surgery for ischemic stroke:

- Patients with large middle cerebral artery infarct may be referred to higher centres equipped with provision for neurosurgery.
- Patients with middle cerebral artery territory infarction should be considered for decompressive hemicraniectomy and operated as early as possible, preferably within 48 hours who meet the criteria below [decision to be individualised]:
 - Decrease in the level of consciousness GCS score (total between 6 and 13, eye-motor score <9, motor score 5 or less), and
 - CT scan showing signs of an infarct of at least 50% of the MCA territory, with evidence of midline shift >4 mm with or without infarction in the territory of anterior or posterior cerebral artery on the same side or diffusion-weighted MRI showing infarct volume >145cm³.
- Patients with large cerebellar infarct causing compression of brainstem and altered consciousness should be surgically managed with suboccipital craniectomy.
- Symptomatic hydrocephalus should be treated surgically with cerebrospinal fluid (CSF) diversion procedure.

4.3 Hemodilution therapy is not recommended for the management of patients with acute ischemic stroke.

4.4 No neuroprotective drug is recommended outside the setting of randomized clinical studies.

4.5 Acute carotid or vertebral artery dissection

- Carotid or vertebral artery dissection should be suspected if patient has neck pain, history of neck/neurotrauma or is young without any apparent risk factors.
- Any patient suspected of having arterial dissection should be investigated with appropriate imaging (Brain MRI and MRA/CTA).

- People with stroke secondary to arterial dissection should be treated with either anticoagulants or antiplatelet agent. In selected patients, stenting may be indicated.
- In case facilities are not available at DH, the patient may be referred to higher centres.

4.6 Cardioembolic stroke

- Patients with disabling ischemic stroke (i.e. large infarction) who are in atrial fibrillation should be treated with aspirin 150 mg for the first one to two weeks before starting anticoagulation.
- In patients with prosthetic valves who have disabling cerebral infarction and who are at significant risk of hemorrhagic transformation, anticoagulation treatment should be stopped for one week and aspirin 150 mg should be substituted.
- Heparin may be started within 48 hours of cardioembolic stroke except in large infarctions. However, evidence to support this is lacking.
- In patients with suspected embolic stroke of undetermined source (ESUS), 24-48 hour Holter monitoring is indicated.

5. Immediate specific management of intracerebral hemorrhage (ICH).

5.1 ICH-related to anti-thrombotic or fibrinolytic therapy

5.1.1 ICH related to intravenous heparin requires rapid normalization of aPTT by protamine sulphate with adjustment of dose according to time elapsed since the last heparin dose (for <30 minutes: 1mg per 100 unit of heparin; 30 to 60 minutes: 0.5 to 0.75 mg; for 60 to 120minutes: 0.375 to 0.5 mg, for >120 minutes 0.25 to 0.3mg/100 units of heparin). Protamine sulphate is given by slow intravenous not to exceed 5 mg/min (maximum of 50 mg). Protamine sulphate may also be used for ICH related to use of subcutaneous low molecular weight heparin.

- Monitor for signs of anaphylaxis; the risk is higher in diabetics who have received insulin.
- Follow-up with STAT aPTT every one hour for the next 4 hours, then every 4 hours through 12 hours of hospitalization.

5.1.2 ICH related to acenocoumarol/warfarin should be managed with vitamin K, fresh frozen plasma (FFP) and wherever available prothrombin complex concentrate (PCC).

- Vitamin K (10 mg IV) should be used but with FFP/PCC. Vit. K alone takes at least 6 hours to normalize the INR.

- FFP (15 to 20 ml/kg) is an effective way of correcting INR, but there is risk of volume overload and heart failure. Both PCC and factor IX complex concentrate require smaller volumes of infusion than FFP (and correct the coagulopathy faster but with greater risk of thromboembolism).

5.1.3 Symptomatic haemorrhage **after thrombolysis**, administration of IV alteplase should be stopped if still infusing until NCCT head has been done. (If CT shows no evidence of bleeding, then infusion can be resumed).

- If the CT shows hemorrhage, then immediately check values of: CBC, PT, a-PTT, platelets, fibrinogen and D-dimer. If fibrinogen is <100 mg/dL, then give cryoprecipitate 0.15 units/kg rounded to the nearest integer. Give 4 units of platelet rich plasma if platelet dysfunction is suspected.
- If heparin has been administered in the past 3 hours, then follow the above paragraph on ICH related to heparin use.
- Serious extracranial hemorrhage should be treated in a similar manner. In addition, compressible sites of bleeding should be manually compressed.
- Patient should be referred to a neurosurgeon or vascular surgeon as needed for intracranial or extracranial bleeding respectively as needed.

5.2 *Restarting Vitamin K antagonists (VKA)*

- Patients with a very high risk of thromboembolism (those with mechanical prosthetic heart valves), vitamin K antagonist therapy may be restarted at 7 to 10 days after onset of the index intracranial hemorrhage. Those with lower risk may be restarted on antiplatelet therapy.

5.3 *Indications for surgery for ICH*

- Patients with cerebellar hemorrhage (>3 cm in diameter) who are deteriorating neurologically or who have signs of brain stem dysfunction should have suboccipital craniectomy and surgical evacuation of hematoma.
- Patients with supratentorial ICH causing midline shift and/or herniation with impairment of consciousness or deteriorating neurologically should have surgical evacuation of hematoma within 72 hours of onset of symptoms, unless they were dependent on others for activities of daily living prior to the event or their GCS is <6 (unless this is because of hydrocephalus).
- Patients with hydrocephalus who are symptomatic from ventricular obstruction should undergo CSF drainage procedure.

6.Immediate specific management of cerebral venous thrombosis

- Patients suspected to have stroke due to cerebral venous thrombosis should be first investigated by CT scan alone. If diagnosis remains unclear, then MRI/MR or CT venogram (MRV/CTV) should be done.
- Patients diagnosed with stroke due to cerebral venous thrombosis (with or without hemorrhagic infarct or secondary cerebral hemorrhage) should be given full-dose anticoagulation (initially heparin and then oral anticoagulants: warfarin or acenocoumarol for at least six months(longer therapy may be required for patients with diagnosedprothromboticstate) unless there are contraindications. Target INR should be between 2 to 3.

General Management

Management of general conditions, any co-morbidity and routine work up should be done by a general physician on a daily basis.

1. Physiological Homeostasis (Oxygen, Temperature, Blood Pressure, Blood Glucose)

1.1 Supplemental Oxygen therapy:

- Patients should receive supplemental oxygen if their oxygen saturation drops below 95%.

1.2 Management of Body Temperature:

- Body temperature should be measured:
 - (i) 4-hourly in ICU or if patient is non-ambulatory
 - (ii) twice a day as long as patient is hospitalised
 - (iii)as and when patient reports / is reported to have fever
- Fever (>99.5⁰F) should be treated with paracetamol. The search for possible infection (site and cause) should be made.
- Temperature<95°F can lead to coagulopathies, electrolyte imbalance, infection and cardiac arrhythmias and therefore should be managed using measures such as:
 - Remove wet clothing
 - Cover the person with blankets
 - Provide warm drinks
 - Use warm, dry compresses (Don't apply direct heat.)
 - Medical treatment depending on severity of cases: passive rewarming, blood rewarming, warm intravenous fluids, airway rewarming etc.

1.3 Management of Blood Pressure:

1.3.1 Ischemic stroke

- In acute ischemic stroke, parenteral antihypertensive medication should be recommended only if there is a hypertensive emergency with one or more of the following serious concomitant medical issues:
 - hypertensive encephalopathy
 - ⊖ Malignant Hypertension
 - hypertensive cardiac failure/myocardial infarction
 - aortic dissection
 - pre-eclampsia/eclampsia
- Antihypertensive medication should be withheld in ischemic stroke patients unless systolic blood pressure/diastolic blood pressure (SBP/DBP) >220/120 mmHg or the mean arterial blood pressure (MAP) is >120 mmHg. Lowering by 15% during the first 24 hours is recommended.
- Except in hypertensive emergency, lowering of blood pressure should be slow and with use of oral medications.
- Sublingual use of antihypertensive is not recommended.
- Blood pressure reduction to 185/110 mmHg or lower should be considered in people who are candidates for thrombolysis.
- For management of hypertension, please see Annexure VIII and hypotension – Annexure IX.

1.3.2 Pre-Thrombolysis

- If BP is >185/110 mm of Hg, Inj. labetalol 10-20mg I.V. should be given over 1-2min and may be repeated every 10 min to a maximum dose of 300mg or labetalol infusion can be started at 1-8mg/min.
- If labetalol is not available, nitroglycerin infusion at 5µg/min or nicardipine infusion at 5mg/hour is an alternative to labetalol. Nitroglycerin dose may be increased by 5 µg/min every 3–5 minutes to a maximum rate of 200 µg/min. Nicardipine can be increased by 2.5mg/hour every 5min up to a maximum dose of 30 mg/hour.
- Aim is to continue treatment till target BP <185/110 mm Hg is achieved.

1.3.3 During/After Thrombolysis

- BP should be monitored every 15 min for 2 hours, then every 30min for next 6 hours and finally every hour for next 16 hours.
- BP goal is $\leq 180/105$ mmHg.

1.3.4 Intracerebral Hemorrhage (ICH)

- If systolic blood pressure is >200 mmHg or MAP is >150 mmHg (recorded twice, two or more minutes apart), then blood pressure should be aggressively treated with parenteral antihypertensive (e.g. labetalol, nitroglycerin or nicardipine or sodium nitroprusside).
- If systolic blood pressure is >180 mmHg or MAP is >130 mmHg (up to 150 mm Hg), use of rapidly acting oral or parenteral medication or nitroglycerin patch is advised.
- Target SBP should be 140mmHg – 150mmHg for at least 7 days (see secondary prevention guidelines for subsequent days).

1.4 Management of Blood Glucose:

- Oral hypoglycemic agents (OHAs) should be discontinued and basal bolus or sliding scale insulin should be started.
- The blood glucose level should be maintained between (140-180 mg/dL). Elevated blood glucose >150 mg/dL should be managed with insulin administration using the sliding scale in the first week of stroke onset.
- Blood glucose should be monitored in case of hypoglycaemia and accordingly 20% glucose (50 ml bolus) should be administered.

1.5 Management of renal function

As the renal clearance of most of the medicines is important, specially when the patient is on thrombolytics, management and monitoring of renal function is important for optimum levels of medicine in blood. Renal clearance is delayed when KFTs are abnormal, it may result in general hemorrhage.

1.6 Cerebral edema and Increased Intracranial Pressure (ICP)

- Until more data are available, Corticosteroids are not recommended for the management of cerebral edema and increased intracranial pressure following stroke.
- In patients whose condition is deteriorating secondary to increased ICP, including those with herniation syndromes, various options include: hyperventilation, mannitol, furosemide, CSF drainage and surgery. If CT scan (first or repeat one after deterioration)

suggests hydrocephalus as the cause of increased ICP, then CSF diversion procedure can be used.

- Initial care includes mild restriction of fluids, elevation of head end of the bed by 30 degrees and correction of factors that might exacerbate increased ICP (e.g. hypoxia, hypercarbia and hyperthermia).
- Hyperventilation acts immediately (reduction of the pCO₂ by 5 to 10 mmHg lowers ICP by 25% to 30%) and may be used as a temporary measure to lower ICP but should be followed by another intervention to control brain edema and ICP. Hyperventilation can cause vasoconstriction that might aggravate ischemia.
- An intravenous bolus of 40 mg furosemide may be used in patients whose condition is rapidly deteriorating. If required, furosemide 20 mg (once daily) may be continued for the first week. 3% hypertonic saline or acetazolamide 250 mg (BD) may be added in those not responding to other treatment methods.
- Strict intake-output chart must be maintained to avoid dehydration.
- In those with altered consciousness, mannitol (0.5 gm/kg intravenously given over 20 minutes) can be given every 6 to 8 hours. If clinically indicated, dose frequency may be increased to every 4 hours only if the central venous monitoring is possible. Central venous pressure should be kept between 5 and 12 mm Hg to prevent hypovolemia. This may be continued for three to five days.

2. General Early Supportive Care

2.1 Position

- Patients should be advised to undertake activities like sitting, standing or walking only with caution. An occasional patient, who deteriorates neurologically on assuming sitting or standing posture, should be advised bed rest for at least 24 hours and then gradual assumption of upright position.
- Non-ambulatory patients should be positioned to minimize the risk of complications such as contractures, respiratory complications, and shoulder pain. Unconscious patients should be placed in recovery position. Change of position every two hours during the day (and also during the night for unconscious patients but for conscious patients every four hours during the night) is recommended to avoid pressure sores.
- Non-ambulatory patients should preferably be nursed on air-mattresses.

2.2 Swallowing

- All conscious patients should have assessment of the ability to swallow. A water swallow test performed at the bedside is sufficient (e.g. 50 ml water swallow test)
- Testing the gag reflex is invalid as a test of swallowing.
- Patients with normal swallow should be assessed for the most suitable posture and equipment to facilitate feeding. Any patient with abnormal swallow should be fed using a nasogastric tube.
- Patients who require nasogastric tube feeding for more than three weeks may be referred for gastrostomy.
- Patients with altered sensorium should be given only intravenous fluids (Dextrose saline or normal saline) for at least 2-3 days, followed by nasogastric tube feeding.

2.3 Oral care

- All stroke patients should have an oral / dental assessment including dentures, signs of dental disease etc. upon or soon after admission.
- For patients wearing a full or partial denture, it should be determined if they have the neuromotor skills to safely wear and use the appliance(s). If not, the denture should be removed.
- The oral care protocol should address areas including frequency of oral care (twice per day or more), types of oral care products (toothpaste and mouthwash) and specific management for patients with dysphagia.
- If concerns are identified with oral health and/or appliances, patients should be referred to a dentist for consultation and management as soon as possible.

2.4 Early mobilization

- All patients should be referred to a physiotherapist/rehabilitation as soon as possible, preferably within 24 to 48 hours of admission.
- Passive full-range-of-motion exercises for paralyzed limbs can be started during the first 24 hours.
- The patient's need in relation to moving and handling should be assessed within 48 hours of admission.

2.5 Nutrition

- Physician/nurse/dietician should do nutrition assessment at bedside and nutritional support should be considered in any malnourished patient.

2.6 Management of Seizures

- Patients with seizure, even single should be treated with loading and maintenance dose of a suitable anticonvulsant. Status epilepticus should be treated as per its guidelines. At present there is insufficient data to comment on the prophylactic administration of anticonvulsants to patients with recent stroke.

2.7 Deep venous thrombosis (DVT)

2.7.1 Prophylaxis against DVT:

- Patients with paralyzed legs (due to ischemic stroke) should be given standard Heparin (5000 units subcutaneous twice daily) or low-molecular weight heparin (with appropriate prophylactic doses as per agent once a day) to prevent DVT.
- In patients with paralyzed legs (due to ICH), DVT pump, routine physiotherapy and early mobilization should be carried out to prevent leg vein thrombosis.
- Early mobilization and optimal hydration should be maintained for all acute stroke patients.
- CLOTS (Clots in Legs Or Socks after Stroke) trial data does not support the routine use of thigh length graduated compression stockings for prevention of deep vein thrombosis.

2.7.2 Treatment of DVT

- Standard heparin (5000 U IV) or low molecular weight heparin (with appropriate therapeutic doses as per agent) should be started initially. When standard heparin is used, a prior baseline complete blood count and aPTT (activated partial thromboplastin time) should be done and a bolus (80 U/kg/h) and maintenance infusion (18 U/kg/h) should be given (target aPTT of 1.5 times the control value). For using low molecular weight heparin, aPTT monitoring is not required.
- Anticoagulation (warfarin 5 mg once daily or acenocoumarol 2 mg) should be started simultaneously unless contraindicated and the dose should be adjusted subsequently to achieve a target INR of 2.5 (range 2.0-3.0), when heparin should be stopped. (Annexure X) The relation with diet and such drugs are given in Annexure XI.
- Baseline INR must be done before starting anti-coagulation with warfarin or acenocoumarol.

2.8 Bladder Care

- An indwelling catheter should be avoided as far as possible and if used, indwelling catheters should be assessed daily and removed as soon as possible.
- Intermittent catheterization should be used for urinary retention or incontinence.

2.9 Bowel care

- Patient with bowel incontinence should be assessed for other causes of incontinence including impacted faeces with spurious diarrhea. Appropriate management with diapers may be considered.
- Patients with severe constipation should have a drug review to minimize use of constipating drugs, be given advice on diet, fluid intake and exercise (as much as possible), be offered oral laxatives and be offered rectal laxatives only if severe problems remain.

2.10 Infections

- Development of fever after stroke should prompt a search for pneumonia, urinary tract infection or deep venous thrombosis.
- Prophylactic administration of antibiotics is not recommended.
- Appropriate antibiotic therapy as per national guidelines on antibiotic use should be administered early (after taking relevant culture specimens).

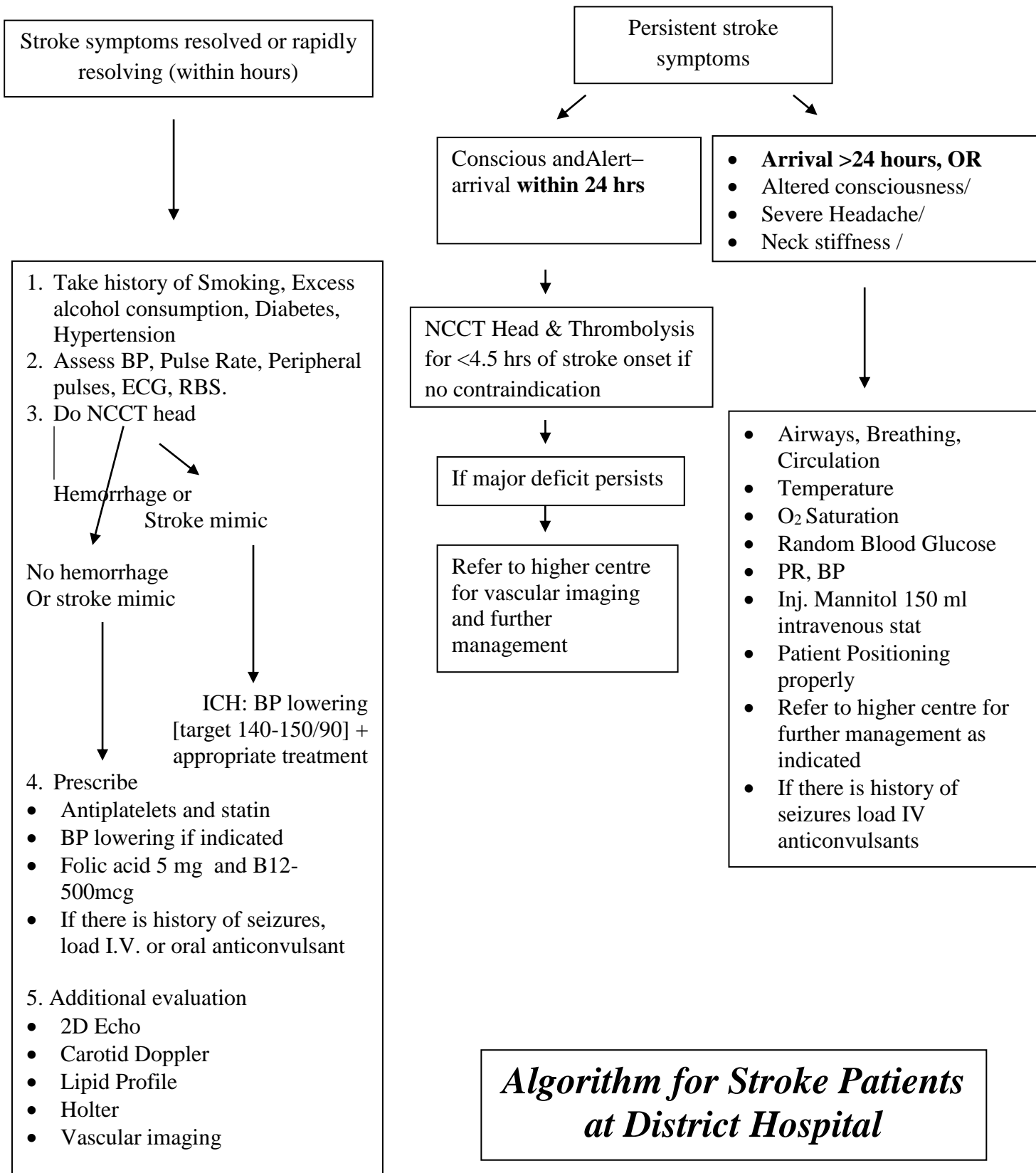
2.11 Eye care

- Eye complications in patients with stroke are common especially in patients who are unconscious or sedated. Eye complications can range from mild conjunctival infection to serious corneal injury. Permanent ocular damage may result from ulceration, perforation, vascularization, and scarring of the cornea. Eye care should be part of the care provided to all people upon admission to stroke unit. To prevent dry eye, polyethylene film, methylcellulose drops, or methylcellulose ointment may be used. Polyethylene film covers are more effective at reducing the incidence of corneal abrasions than are ointments and drops.

III. Discharge planning

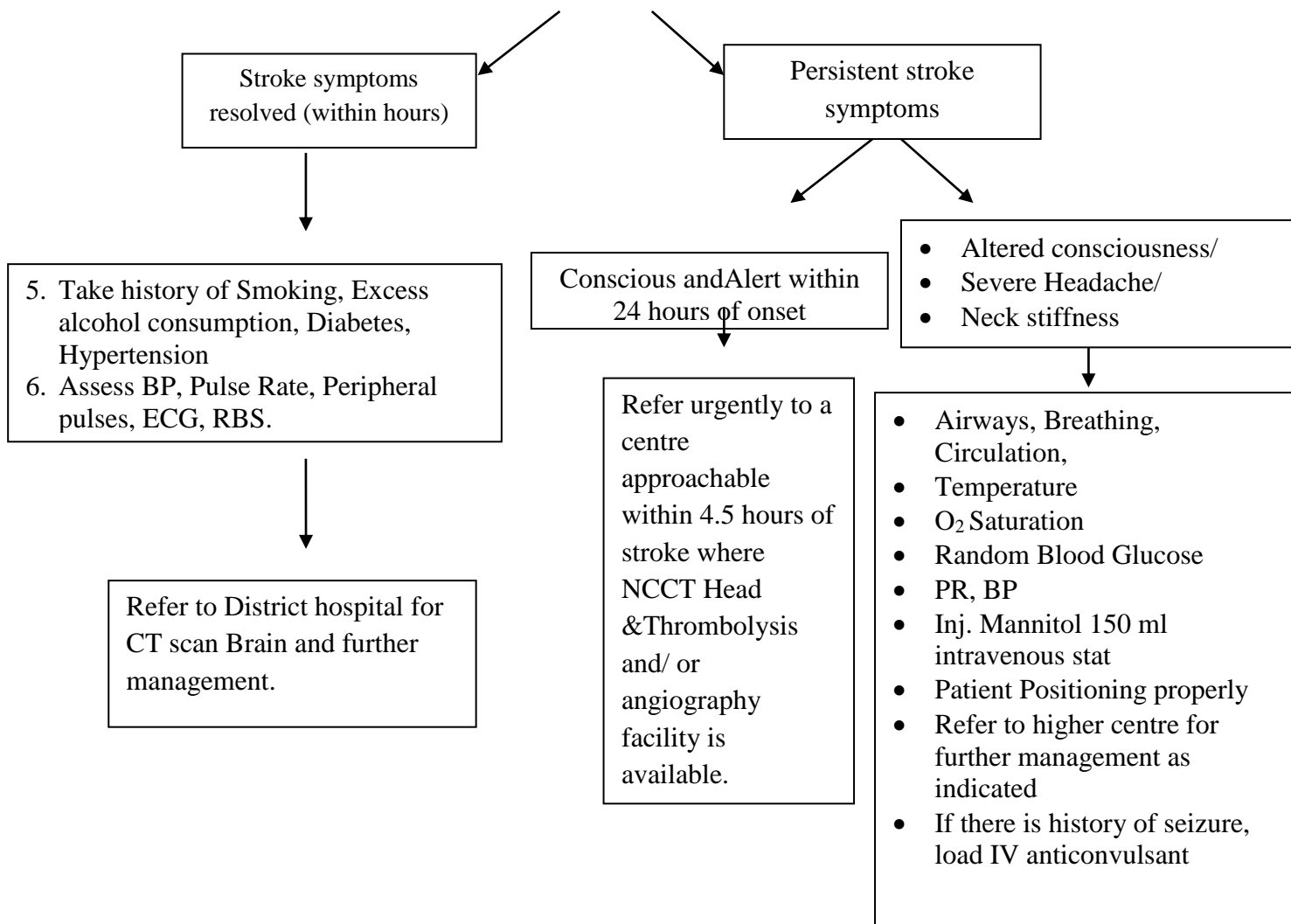
- Discharge planning should be initiated as soon as a patient is stable
 - Patients and families should be prepared and fully involved
 - Care givers should receive all necessary training in caring for it including physiotherapy.
 - Patients should be given information about all issues including secondary prevention and explained the need for and timing of follow up after discharge.

Stroke (CVE) Patients



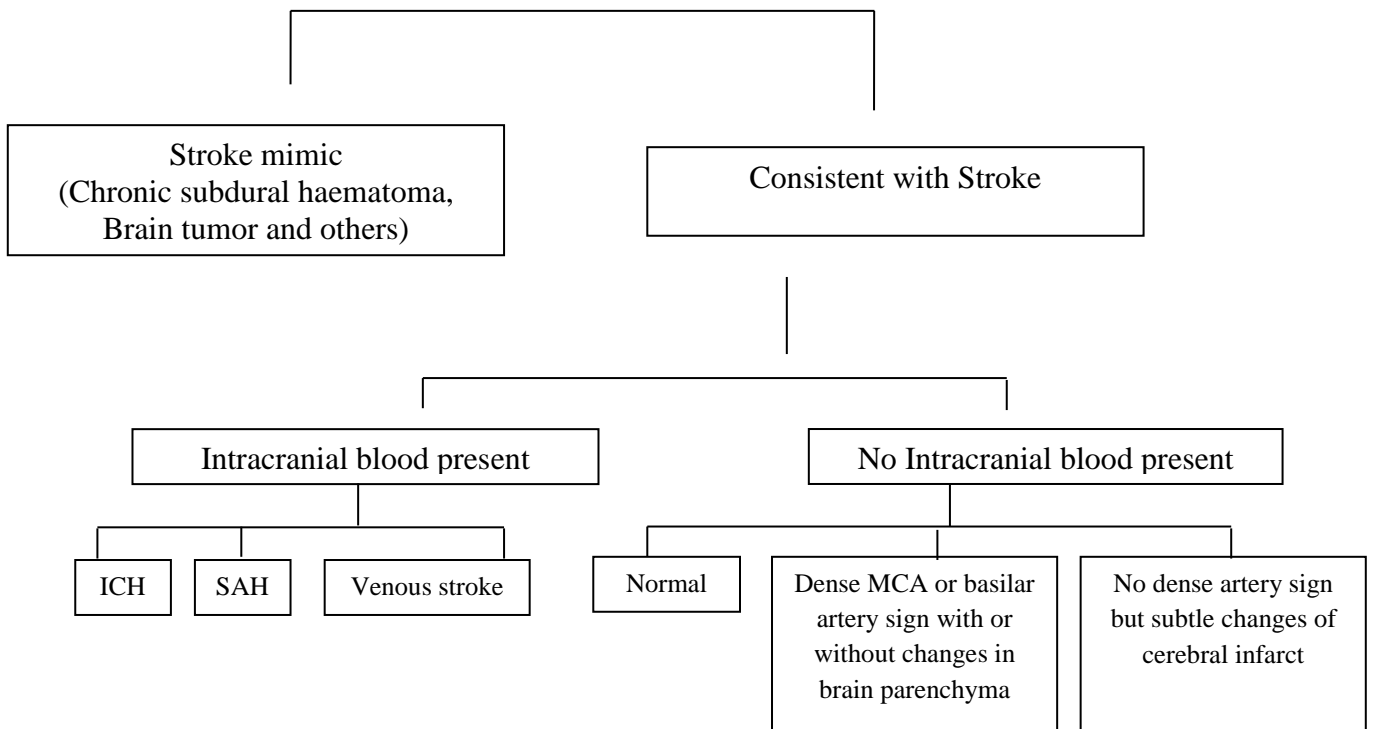
Algorithm for Stroke Patients at District Hospital

Stroke (CVE) Patients



Algorithm for Stroke Patients at Primary Health Centre

NCCT Head done



Notes

- ASHA should refer suspected cases of stroke to nearest stroke ready hospital directly within 3 hours of onset of symptoms
- Stroke ready hospital is a facility equipped with CT Scan, thrombolytics (alteplase/ tenecteplase) and trained doctor/ nurse round the clock
- Blood glucose, if readily available, should be checked before referral
- Physiotherapist may be called in from District NCD clinics

6. Secondary prevention

1. Introduction

This includes measures to reduce the risk of recurrence of stroke in patients who have had TIA or stroke. These guidelines apply to vast majority of patients with TIA or stroke, although some of the recommendations may not be appropriate for those with unusual causes of stroke, like trauma, infections, etc.

2. Risk stratification

All stroke and TIA patients must undergo a risk assessment for recurrent stroke and categorized accordingly by a physician trained in stroke care to initiate appropriate investigations and management strategies.

However, secondary prevention should be addressed at all appropriate healthcare encounters on an ongoing basis following a stroke or transient ischemic attack.

3. Evaluation for modifiable risk factors

Every patient should be evaluated promptly for modifiable risk factors but certainly within one week of onset. This includes:

- Hypertension
- Diabetes
- Dyslipidemia
- Lifestyle risk factor - diet, daily sodium intake, exercise, weight, smoking and alcohol
- Carotid artery stenosis (for those with non-disabling stroke)
- Atrial fibrillation or other arrhythmias
- Structural cardiac disease
- Obstructive sleep apnea (OSA)

4. Basic investigations

- Basic investigations include:CT brain preferably with CTA or brain MRI with MRA, carotid ultrasound, ECG, Echocardiography,complete blood count, serum electrolytes, creatinine, fasting lipid profile, fasting glucose level, HbA1C, coagulation profile, liver function test.
- In selected patients, when basic investigations are inconclusive, Holter monitoring for 24-48 hours should be done, especially in suspected arrhythmia cases.

- In patients below 45 years of age without apparent cause, additional tests like serum VDRL, HIV and anti-phospholipid antibodies, protein C, S and anti-thrombin III, antinuclear antibodies, anti-cardio lipid antibodies should be done.
- For those investigations not available in district hospitals, patient may be referred to higher centres.

5. Interventions

5.1 Antiplatelet therapy

- All patients with ischemic stroke or TIA should receive antiplatelet therapy or anticoagulation as per indication.
- All patients with diagnosis of TIA should be started on aspirin 150mg daily and clopidogrel (300 mg loading dose and 75mg daily dose) for first three weeks followed by either aspirin 75mg daily or clopidogrel 75 mg daily and should be assessed as early as possible by a specialist physician
- In children, the maintenance dose of aspirin is 3 to 5 mg/kg per day.
- Combined aspirin-extended release dipyridamole as well as clopidogrel are marginally more effective than aspirin in preventing vascular events.
- The combination of aspirin (75 mg per day) and clopidogrel(300 mg loading dose followed by 75 mg per day) should be given for first three weeks in patients with TIA and minor stroke but not beyond three weeks because it increases the risk of hemorrhage and is not recommended unless there is indication for this therapy (i.e. coronary stent or acute coronary syndromes).
- Addition of proton pump inhibitor/ H2 receptor blocker should not be routine and should only be considered when there is dyspepsia or other significant risk of gastro-intestinal bleeding with Aspirin.

5.2 Anticoagulation

- Anticoagulation should be started in every patient with atrial fibrillation (valvular or non-valvular) unless contraindicated, if they are likely to be compliant with the required monitoring (for VKA) and are not at high risk for bleeding.
- If there are constraints to the use of oral anticoagulation, then aspirin should be used. (Table-1).
- With nonvalvular AF, paroxysmal or permanent, VKA (warfarin or acenocoumarol) and newer oral anticoagulants [NOAC (apixaban, rivaroxaban or dabigatran)]are all equally

effective and are to be given on individual basis, and should be initiated within 14 days of event.

- Combination of antiplatelet and anticoagulation is not recommended, except in cases of acute coronary syndrome or stent placement.
- Anticoagulation should be considered for all patients who have ischemic stroke associated with mitral valve disease, prosthetic heart valves, or within 3 months of myocardial infarction.
- For patients with rheumatic valvularheart disease developing stroke / TIA while on VKA, an anti-platelet drug can be added.
- For patients with mechanical aortic/mitral valve with history of ischemic stroke/TIA prior to its insertion, VKA therapy with target INR of 2.5 and 3.0 respectively, is recommended. Addition of aspirin along with VKA is recommended in those patients who are at low risk of bleeding.
- Anticoagulation should not be started until brain imaging has excluded haemorrhage, and 7 to14 days have passed from the onset of a disabling ischemic stroke (except when a demonstrable intracardiac thrombus is present).
- Anticoagulation should not be used for patients in sinus rhythm (excluding intermittent atrial fibrillation) unless cardiac embolism is suspected.
- For effective anticoagulation target, INR is 2.5 (range 2.0 to 3.0) except for mechanical cardiac valves (3.0: range 2.5 o 3.5).

5.3 Blood Pressure Lowering

- Blood pressure lowering treatment is recommended for all patients with history of TIA or stroke. The benefit extends to persons with or without a history of hypertension.
- After acute period is over, an optimal target for stroke patients is 130/80 mmHg, but for patients known to have bilateral severe (>70%) internal carotid artery stenosis, systolic BP of 150 mmHg may be appropriate.
- Optimal drug should be used for blood pressure management considering co-morbidity.

5.4Carotid Intervention

- Patients with TIA or non-disabling stroke and ipsilateral 70-99% internal carotid artery stenosis (measured by two concordant non-invasive imaging modalities or on a catheter angiogram) should be offered carotidintervention (see below) within two weeks of the incident event unless contraindicated.

- Carotid intervention is recommended for selected patients with moderate (50-69%) stenosis in symptomatic patients.
- Carotid ultrasound / angiogram should be performed on all patients who would be considered for carotid intervention.
- Carotid endarterectomy or carotid angioplasty should be performed by a surgeon or interventionist with a known perioperative morbidity and mortality of <6%.
- Carotid intervention is not recommended for patients with mild (<50%) stenosis.
- For older (>70 years) patients, CEA is a preferred option while younger patients CAS and CEA are found to be equivalent.
- Carotid bypass surgeries are to be considered as only investigational and only for patients with recurrent or progressive ischemic symptoms ipsilateral to a stenosis or occlusion of a distal (surgically inaccessible) carotid artery, or occlusion of a midcervical carotid artery after institution of optimal medical therapy. All those with carotid stenosis should receive all other secondary prevention measures, whether or not they receive carotid intervention.

5.5 Intracranial Atherosclerotic Disease

- For patients with severe stenosis (70-99%) of a major intracranial artery, dual antiplatelet therapy in the form of clopidogrel 75mg/day in addition to aspirin is recommended for 90 days followed by single antiplatelet (Aspirin or Clopidogrel).
- For patients with moderate stenosis (50-69%) of a major intracranial artery, there is no specific recommendation for use of dual antiplatelets. However, high intensity statin and maintenance of systolic BP around 140 mm of Hg is recommended.
- Intervention in form of stenting or angioplasty is not recommended in intracranial atherosclerotic disease.

5.6 Blood Sugar Control

- After a TIA or ischemic stroke, all patients should be screened for diabetes with testing of fasting plasma glucose, HbA1C, or an oral glucose tolerance test
- Choice and timing guided by clinical judgment and recognition that acute illness may temporarily perturb measures of plasma glucose.
- HbA1C is more accurate than other screening tests in the immediate post event period.

5.7 Myocardial Infarction

- VKA is recommended with target INR of 2-3 for three months in acute anterior STEMI with apical akinesis or dyskinesis but with no mural thrombus.

- In case of presence of LA/LV mural thrombus, VKA therapy is recommended for 3 months. Patients should also be under care of a cardiologist.
- In case of presence of mural thrombus or EF <40%, and those intolerant to VKA; LMWH, dabigatran, apixaban or rivoraxabanshouldbe used as alternatives for 3 months.

5.8 Lipid lowering therapy

- All patients with history of TIA or ischemic stroke should be treated with a statin if they have a total cholesterol of > 200 mg%, or LDL cholesterol > 100 mg%.
- Treatment with high dose statin therapy should be avoided or if used, should be with caution in patients with history of haemorrhagic stroke.

5.9 Lifestyle measures:

- All patients who smoke should be advised to stop smoking and to avoid environmental smoke.
- All patients who can do regular exercise should be advised to do so for at least 30 minutes each day. They should be advised to start with low intensity exercise and gradually increase to moderate levels (sufficient to become slightly breathless).
- All patients should be advised yoga,use of low fat dairy products and products based on vegetables, fruits and whole grains and plant oils, and reduce intake of sweets and red meat.
- Patients' body mass index or waist circumference should be measured, and those who are overweight or obese should be offered advice and support to lose weight.
- All patients, but especially those with hypertension, should be advised to reduce their salt intake by not adding extra (table) salt to food, using as little as possible in cooking, and avoiding preserved foods, pickles etc. and choosing low salt foods.
- All patients should be screened for diabetes and treated to achieve target HbA1C<6.5%.
- All patients should be screened for OSA/sleep apnoeaand refer to higher centre for treatment.

5.10Hyperhomocysteinemia

- Supplementation with folate, vitamin B6 and vitamin B12 has shown to reduce homocysteine levels, but there is no high quality evidence demonstrating prevention ofstroke. However, in populations where food is not fortified with folic acid, B vitamins may have a protective role on ischemic stroke.

6. Hemorrhagic strokes

- Mainstay of secondary prevention of intra cerebral hemorrhage (ICH) is control of hypertension. Those who had ICH, whether hypertensive or amyloid angiopathy or subarachnoid hemorrhage, the blood pressure should be controlled to the target level of 130-135/80-85 mmHg.

Table 1: Antithrombotic treatment for patients in atrial fibrillation

Stratification of risk based on level of accompanying risk factors	Stroke risk (% per year)	Recommended therapy
Any high risk factor* or more than 1 moderate risk factor	6 – 12	warfarin/ acenocoumarol, INR 2.0 – 3.0
One moderate risk factor [#]	2 – 5	warfarin/ acenocoumarol, INR 2.0 – 3.0; or Aspirin 75 – 300 mg/day
No risk factors	≤1	aspirin 75 – 300 mg/day

* High risk factors are previous stroke or TIA, hypertension on treatment, reduced left ventricular function, age > 75 years, mitral stenosis, prosthetic heart valve.

Moderate risk factors are age 65 – 75 years, diabetes, coronary heart disease.

INR: International Normalised Ratio.

Appendix 1:

Drugs that can be used in NVAF:

- Warfarin and acenocoumarol: target INR of 2-3 (Up to 2.5 to 3.5 for bio prosthetic valves). Reduced dose in elderly. Contraindicated in significant renal or hepatic impairment; Increased effect with antiarrhythmics (e.g. amiodarone, quinidine).
- Warfarin: 5 mg tablets; Bridging heparin therapy necessary while building up dose to therapeutic range to reverse temporary hypercoagulable state while initiating. Contraindicated in first trimester of pregnancy. Broad spectrum Antibiotics may enhance its effect. Inhibitors and inducers of VKORC1 and CYP2C9 enzymes and protein binding levels can alter anticoagulant effects. Polymorphisms of these genes can modify dose responses up to 30% and 10% respectively for warfarin and in case of VKORC1 reduce time to significant rise INR but augmentation/inhibition determined also by type of polymorphism in an individual.
- Acenocoumarol 1, 2, 3 or 4 mg tablets; Initially: 2-4 mg daily for 2 days. Alternatively, 6 mg on the 1st day as loading dose, followed by 4 mg on the 2nd day. Subsequent dose adjusted according to response. Maintenance: 1-8 mg daily. Administer at the same time each day. Enhanced effect with inhibitors of drug metabolizing enzymes CYP2C9, CYP2C19, and CYP3A4 isoenzymes and reduced effect with enzyme inducers.
- Dabigatran 110 mg twice a day. GI bleeding is bigger concern than with warfarin
- Rivoroxaban 15mg/day
- Apixaban 5mg twice a day (2.5 mg BD, if age >80 years weight <40 kg or creatinine>1.7 mg/day)

7. Rehabilitation of stroke patients

Rehabilitation of stroke patients is a multidisciplinary team approach including physician, physiotherapist, occupational therapist, nurse, speech and language therapist, clinical psychologist, orthotist, dietician and social worker.

PHYSIOTHERAPEUTIC MANAGEMENT OF STROKE PATIENTS

Aim: Physiotherapeutic management after stroke aims at improving motor control, upper extremity functions, gait and activities of daily living, facilitating self care and societal participation.

GENERAL RECOMMENDATIONS

1. All stroke patients must be attended and assessed by a physiotherapist within first 48 hours of admission. The assessment needs to be reviewed biweekly till the time of discharge, weekly in first month, monthly till first 6 months and followed by biannually in subsequent years till patient achieves maximal functional recovery.
2. Patient and caregivers should be involved throughout the process of recovery in deciding the goals and choice of treatment.
3. Functional use of affected side should be encouraged as much as possible at all stages of recovery.
4. Patients along with the caregivers should be educated and motivated to ensure the practice of the skills acquired during therapy sessions at home as well.
5. Aggressive stretching should be avoided around vulnerable joints (shoulder, knee, wrist and hand) and flaccid muscles.
6. Duration and frequency of therapy session should be planned when patient is most alert to avoid fatigue and ensure maximal participation.
7. All stroke patients should get a minimum of 45 minutes of supervised physiotherapy 5 days per week till the patient achieves preset goals as per the assessment.
8. Therapist : Patient ratio :: 1:6

Note: Physiotherapeutic management has been divided into following three levels.

Level 1: All recommendations (except specified for Level 2 or 3) can be implemented at most of the set-ups including District hospital.

Equipments and aid required:

3 to 4 pillows, two sand bags, shoulder sling (may be home made with chunni/dupatta), simple mirror, static ankle foot orthosis.

Level 2: These recommendations require few equipments and expertise that are desirable. These equipments are low cost and can be easily procured.

Equipments and aid required:

Postural mirror, Functional electrical stimulator, Neuromuscular electrical stimulator, dynamic ankle foot orthosis, static cycle, treadmill, intermittent pneumatic compression unit.

Level 3: These recommendations are meant for advanced stroke rehabilitation centres.

Equipments and aid required:

Surface EMG biofeedback, Body weight support treadmill trainer, arm ergometry, robotics, mental imagery, visual scanning training, force platform, balance and gait analysis system.

EARLY PHASE (0-48 HOURS)

Aim: In early phase, physiotherapeutic management aims at assessment of deficits, prevention and management of respiratory, musculoskeletal, venous and skin complications.

Recommendations:

1. All stroke patients including those on mechanical ventilatory support should be assessed for atelectasis, pulmonary aspiration and or consolidation by auscultation and chest X-rays.
2. Patients with atelectasis should be positioned with affected lung area uppermost for 2 hours alternated with other position till the atelectasis is resolved. Manual hyperinflation using resuscitating bags (in unconscious patients) and deep breathing exercises (who can follow verbal commands) should be included to resolve atelectasis.
3. Patients with retention of secretions or consolidation should be managed with airways clearances techniques like active cycle of breathing technique, huffing, coughing (if

cough reflex is good) or percussion, vibration and assisted coughing (if cough reflex is impaired). Head down postural drainage positions should be avoided.

4. Baseline activities of daily living capability should be assessed with standardized tools like Modified Barthel's Index (Annexure XIII).
5. Positioning (in bed): Therapeutic positioning with pillows and bolsters are recommended to maintain normal joint alignment. The flaccid upper extremity should be positioned with scapula in protraction and elevation, shoulder in external rotation and abduction, elbow in extension, forearm in supination, wrist and hand in functional position. Pelvic girdle should be kept in protraction, hip and knee in flexion and neutral rotation, ankle and foot in planti-grade position (Figure 1-5). Patient shown is left hemiplegic and marked with dark shadow. These recommended joint positions should be kept for at least 6 hours in a day alternately with other position. Static ankle foot orthosis should be applied on paretic foot.
6. To prevent shoulder pain following measures should be taken:
 - (a) Hanging of paretic shoulder should be avoided. An elbow support like lap-tray while sitting and a sling in standing/ walking may be used for the same. Wrist hand orthosis should not be a routine practice as it doesn't help in pain or functional recovery of hand.
 - (b) Patient and relatives should be taught to support the paretic shoulder during transfers.
 - (c) Shoulder full range of motion exercise should be done at least twice daily.
 - (d) Overhead pulley exercises are NOT recommended.
7. Early mobility (Mobility between 24-48 hours of stroke) has been associated with improved functional outcomes. To mobilize stroke patients following actions should be taken considering contraindications and termination criteria (Annexure XIV):
 - a. Active and passive range of motion (ROM) exercise should be initiated within 24 hours of onset of stroke.
 - b. ROM exercises should be limited to point of resistance in unconscious patients and range of comfort in conscious patients.
 - c. Bedside sitting and standing can be initiated within first 48 hours of stroke.
 - d. In patients who have undergone angiography through femoral artery, range of motion exercise for hip joint should be deferred for 6 hours post angiography. Monitoring of any bleeding and discomfort should be noted for at least 2 days post angiography.

- e. Functional retraining (i.e. participation in bedside mobility, transfers, and activities of daily living) and active participation in self care should be initiated as soon as patient is able to participate.
 - f. In hemorrhagic stroke, mobilization should be delayed till volume of blood gets stabilized for atleast 24 hours.
 - g. Patients with extra ventricular drain (EVD) can be mobilized provided EVD is clamped and secured and intracranial pressure is kept below 20 mm Hg.
 - h. Vital parameters (Heart rate, Blood pressure, Respiratory rate, Temperature), Intracranial pressure if available should be monitored prior to start early mobility, during the session and post interventions.
- Level 2: Patients who are unable to stand due to poor sensorium or flaccidity, tilt table may be used to make them stand.

SUB ACUTE PHASE (TILL THE TIME OF DISCHARGE)

Aim: Therapeutic interventions aim at assessment and management of deficits and preparing the plans for discharge from hospital.

Recommendations:

1. Assessment
 - a. Patients who continue on mechanical ventilatory support or oxygen support, they should be assessed for respiratory status in terms of respiratory rate, pattern, use of accessory muscles, arterial blood gases (if available), evidence of secretion retention and atelectasis.
 - b. Baseline functional performance of patients should be assessed using Fugl Meyer assessment system.
2. Lung expansion exercises (deep breathing exercise) should be administered in case of reduced lung expansion globally or regionally as evident on auscultation or radiological evidence of atelectasis.
3. Patients who have evidence of retention of secretions on auscultation and/or chest X-rays and are able to expectorate should be managed with airway clearance techniques like active cycle of breathing technique, and forced expiratory techniques.
4. Patients who have evidence of retention of secretions on auscultation and/or chest X-rays and are unable to expectorate should be managed with airway clearance techniques like percussion, vibrations, postural drainage positions and suctioning.

5. Coma arousal techniques like multi-sensory modality stimulation (stimulation of all five sensations, vision, hearing, taste, smell and touch) may be administered in comatose patients. Only one type of stimulation should be given in one session.
Level 2: Median nerve stimulation of right hand may be given for 30-45 minutes as coma arousal technique.
6. Hypotonicity (Lack of initiation of voluntary action) should be addressed by neuromuscular electrical stimulation (Distal muscles of extremities like extensors of wrist and fingers and anterior tibial muscles), functional training/ task oriented practice, neuro-developmental facilitatory techniques and by promoting weight bearing on affected limb.
7. Hypertonicity (Grade >1 on Modified Ashworth Scale) (Annexure XV) should be managed by optimal positioning (affected muscles in lengthened position), active and passive range of motion exercises, stretching, strengthening of antagonists, functional electrical stimulation and splints.
8. Facial exercises (every 4-6 hourly) should be practiced by patients with facial muscle weakness.
Level 2: Facial exercises with biofeedback¹ by using mirror
Level 3: Facial exercises with biofeedback by using surface EMG.
9. Weight bearing and weight transfer training should be initiated in all active patients.
10. Sitting balance training should be incorporated in case of impaired sitting balance. In case of difficulty in standing from sitting, practice of sit to stand training should be initiated. Standing balance training should be provided if impaired.
11. Walking aids (stick, tripod, quadripod, walker) should be used for safety and to manage balance and gait impairments. Wheelchairs should be used for non-ambulatory patients.
Level 2: Dynamic ankle foot orthosis should be used in case of ankle instability and weakness of dorsiflexors.
12. Strength training should be initiated for weak muscles. 3 sets of 10 repetitions of strength training should be exercised 5 times per week for each weak muscle group.
13. Upper limb training by constraint induced movement therapy should be incorporated for patients who have at least 20 degrees of active wrist and 10 degrees of fingers extension (A minimum of 2 hours of active therapy per day and restrain for at least 6 hours per day).

14. Gait training should be administered to avoid development of abnormal gait pattern. It can be done by providing verbal commands and visual cues to encourage normal walking and by optimizing agonist-antagonist muscle control on joints. Both the duration and frequency of ambulation should be progressed gradually.

Level 2: Gait training with biofeedback by using postural mirror

Level 3: Gait training with biofeedback by using surface EMG.

15. Discharge summary should include specific instructions for

- a. home exercise program,
- b. instructions about safety measures,
- c. possible complications and their prevention strategies,
- d. patients' special needs (artificial airway care, pressure sores, and altered sensorium),
- e. home modification,
- f. use of orthotics and adaptive devices if any.

FROM THE TIME OF DISCHARGE TO 6 MONTHS POST STROKE

Aim: Physiotherapy management aims at prevention and reduction of activity limitations, restriction of participation and thereby improving quality of life.

Recommendations:

- 1) Bedside physiotherapy should be continued on outdoor basis or home care setting.
- 2) Balance training, gait training, regaining motor control and functional re-education should be continued.
- 3) For sitting balance training following measures should be taken:
 - i) Create awareness of body position by using verbal/ visual cues
Level 2: biofeedback by using postural mirror
Level 3: biofeedback by using force platforms encouraging symmetrical weight distribution
 - ii) Core stability exercises 5 days/week for 6 weeks
 - iii) Multidirectional reach exercises at beyond arms length by 110-140%
- 4) Sit to stand training (without arm support); prefer modified (asymmetric) stance with weak foot placed behind by 50% of foot length from the normal foot.
- 5) Weight transfer, manipulation of centre of gravity, base of support and supporting surface, visual and vestibular inputs may be incorporated to improve standing balance.

- 6) Gait training to restore bio-mechanical alignment by postural biofeedback, optimizing muscle length, strength and orthotic support should be administered. The following approach should be included as per the need of the patient:
 - a) Level 2: Mirror therapy: While in seated/semi seated position, Place the mirror in the mid-sagittal plane, place the affected limb behind the mirror out of sight, patient views a reflection of their unaffected limb in a mirror during performing lower limb movements. It is useful for patient with poor voluntary control of lower limb.
 - b) Level 3: Body weight supported gait training. When patient is unable to take full weight on affected limb but do have some voluntary control, patient may be referred to higher centre for body weight support gait training.
 - c) Level 3: Functional Electrical Stimulation (FES) based gait training: Both overground and/ treadmill. The FES strategy is personalized according to an initial locomotion assessment of the patient. FES technique may be used for patients who have weak anterior tibial muscles and drag their foot while walking.
- 7) Circuit training (multiple stations) inclusive of stepping, hurdle walking, stair climbing, and walking on uneven surfaces should be included for mobility related dysfunction.
- 8) To preserve and improve sensory functions, sensory retraining should be practiced:
 - a) Safety education
 - i) Regarding the nature and extent of sensory loss
 - ii) Prevent development of learned non-use
 - b) Passive sensory training (Sensory stimulation approach)
 - i) Level 2: Intermittent pneumatic compression , 90 seconds on/ 90 seconds off for the whole extremity
 - ii) Level 2: Cutaneous electrical stimulation from 10 Hz to 100 Hz at perceptible intensities below pain threshold for 30 mins to 2 hours/day, 5 days a week to the extensor digitorum muscle
 - c) Active sensory training (for both upper limb & lower limb)
 - i) Practice detecting, localizing & discriminating sensations
 - ii) Discrimination of texture, shape, or weight, object recognition activities, detection of touch, temperature discrimination by placing the feet on a variety of floor surfaces
 - d) Proprioceptive training (position sense training)
 - e) Duration of sensory re-education should be at least 30-50 minutes sessions 5 times per week.

- 9) To preserve and improve hand functions intensive task oriented therapy should be practiced by either or combination of the following:
- i) Level 2: Mirror therapy: 20- 30 mins sessions, 4-5 times per day, optimal for patients with lack of voluntary control
 - ii) Level 3: EMG-Triggered FES for wrist and finger extension with poor recruitment of extensor muscles.
 - iii) Bimanual active-passive training started early after stroke to facilitate functional retraining
 - iv) Whenever patient attains 20 degrees of wrist extension and 10 degrees of fingers extension, constraint induced movement therapy (CIMT) should be practiced. The participant is forced to wear a mitt or cast on the less affected hand (for atleast 10-12 waking hours/day) while carrying out repetitive tasks designed to initiate the use of the affected arm and hand (for 5-6 hours/ day for 2 weeks)
- 10) Patients who have shoulder subluxation should be managed with
- a) Level 2: Neuro-muscular electrical stimulation for posterior deltoid and supraspinatus muscle 1 or 2 times per day for 30 minutes per session (1:3 duty cycle of 6 sec ON: 18 sec OFF) at 35 Hz in the acute stage for prevention as well as management.
 - b) Shoulder supports/ orthosis to preserve or improve biomechanical alignment of shoulder girdle
 - c) Active range of motion exercises (10 repetitions thrice daily)
- 11) Patients with symptoms of unilateral neglect should be managed with pen and paper task and eye patching.
- Level 3: They may be referred to higher centers with facility of visual scanning training and mental imagery.
- 12) Task and context specific training to address specific occupational needs of the patient should be done.
- 13) Home adaptation, footwear adaptation, use of walking aids, correction of visual impairment should be included to reduce the risk of falls.
- 14) Structured endurance and strength training should be included to address secondary prevention of risk factors like dyslipidemia, diabetes mellitus, hypertension, obesity.
- Dosage: minimum duration of 30 minutes/day, 5 days/week at intensity of 60-80% peak heart rate after standardized submaximal exercise tolerance testing.
- Level 1: Exercise Training using overground walking as mode of exercise
- Level 2: Exercise Training using static cycling as mode of exercise

Level 3: Exercise training using arm ergometry as mode of exercise

POST 6 MONTHS OF STROKE

Aim: After 6 months of stroke physiotherapeutic interventions aims at accommodation of the residual deficits, facilitation of re-integration in community, coping with limitations, preservation of physical functions, return to work and thereby optimizing quality of life.

Recommendations:

- 1) Patients who have achieved functional goals and become independent should be continued on aerobics training to prevent secondary prevention of risk factors as practiced in previous phase.
- 2) Patients who have residual deficits should be reassessed for possibility of further improvements. Accordingly goals are set and appropriate therapeutic interventions as explained in earlier phase should be continued.
- 3) Patients who have residual deficits and have limited chances of further improvement, such patients should be prescribed with appropriate assistive devices, aids and appliances to accommodate residual deficits.
- 4) Occupational needs and capabilities should be assessed. Modifications of home, work place and commutation should be addressed.

Figures 1



Figure 2

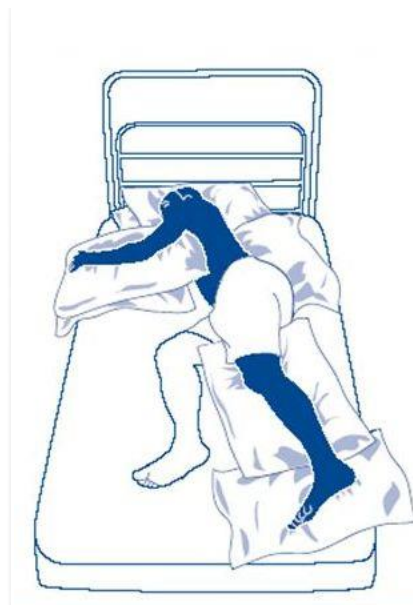


Figure 3



Figure 4



Figure 5.



8. Pattern of assistance for integrating Stroke care services at District Hospital

Under NPCDCS, there is provision for setting up of a Cardiac Care Unit (CCU) at the district level. For this purpose, one time financial assistance is provided @ Rs. 150 lakh for establishing a 4-bedded unit and recurring grant is provided @ Rs 26 lakh per year.

For providing stroke care services, up gradation of CCU to Cardiac and Stroke Care Unit (CSCU) is one of the options. The other option is to set up a stand-alone Stroke Care Unit (SCU).

Existing Indian Public Health Standard keeps CT scanner (required to differentiate between ischemic and hemorrhagic stroke) as desirable (not essential) option at DH. It is required that provision for CT scan will be made available at District Hospital by installing a CT scanner or by the way of such outsourcing that CT scan can be done expeditiously.

8.1.Option 1: For up gradation of CCU to CSCU

With this option, scope of CCU is expanded to Cardiac and Stroke Care Unit (CSCU), a facility providing emergency care for cardiac and stroke cases as an integrated facility.

A. Equipments.

a) Following equipment for CCU are provided under NPCDCS:

S. No.	Name of the Equipment
1	ECG machine computerized
2	ECG machine ordinary
3	12 Channel stress ECG test equipments Tread Mill
4	Cardiac Monitor with Defibrillator
5	Cardiac Monitor
6	Defibrillator
7	Ventilators (Adult)
8	Ventilators (Paediatrics)
9	Pulse Oximeter cum Capnograph
10	Pulse Oximeter with NIB.
11	Infusion pump
12	B.P. apparatus table model
13	B.P. apparatus stand model
14	Stethoscope
15	Portable X-Ray Machine

16	Central Patient Monitoring Station
17	Intubation Kit, Bronchoscope, Laryngoscope
18	Portable Ultrasound Machine
19	Medical Gas Pipeline

b) For up gradation of CCU to CSCU, additional equipment will be required as below.

Sl. No.	Equipment	Quantity Required
1	Glucometer	1
2	Nebulization Machine	2
3	ICU beds	As per need
4	Air Mattress	4
5	DVT pumps	2
6	Wheel chair	2
7	Cost for building and furnishings	1

Lump sum cost of these additional equipments is estimated to be Rs. 8.9 lakh. This is an indicative cost for up gradation of 4 bedded CCU to 4 bedded CSCU. Purchase of individual equipment can be undertaken after undertaking market price discovery through a competitive process, following the extant financial rules.

B. Investigations

a) The indicative list of required investigations to be undertaken at District Hospital for CCU, as per NPCDCS guidelines:

- Hb, TLC, DLC, ESR, Platelet count
- Bleeding Time, Clotting time
- Fasting /PP blood sugar
- Lipid profile
- Liver Function Test
- Kidney Function Test
- Urine routine & Urine Sugar
- X-ray and ECG

- Ultrasound
- Echocardiography

b) For up gradation of CCU to CSCU, additional investigations will be required as below.

Sl No.	Investigations
1	HbA1c
2	TFT
3	CRP
4	PT/INR
5	Blood group

Lump sum provision of Rs. 4.38 lakh can be made for additional investigations, considering patient load of 200 per year. States may make provision keeping in mind the patient load and their norms.

C. Drugs

a) The indicative List of Drugs under NPCDCS for emergency care is as follows:

ACE Inhibitor	Enalapril, Ramipril, Lisinopril, Captopril
Calcium channel blocker	Amlodipine
Diuretic	Indepamide, Chlorthalidone, Frusemide, Hydrochlorthiazide, Aldosterone antagonist
Beta blocker	Atenolol, Metoprolol, Labetolol
Oral hypoglycemic	Metformin, Gliclazide, Glibenclamide
Insulin	short, intermediate, long acting
Fibrinolytics	Streptokinase, rTPA (alteplase and tenecteplase)
Anti-platelet	Clopidogrel
Lipid lowering	Statins

Nitrates	Isosorbidedinitrate, Glyceryltrinitrate,
Antiepileptics	Diazepam, Phenytoin, Carbamazepine, Levetiracetam, Valproic acid, Midazolam
Antiemetics	Ondansetron, Domperidone
Antibiotics	Benzathine penicillin, Penicillin V, Amoxicillin, Erythromycin
Others	Adrenaline (1:1000), Warfarin, Heparine, Atropine, Digoxin, Methyldopa, Protamine, Mannitol, Mephentine, Lignocaine, Aspirin, Dopamine, Potassium Chloride, Aminophylline, Folic acid

b) For up gradation of CCU to CSCU, additional drugs will be required as below.

Sl. No.	Drugs
1	Injection Noradrenaline 4mg / 1 ampule
2	Injection Hydrocortisone 100mg /ampule
3	Injection Low Molecular Weight Heparin
4	Injection Alteplase 50mg
5	Injection Tenecteplase 20mg

Lump sum provision up to Rs. 29.8 lakh can be made considering patient load of 200 per year. States may make provision keeping in mind the patient load and their norms.

D. Training and HR

Presently, 54 doctors from 15 states/ UTs have been trained on stroke care who can conduct State level trainings. Budget up to Rs. 50,000/- may be kept for training per CSCU. There is provision for one specialist (Cardiology/M.D. General Medicine), four “General Nursing and Midwifery (GNMs) for CCU and one General Physician, two GNMs and one physiotherapist for NCD Clinic under NPCDCS. For CSCU, additional Staff, if required, can be provided from existing strength at District Hospital, who will be trained in management of Stroke care. However, depending upon requirements, for upgrading CCU to CSCU, provision of up to

four additional staff nurses can be made as per state norms. State needs to do gap analysis first for assessing need of manpower.

Considering indicative salary of Rs. 25,000/- per month, four additional staff nurses would need provision of Rs. 12,00,000/- per annum. (Subject to prevailing norms in the State for similar positions) Cost of the HR will be worked out on the basis of gap analysis and rearrangements.

E. Indicative unit cost for expanding CCU to CSCU : Summary

Particulars	Total Cost Per Year(Rs.)	Recurring/Non Recurring(Rs.)
Non recurring (Equipment and building etc)	8,90,500	Non Recurring
Investigations	4,38,000	Recurring (to be calculated as per expected patient load)
Drugs	29,79,540	Recurring (to be calculated as per expected patient load)
Man Power	12,00,000	Recurring (on basis of gap analysis and rearrangements)
Training	50,000	Recurring
Non Recurring Expenses	8,90,500	
Recurring Expenses	46,67,540	

As per the gap analysis done by State, the requisite funds for procurement of equipment; services, training may be reflected under Health System Strengthening in State PIP as per the existing procedure and FMR codes.

8.2. Option 2: Setting up of Stand-alone Stroke Care Unit(SCU)

A 4-bedded Acute Stroke Care Unit can be set up at district level. There can be provision for, ICU beds, DVT pumps and wheel chair, among others. Among drugs, injection alteplase and

tenecteplase will be provided for thrombolysis. The unit will manage stroke cases and will perform thrombolysis, as appropriate. The unit will require availability of CT Scanner or CT scan facility where scan can be done expeditiously. Initially the District Hospital with CT scan facility can be chosen for setting up of Stroke Care Unit.

8.2.1. Table A – Indicative equipment list for Stand-alone SCU

Sl. No.	Equipment	Quantity Required
1	Cardiac Monitor	4
2	Cardiac monitor with defibrillator	1
3	Ventilators	1
4	Intubation Kit	1
5	Pulse Oximeter	4
6	Infusion Pumps	2
7	BP apparatus	1
8	Glucometer	1
9	Nebulization Machine	2
10	ICU beds	4
11	Air Mattress	4
12	DVT pumps	2
13	Wheel chair	2
14	Cost for building and furnishings	1

Lump sum provision of Rs. 27 lakh can be made. This is an indicative cost for setting up of a 4 bedded CSCU. Purchase of individual equipment can be undertaken after undertaking market price discovery through a competitive process, following the extant financial rules.

8.2.2.. Table B – Indicative investigations list for Stand-alone SCU

Sl No.	Investigations
1	Haemogram
2	Blood sugar
3	RFT
4	LFT

5	Lipid Profile
6	BT/CT
7	Urine R/M & Sugar
8	ECG
9	X ray chest
10	HbA1c
11	TFT
12	CRP
13	PT/INR
14	Blood group

Lump sum provision of Rs. 13.5 lakh can be made (for patient load of 200 per year). States may make provision keeping in mind the patient load and their norms.

8.2.3. Table C – Indicative drug list for Stand-alone SCU

Sl No.	Drugs
1	Tab Aspirin 150mg
2	Tab Atenolol 50mg
3	Tab Amlodipine 10mg
4	Tab Metoprolol
5	Tab Hydrochlorothiazide 12.5, 25mg
6	Tab Enalapril 5mg
7	Tab Atorvastatin 40mg
8	Tab Clopidogrel 75mg
9	InjFrusemide 40mg
10	Tab Folic acid
11	Tab Metformin SR 500mg
12	Injection Insulin, Regular (400 units /vial)
13	Tab Carbamazepine 200mg
14	Injection Adrenaline 1 mg
15	Injection Atropine .6mg
16	Mannitol 20mg/100ml
17	Syrup Potassium Chloride

18	Tab Phenytoin 300mg
19	Inj Phenytoin 100mg
20	InjLevetiracetam 500mg
21	InjValproic acid500mg
22	Tab Domperidone 10mg
23	Tab Ondansetron 4mg
24	InjOndansetron 4mg
25	Injection Noradrenaline 4mg / 1 ampule
26	Injection Dopamine 200mg/ ampule
26	Injection Midazolam 5mg /vial
28	Injection Hydrocortisone 100mg /ampule
29	Injection Low Molecular Weight Heparin
30	Injection Alteplase 50mg
31	Injection Tenecteplase 20mg
32	Injection Labetolol 20mg

Lump sum provision of Rs. 61 lakhs can be made (considering patient load of 150 per year). States may make provision keeping in mind the patient load and their norms.

8.2.4. Table D- Other provisions for Stand-alone SCU

SI No.	Other provisions
1	Glucose strips, lancets, swab
2	Referral card
3	Ryles tube
4	Foleys catheter

8.2.5. Human resources and training

Doctors will be provided from existing strength at District Hospital, who will be trained in management of stroke care. In SCU, 2 Nurses can be required per shift. Therefore, up to 8 nurses can be provisioned for SCU, which will be based on gap analysis. Provision for one Physiotherapist can also be made. Nurses and other staffs can be trained under the programme. Till now, 54 doctors from 15 states/ UTs have been trained who can conduct State level training. Considering indicative salary of Rs. 25,000/- per month, up to eight staff

nurses and one physiotherapist would need provision of Rs. 27,00,000/- per annum. (Subject to prevailing norms in the State for similar positions).

Table E- Indicative manpower for Stand-alone SCU

SI No	Man Power	Requirement
1	Physiotherapist	1
2	Nurse	8

Note: Subject to prevailing norms in the State for similar positions

Setting up of separate SCU will require Non Recurring cost of Rs. 27.01 lakh. The cost of drugs, calculated on the basis of average stroke incidence comes out to be Rs. 60,95,575 per year. Drug requirement has been calculated for up to 150 patients per year. Investigation requirement has been calculated for about 200 patients per year. Accordingly, recurring cost of Rs. 1.02 cr per annum is estimated. However, requirement will have to be calculated on the basis of expected patient load. For training, per SCU, provisions for up to Rs. 50,000/- can be made.

8.2.6. Unit cost for Stand-alone SCU

Table F- Unit cost for Stand-alone SCU: Summary

Particulars	Total Cost Per Year(Rs.)	Recurring/Non Recurring(Rs.)
Non recurring (Equipment and building etc)	27,01,000	Non Recurring
Investigations	13,52,000	Recurring (to be calculated as per expected patient load)
Drugs	60,95,575	Recurring (to be calculated as per expected patient load)
Other provisions	47,700	Recurring
Man Power	27,00,000	Recurring (to be calculated as per expected patient load)
Training	50,000	Recurring
Non Recurring Expenses	27,01,000	

Recurring Expenses	1,02,45,275	
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8.2.7. Indicative FMR Code for proposing CSCU or SCU

Head	FMR Code
Manpower	8.1.1.2
Equipments	6.1.1.23.a
Training	9.5.19
Drugs	6.2.19.2

Annexure I

CHA2DS2VASc score

	Conditions	Point
C	Congestive heart failure (or Left ventricular systolic dysfunction)	1
H	Hypertension: blood pressure consistently above 140/90 mmHg (or treated hypertension on medication)	1
A ₂	Age \geq 75 years	2
D	Diabetes mellitus	1
S ₂	Prior stroke or TIA or thromboembolism	2
V	Vascular disease (e.g. peripheral artery disease, myocardial infarction, aortic plaque)	1
A	Age 65-74 years	1
Sc	Sex category (i.e., female sex)	1

Annual stroke risk

CHA2DS2VASc score	Risk for stroke %
0	0
1	1.3
2	2.2
3	3.2
4	4.0
5	6.7
6	9.8
7	9.6
8	12.5
9	15.2

Ischemic stroke risk of more than 2% or more should be an indication to start an anticoagulant therapy

Score	Risk	Anticoagulation
0 (male) or 1 (female)	Low	No anticoagulation
1 (male)	Moderate	Oral anticoagulation should be recommended
2 or greater	High	Oral anticoagulation is recommended

Annexure II

Heart risk calculator

- Age (years)
- Gender
- Race
- Total cholesterol (mg/ dL)
- HDL cholesterol (mg/ dL)
- Systolic BP (mm Hg)
- Diastolic BP (mm Hg)
- Treated for high blood pressure
- Diabetes
- Smoker

The screenshot shows a web browser window with the URL www.cvriskcalculator.com. The page contains a form for calculating 10-year heart disease or stroke risk. The form fields are as follows:

- Age (years):** Text input field with value "40-79".
- Gender:** Radio buttons for "Male" (selected) and "Female".
- Race:** Radio buttons for "African American" and "Other" (selected).
- Total cholesterol (mg/dL):** Text input field with value "130-320".
- HDL cholesterol (mg/dL):** Text input field with value "20-100".
- Systolic blood pressure (mmHg):** Text input field with value "90-200".
- Diastolic blood pressure (mmHg):** Text input field with value "30-140".
- Treated for high blood pressure:** Radio buttons for "No" (selected) and "Yes".
- Diabetes:** Radio buttons for "No" (selected) and "Yes".
- Smoker:** Radio buttons for "No" (selected) and "Yes".

A blue "Calculate" button is located at the bottom of the form. To the right of the form, there is explanatory text and updates:

Calculate your 10-year risk of heart disease or stroke using the ASCVD algorithm published in [2013 ACC/AHA Guideline on the Assessment of Cardiovascular Risk](#).

This calculator assumes that you have not had a prior heart attack or stroke. If you have, generally it is recommended that you discuss with your doctor about starting aspirin and a statin. Furthermore, if you have an LDL-cholesterol (bad cholesterol) greater than 190, it is also generally recommended that you discuss with your doctor about starting aspirin and a statin.

Unfortunately, there is insufficient data to reliably predict risk for those less than 40 years of age or greater than 79 years of age and for those with total cholesterol greater than 320.

UPDATE (11/21/17) -- The ACC/AHA has released their [2017 Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults](#). At a high level, the new guidelines redefine hypertension as blood pressure >130/80 and recommend starting anti-hypertensives based on ASCVD risk score of >10%. This will be a significant change from JNC-8. Please let us know if you would like us to incorporate the new guidelines into [cvriskcalculator.com](#) by completing [this 1-question survey](#).

UPDATE (6/30/16) -- The calculator has been vetted against the [final guidelines from the USPSTF](#) for initiating

Annexure III

Glasgow Coma Scale

	1	2	3	4	5	6
Eye opening	Does not open eyes even in response to pain	Opens eyes in response to pain	Opens eyes in response to command	Opens eyes spontaneously	N/A	N/A
Verbal	Makes no sounds	Makes incomprehensible sounds	Speaks inappropriate words	Confused, disoriented	Oriented, converses normally	N/A
Motor	Makes no movements	Extension to painful stimuli	Abnormal flexion to painful stimuli	Normal Flexion / Withdrawal to painful stimuli	Localizes to painful stimuli	Obeys commands

Annexure IV

National Institute of Health Stroke Scale (NIHSS)

Tested item	Response	Scores
1A	Level of consciousness	0—Alert
		1—Drowsy
		2—Obtunded
		3—Coma/unresponsive
1B	Orientation questions (2)	0—Answers both correctly
		1—Answers 1 correctly
		2—Answers neither correctly
1C	Response to commands (2)	0—Performs both tasks correctly
		1—Performs 1 task correctly
		2—Performs neither
2	Gaze	0—Normal horizontal movements
		1—Partial gaze palsy
		2—Complete gaze palsy
3	Visual fields	0—No visual field defect
		1—Partial hemianopia
		2—Complete hemianopia
		3—Bilateral hemianopia
		0—No visual field defect
4	Facial involvement	0—Normal

		1—Minor facial weakness
		2—Partial facial weakness
		3—Complete unilateral palsy
5	Motor function (arm)	0—No drift
	a. left	1—Drift before 10 s
	b. right	2--Falls before 10 s
		3—No effort against gravity
		4—No movement
6	Motor function (leg)	0—No drift
	a. Left	1—Drift before 5 s
	b. Right	2—Falls before 5 s
		3—No effort against gravity
		4—No movement
7	Limb ataxia	0—No ataxia
		1—Ataxia in 1 limb
		2—Ataxia in 2 limbs
8	Sensory	0—No sensory loss
		1—Mild sensory loss
		2—Severe sensory loss
9	Language	0—Normal
		1—Mild aphasia
		2—Severe aphasia

		3—Mute or global aphasia
10	Articulation	0—Normal
		1—Mild dysarthria
		2—Severe dysarthria
11	Extinction/ Inattention	0—Absent
		1—Mild loss (1 sensory modality lost)
		2—Severe loss (2 modalities lost)

Annexure V

Indicative list of logistics

Table A –Indicative list of Equipments

Equipment	Quantity Required	Remarks
Cardiac Monitor	4	Min 6 parameters
Cardiac monitor with defibrillator	1	Biphasic
Ventilators	1	Adult
Intubation Kit	1	16 item
Pulse Oximeter	4	Hand held
Infusion Pumps	2	Syringe type
BP apparatus	1	Digital
Glucometer	1	
Nebulization Machine	2	
ICU beds	4	Electrical
Air Mattress	4	
DVT pumps	2	
Wheel chair	2	

Table B – Indicative list of Investigations

Investigations
Haemogram
Blood sugar
RFT
LFT
Lipid Profile
BT/CT
Urine R/M & Sugar
ECG

X ray chest
HbA1c
TFT
CRP
PT/INR
Blood group

Table C– Indicative list of Drugs

Tab Aspirin 150mg	Syrup Potassium Chloride
Tab Atenolol 50mg	Tab Phenytoin 300mg
Tab Amlodipine 10mg	Inj Phenytoin 100mg
Tab Metoprolol	InjLevetiracetam 500mg
Tab Hydrochlorthiazide 12.5, 25mg	InjValproic acid500mg
Tab Enalapril 5mg	Tab Domperidone 10mg
Tab Atorvastatin 40mg	Tab Ondansetron 4mg
Tab Clopidogrel 75mg	InjOndansetron 4mg
InjFrusemide 40mg	Injection Noradrenaline 4mg / 1 ampule
Tab Folic acid	Injection Dopamine 200mg/ ampule
Tab Metformin SR 500mg	Injection Midazolam 5mg /vial
Injection Insulin, Regular (400 units /vial)	Injection Hydrocortisone 100mg /ampule
Tab Carbamazepine 200mg	Injection Low Molecular Weight Heparin
Injection Adrenaline 1 mg	Injection Alteplase 50mg
Injection Atropine .6mg	Injection Tenecteplase 20mg
Mannitol 20mg/100ml	Injection Labetolol 20mg

Table D –Other requirements

Glucose strips, lancets, swab
Referral card
Ryles tube
Foleys catheter

Intravenous (IV) thrombolysis

For adult patients arriving within 4.5 hours

- 0-3 hours- IV tenecteplase (TNK) or IV rtPA
- 3-4.5 hours- IV rtPA(For 3 to 4.5 hours: additional criteria to be met are: age \leq 80 years; No history of diabetes AND previous stroke; Not on anticoagulation; and NIHSS \leq 25)

Informed consent is a must before starting thrombolysis. The choice of thrombolytics may be discussed with patient's attendants. (Annexure XII)

Indications for IV thrombolysis:

- Age greater than or equal to 18 years
- A significant neurologic deficit expected to result in long term disability
- Non contrast CT scan showing no hemorrhage or well established large infarct
- Acute ischemic stroke symptoms with onset (last known well) clearly defined, less than 4.5 hours before thrombolysis will be given

Contraindications

Contraindications include any of the following

- Current intracranial or subarachnoid hemorrhage
- CT demonstrates multilobar infarction (hypodensity $>$ 1/3 cerebral hemisphere)
- Recent (within 3 months) intracranial or intraspinal surgery/ serious head trauma/prior stroke
- Current severe uncontrolled hypertension ($>$ 185/110mm Hg)
- Presence of intracranial conditions that may increase the risk of bleeding (vascular neoplasms, arteriovenous malformations or aneurysm)
- Active internal bleeding
- Bleeding diathesis including but not limited to platelet $<$ 100 000/mm³; current use of oral anticoagulant with INR $>$ 1.7; PT $>$ 15 seconds , current use of direct thrombin inhibitors or direct factor Xa inhibitors with sensitive lab tests, administration of

heparin within 48 hours with elevated aPTT, administration of LMWH in 24 hours-

Thrombolysis should not be delayed by coagulation testing.

Warnings

These conditions may increase risk of unfavorable outcomes but are not necessarily a contra indication to treatment:

- Glucose less than 50 mg/dl or greater than 400mg/dl (*If presenting neurological symptoms appear not to be due to ischemia, treatment for correcting glucose level may be given*)
- Seizures at onset of stroke- if residual deficits are due to post-ictal state rather than due to ischemia. If rapid diagnosis of vascular occlusion can be made, treatment may be given.
- Only minor or rapidly improving stroke symptoms
- Hypertension – systolic blood pressure >175 mm Hg and diastolic blood pressure > 110 mm Hg
- Recent major surgery or procedures (e.g. coronary artery bypass graft, obstetrical delivery, organ biopsy, previous puncture of non-compressible vessels), particularly within 14 days
- Recent gastro intestinal or genitourinary bleeding (within 3 weeks)
- Recent H/o recent intracranial hemorrhage
- Recent h/o serious trauma
- Recent myocardial infarction (within 3 months)
- High likelihood of left heart thrombus (*e.g.: Mitral stenosis with atrial fibrillation*)
- Acute pericarditis / subacute bacterial endocarditis (SBE)
- Diabetic hemorrhagic retinopathy or other hemorrhagic ophthalmic conditions
- Septic thrombophlebitis or occluded AV cannula at seriously infected site
- Hemostatic defects including those secondary to severe hepatic or renal disease
- Any other condition in which bleeding constitutes a significant hazard / would be particularly difficult to manage because of its location.
- Severe hepatic dysfunction
- Renal dysfunction due to any cause including dehydration
- Prior hypersensitivity
- Advanced age >90 years

- Pregnancy
- Lactating woman
- Patient on GpIIb-IIIa inhibitors

Treatment Phase

- Calculate tenecteplase / IV tPA dose based on weight estimate.
- Document estimated weight
- Review with nursing staff to ensure accuracy
- Confirm BP within safe limits
- Write order for thrombolytic therapy-
 - For patients with weight < 60 kg TNK dose is calculated as 0.2 mg/kg. For patients \geq 60 Kg a dose of 0.2-0.25mg/Kg is used. Maximum dose is up to 20mg. Volume of TNK to be administered at a dilution of 2mg/ml.
 - Administer TNK IV bolus in 5 seconds.
 - The recommended total dose of tPA is 0.9 mg/kg body weight (maximum of 90 mg). Administer 10% of tPA as bolus dose over 1 minute and document time on emergency medication order sheet, immediately followed by the remainder of the total dose as infusion intravenously over 1 hour.
- Once infusion begins monitor vital signs as follows:
 - Every 15 minutes for 2 hours, then:
 - Every 30 minutes for 6 hours, then:
 - Every 60 minutes for 16 hours
- Suspect occurrence of intracranial hemorrhage following the start of thrombolytic drug therapy, if there is any acute neurological deterioration, new headache, acute hypertension, or nausea and vomiting
- Notify physician immediately if SBP/DBP greater than 175/100 mm Hg
- Avoid intra muscular injection and trauma while on thrombolytic therapy
- Perform venepuncture carefully and only if absolutely required
- Do not insert Foley catheter or nasogastric tube unless absolutely necessary
- Document hourly neurologic assessment (*more frequently if changes occur*)
- Repeat NIHSS evaluation if patient exam has changed significantly

- If any anaphylaxis develops, discontinue thrombolytic therapy and promptly institute appropriate therapy
- Orolingual angioedema may develop with IV thrombolysis. Discontinue IV thrombolytic infusion and hold ACEIs(angiotensin converting enzyme inhibitors).Administer IV methylprednisolone 125 mg, IV diphenhydramine 50 mg and ranitidine 50 mg IV. If there is further increase in angioedema, administer epinephrine (0.1%) 0.3 mL subcutaneously or by nebulizer 0.5 mL.Endotracheal intubation may be needed if there is respiratory distress.
- Admit the patient to designated ward
- Coordinate the post thrombolytic therapy care with the emergency departmentdoctor to ensure continuity until the patient is transferred out of from emergency department to designated ward
- Management of blood pressure (see BP management)

Post Treatment Phase

- Document neurologic assessment hourly or more frequently if changes occur
- Vital monitoring as described under Treatment Phase
- Verify the patency of IV and completion of thrombolytic drug dose
- Order routine non-contrast CT at 24 hours post treatment (Or soon with any worsening in neurologic status)
- Strict control of blood pressure for 24 hours as per protocol
- Restrict patient intake to strict nil per oral (NPO) including medicines until swallowing test is performed and passed
- Continuous pulse oximetry monitoring, order oxygen by nasal cannula or mask to maintain oxygen saturation greater than 95%
- No antiplatelet agents or anticoagulants (including heparins for DVT prophylaxis) in first 24 hours
- No Foley catheter, nasogastric tube, arterial catheter or central venous catheter for 24 hours unless absolutely necessary

For suspected symptomatic hemorrhage

- Hold administration of iv thrombolytic therapy if still infusing until brain CT completed and shows no evidence of bleeding

- Exclude other possible causes of neurologic worsening or acute hemodynamic instability

For confirmed symptomatic hemorrhage on CT head

- Consult neurosurgery for possible intervention
- Draw blood for CBC, grouping, PT, APTT, fibrinogen and D-dimer
- If fibrinogen is less than 100mg/dl, then give cryoprecipitate 0.15units/kg rounded to the nearest integer. If still bleeding at 1 hour and fibrinogen level still less than 100mg/dl, repeat cryoprecipitate dose
- Institute frequent neuro-checks and therapy of acutely elevated ICP, as needed
- For uncontrolled, life threatening bleeding, consider aminocaproic acid 10g IV in 250cc NS IV over 1 hour as a last resort. Note there is significant risk of pathologic thrombosis with aminocaproic acid.
- Serious systemic hemorrhage should be treated in a similar manner. Manually compress at compressible site of bleeding and consult appropriate additional service to consider mechanically occluding arterial or venous sources of medically uncontrollable bleeding.

Annexure VI

Common drugs used in stroke and related information

Drugs	Indication	Dose	Contraindications	Side effects	When to discontinue	Monitoring parameters	Pregnancy
Aspirin	Ischemic stroke/Transient Ischemic Attack (TIA), Acute Myocardial Infarction (AMI)	Daily dose 75 to 150mg. Loading dose 300mg stat	Bleeding, allergy, G6PD deficiency, anticoagulation therapy, renal insufficiency, gout, dengue, caution for asthma	GI bleeding, Reye's syndrome	Before surgery in selective cases	Gum bleeding or any evidence of bleeding from any site	Could be used
Clopidogrel	Ischemic stroke, TIA, allergy to aspirin, dual therapy for severe intracranial stenosis in major artery, h/o AMI	Daily dose 75mg. Loading dose 300mg stat	Bleeding, severe hepatic/ renal insufficiency	Bleeding, bruising, pain abdomen, headache	Before surgery in selective cases	Gum bleeding or any evidence of bleeding from any site	Unknown

Injection Tenecteplase (TNK) or Alteplase (recombinant Tissue Plasminogen Activator - rTPA) (Both alteplase and tenecteplase are approved for stroke in India)	Ischemic stroke, AMI	Injection Tenecteplase - 0.2mg/Kg when bodyweight < 60 kg. For patients ≥ 60 Kg, dose is 0.2-0.25 mg/Kg weight. Maximum dose is 20mg. Injection Alteplase – 0.9mg/Kg body weight with maximum dose 90mg bolus (10% of dose given bolus and remaining intravenous infusion over 60 minutes).	Intracranial hemorrhage, subarachnoid hemorrhage, multilobar infarction, recent surgery, uncontrolled hypertension, active bleeding, serious head trauma, oral anticoagulant with INR>1.7, severe hepatic/ renal insufficiency, PT > 15 s, thrombocytopenia (Refer annexure-V for thrombolysis in ischemic stroke)	Bleeding any site	Evidence of haemorrhage, orolingual angioedema	Neurological deterioration, bleeding at any site	Relative contraindication
Heparin	Treatment and prevention of Deep Vein Thrombosis (DVT), stroke due to cerebral venous sinus thrombosis	Unfractionated heparin – Injection 5000 units subcutaneously six hourly. Low molecular weight heparin – 0.6 ml subcutaneously twice daily.	Renal insufficiency	Bleeding, thrombocytopenia, hyperkalaemia	Evidence of haemorrhage, orolingual angioedema	activated partial thromboplastin time (aPTT) or any site of bleeding	Relatively safe
Warfarin/acenocoumarol	Treatment and prevention of DVT, prevention of stroke in patients with Atrial Fibrillation (AF), Valvular heart disease	Tablet started from 1 mg and dose escalated to achieve international normalized ratio (INR) of 2 to 3. For mechanical heart valves INR 2.5 to 3.5	Severe hepatic/ renal insufficiency	Bleeding, osteoporosis, warfarin necrosis	Evidence of haemorrhage, orolingual angioedema	Prothrombin Time (PT) and International Normalised ratio (INR)	Contraindicated

Labetalol	For hypertensive urgency and for blood pressure lowering in cases undergoing intravenous thrombolysis and intracerebral haemorrhage	Injection 10 to 20 mg bolus intravenous and repeated bolus dose after every 15 to 30 minutes or intravenous infusion achieving target blood pressure control. Maximum dose advised is upto 200 mg.	Cardiogenic shock, Uncontrolled incipient or digitalis refractory heart failure, Sick sinus syndrome (including sino-atrial block), History of wheezing or asthma, Untreated phaeochromocytoma, Metabolic acidosis, Bradycardia (<45-50 bpm), Hypotension, Hypersensitivity to labetalol, Severe peripheral circulatory disturbances.	Hypotension	Hypotension, cardiogenic shock	Blood Pressure monitoring	Individualized decision and should be administered if the potential benefit outweighs the potential risk.
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Caution: All drugs are to be used cautiously in elderly patients especially when age >90 years, along with other co-morbidities.

Annexure VII

Oral Agents for the Treatment of Hypertensive Urgencies

Agent	Dosage	Onset/Duration of Action (after discontinuation)
Captopril	25 mg PO; repeat as needed; SL, 25 mg	15-30 min/6-8 hr; SL 10-20 min/2-6 hr
Clonidine	0.1-0.2 mg PO, repeat hourly as required to total dosage of 0.6 mg	30-60 min/8-16 hr
Labetalol	200-400 mg PO; repeat every 2-3 hr	1-2 hr/2-12 hr
Amlodipine	2.5-5 mg	1-2 hr/12-18 hr

Treatment of Hypertensive Emergencies

Agent	Dosage	Onset/Duration of Action (after discontinuation)
Captopril	25 mg PO; repeat as needed; SL, 25 mg	15-30 min/6-8 hr; SL 10-20 min/2-6 hr
Clonidine	0.1-0.2 mg PO, repeat hourly as required to total dosage of 0.6 mg	30-60 min/8-16 hr
Labetalol	200-400 mg PO; repeat every 2-3 hr	1-2 hr/2-12 hr
Amlodipine	2.5-5 mg	1-2 hr/12-18 hr
Parenteral antihypertensives		
Esmolol	500- μ g/kg bolus injection IV or 50-100 μ g/kg/min by infusion; may repeat bolus after 5 min or increase infusion rate to 300 μ g/kg/min	1-5 min/15-30 min
Phentolamine	5-10 mg as IV bolus	1-2 min/10-30 min
Fenoldopam mesylate	0.1-0.3 μg/kg/min as IV infusion	<5 min/30 min

Annexure VIII

Management of hypotension

Patients with stroke who developed hypotension should be evaluated for possible cause including; hypovolemia, sepsis, cardiogenic - acute myocardial infarction, pulmonary embolism, cardiac tamponade, tension pneumothorax, anaphylaxis, adrenal crisis. They should be treated accordingly. The most common cause is hypovolemia and sepsis for which treatment is outlined below:

- Hypovolemia: Intravenous fluids - normal saline guided according to central venous pressure (CVP) wherever possible.
- Sepsis: Aggressive fluid resuscitation, broad spectrum antibiotics and inotropic (Noradrenaline, dopamine, vasopressin) support if needed.

Refractory cases should be considered/referred for ICU monitoring and treatment.

Annexure IX

International normalized ratio

The result (in seconds) for a prothrombin time performed on a normal individual will vary according to the type of analytical system employed. This is due to the variations between different types and batches of manufacturer's tissue factor used in the reagent to perform the test. The INR was devised to standardize the results. Each manufacturer assigns an ISI value (International Sensitivity Index) for any tissue factor they manufacture. The ISI value indicates how a particular batch of tissue factor compares to an international reference tissue factor. The ISI is usually between 0.94 and 1.4 for more sensitive and 2.0-3.0 for less sensitive thromboplastins.

The INR is the ratio of a patient's prothrombin time to a normal (control) sample, raised to the power of the ISI value for the analytical system being used.

Interpretation

The prothrombin time is the time it takes plasma to clot after addition of tissue factor (obtained from animals such as rabbits, or recombinant tissue factor, or from brains of autopsy patients). This measures the quality of the *extrinsic pathway* (as well as the *common pathway*) of coagulation. The speed of the *extrinsic pathway* is greatly affected by levels of functional factor VII in the body. Factor VII has a short half-life and the carboxylation of its glutamate residues requires vitamin K. The prothrombin time can be prolonged as a result of deficiencies in vitamin K, warfarin therapy, malabsorption, or lack of intestinal colonization by bacteria (such as in newborns). In addition, poor factor VII synthesis (due to liver disease) or increased consumption (in disseminated intravascular coagulation) may prolong the PT.

The INR is typically used to monitor patients on warfarin or related oral anticoagulant therapy. The normal range for a healthy person not using warfarin is 0.8–1.2, and for people on warfarin therapy an INR of 2.0–3.0 is usually targeted, although the target INR may be higher in particular situations, such as for those with a mechanical heart valve (2.5 to 3.5). If the INR is outside the target range, a high INR indicates a higher risk of bleeding, while a low INR suggests a higher risk of developing a clot.

Annexure X

Coumarin and diet

1. Coumarin-based drugs (warfarin, acitrome) and other inhibitors of Vit K are useful in prevention of blood clot in certain conditions like thrombo-embolic disorders.
2. If you are on blood thinners keep vitamin K intake in your diet steady. Vitamin K is required to help your blood to clot. If you vary the amount of vitamin K in your diet too much, it will require repeated dose adjustment of blood thinner.
3. People who take blood thinner can eat a normal diet. But it is important to make sure you get approximately the same amount of vitamin K each day.
4. Vitamin K is synthesized by plants and bacteria. Animals, including human beings, however can not synthesize the vitamin, still, they require it for blood clotting .
5. The best way to ensure a proper dosage of the nutrient is through a balanced, healthy diet that includes foods with almost equal amount of vitamin K at each meal. Sudden increase or decrease in foods rich in vitamin K should be avoided. The common food sources and their approximate content of Vitamin K foods is given below.
6. Restrict green leafy vegetables such as spinach, mustard leaves, coriander leaves, pudina, cauliflower, cabbage, bathua, tomato and egg yolk. Avoid Mustard oil and Soyabean oil.
7. In addition stop smoking and avoid alcohol and maintain ideal body weight.

Food sources of Vit K

Kale (Karamsaag- A type of Gobi)
Collard greens (Kaanulhaak)
Spinach (Palak)
Brussels sprouts (Chotigobhi)
Broccoli (Hariphoolgobhi)
Parsley (Dhaniya)
Asparagus (Shatwar, Sootmoli, Musli)
Lettuce (A type of palak)
Endive (Gulsuchal)
Okra (Bhindi)
Mustard greens (Sarsonkssaag) Tomato

Vitamin K Contents of food($\mu\text{g}/100 \text{ gm}$)

Food	Vit K	Food	Vit K
Mung	33	Apples	4
Snap	28	Banana	0.5
Asparagus	39	Oranges	1.3
Tomato	48	Peaches	3
Spinach	266	Straw berries	14
Kale	275	Eggs	50
Lettuce	113	Egg yolk	149
Soybean oil	200	Beef liver	104
Canola(rapeseed)	830	Chicken	80
Olive oil	58	Pork Liver	88
Oats	63	Rice	0.05
Wheat	20	Wheat Bran	83
Wheat germ	39	Peas	28

Information sheet for Patients / Caregivers

Thrombolytic agents for Stroke – Potential Benefit, Risk and Alternatives

Introduction

Two “clot-dissolving” drugs are approved by the drug controller general of India (DCGI) for stroke: one is a second generation product, Recombinant tissue Plasminogen Activator (rt-PA) and one third generation product, Tenecteplase.

A blockage-type (ischemic) stroke occurs when an area of the brain is deprived of oxygen and nutrients because of a blocked blood vessel. Many sudden blockages are due to a blood clot and can result in loss of function in the affected area of the brain. Common signs and symptoms of stroke include abrupt onset of one-sided weakness/numbness, and difficulty with vision, speaking, walking, thinking or coordination.

Potential Benefit

A summary analysis of studies suggested that 30% patients will recover without rt-PA but 35% of patients will recover with rt-PA over a period of 1 to 6 months, a difference of 5%. However, with earlier treatment (<3 hrs), the difference can go upto 10%. A summary analysis on tenecteplase versus rt-PA in acute ischemic stroke found tenecteplase to be as effective as rt-PA possibly, more effective.

Potential Risk

- As with most treatments, there are risks associated with rt-PA or tenecteplase administration. Studies vary in predicting the likelihood of complications, which include bleeding into the brain, other types of severe bleeding (e.g., gastrointestinal), and death.
- A summary analysis consisting of 12 studies reported 5 to 7% of patients with serious bleeding with rt-PA. A summary analysis comprising four studies reported 4% of patients with serious bleeding with tenecteplase.
- Bleeding into the brain might not always cause a problem but sometimes it causes significant worsening of symptoms or death.
- Subsequent studies demonstrated that using rt-PA more liberally than is recommended in the NINDS protocol resulted in a higher rate of intracranial haemorrhage.

Note: Treatment of stroke cases must be individualised. The above benefits and risks are average of hundreds and thousands of patients. In a particular patient, the benefit and risks needs assessment by the treating

physician and discussion with patient / caregiver to arrive at a final decision (shared decision making).

Consent

The contents of the information sheet have been read carefully by me / explained in detail to me, in a language that I comprehend, and I have fully understood the contents. I confirm that I have had the opportunity to ask questions. I hereby give my consent to administer “Clot-dissolving” drug to me/ my patient.

(Patient’s / Caregiver’s Signature)

(Witness’ Signature)

Annexure XIII

MODIFIED BARTHEL INDEX (SHAH VERSION) : SELF CARE ASSESSMENT

INDEX ITEM	SCORE	DESCRIPTION
CHAIR/BED TRANSFERS	0	Unable to participate in a transfer. Two attendants are required to transfer the patient with or without a mechanical device.
	3	Able to participate but maximum assistance of one other person is require in <u>all aspects</u> of the transfer.
	8	The transfer requires the assistance of one other person. Assistance may be required <u>in any</u> aspect of the transfer.
	12	The presence of another person is required either as a confidence measure, or to provide supervision for safety.
	15	The patient can safely approach the bed walking or in a wheelchair, lock brakes, lift footrests, or position walking aid, move safely to bed, lie down, come to a sitting position on the side of the bed, change the position of the wheelchair, transfer back into it safely and/or grasp aid and stand. The patient must be independent in all phases of this activity.
AMBULATION	0	Dependent in ambulation.
	3	Constant presence of one or more assistant is required during ambulation.
	8	Assistance is required with reaching aids and/or their manipulation. One person is required to offer assistance.
	12	The patient is independent in ambulation but unable to walk 50 metres without help, or supervision is needed for confidence or safety in hazardous situations.
	15	The patient must be able to wear braces if required, lock and unlock these braces assume standing position, sit down, and place the necessary aids into position for use. The patient must be able to crutches, canes, or a walkalette, and walk 50 metres without help or supervision.
AMBULATION/WHEELCHAIR * (If unable to walk) Only use this item if the patient is rated "0" for Ambulation, and then only if the patient has been trained in wheelchair management.	0	Dependent in wheelchair ambulation.
	1	Patient can propel self short distances on flat surface, but assistance is required for all other steps of wheelchair management.
	3	Presence of one person is necessary and constant assistance is required to manipulate chair to table, bed, etc.
	4	The patient can propel self for a reasonable duration over regularly encountered terrain. Minimal assistance may still be required in "tight corners" or to negotiate a kerb 100mm high.
	5	To propel wheelchair independently, the patient must be able to go around corners, turn around, manoeuvre the chair to a table, bed, toilet, etc. The patient must be able to push a chair at least 50 metres and negotiate a kerb.

INDEX ITEM	SCORE	DESCRIPTION
STAIR CLIMBING	0	The patient is unable to climb stairs.
	2	Assistance is required in all aspects of chair climbing, including assistance with walking aids.
	5	The patient is able to ascend/descend but is unable to carry walking aids and needs supervision and assistance.
	8	Generally no assistance is required. At times supervision is required for safety due to morning stiffness, shortness of breath, etc.
	10	The patient is able to go up and down a flight of stairs safely without help or supervision. The patient is able to use hand rails, cane or crutches when needed and is able to carry these devices as he/she ascends or descends.
TOILET TRANSFERS	0	Fully dependent in toileting.
	2	Assistance required in all aspects of toileting.
	5	Assistance may be required with management of clothing, transferring, or washing hands.
	8	Supervision may be required for safety with normal toilet. A commode may be used at night but assistance is required for emptying and cleaning.
	10	The patient is able to get on/off the toilet, fasten clothing and use toilet paper without help. If necessary, the patient may use a bed pan or commode or urinal at night, but must be able to empty it and clean it.
BOWEL CONTROL	0	The patient is bowel incontinent.
	2	The patient needs help to assume appropriate position, and with bowel movement facilitatory techniques.
	5	The patient can assume appropriate position, but cannot use facilitatory techniques or clean self without assistance and has frequent accidents. Assistance is required with incontinence aids such as pad, etc.
	8	The patient may require supervision with the use of suppository or enema and has occasional accidents.
	10	The patient can control bowels and has no accidents, can use suppository, or take an enema when necessary.
BLADDER CONTROL	0	The patient is dependent in bladder management, is incontinent, or has indwelling catheter.
	2	The patient is incontinent but is able to assist with the application of an internal or external device.
	5	The patient is generally dry by day, but not at night and needs some assistance with the devices.
	8	The patient is generally dry by day and night, but may have an occasional accident or need minimal assistance with internal or external devices.
	10	The patient is able to control bladder day and night, and/or is independent with internal or external devices.

INDEX ITEM	SCORE	DESCRIPTION
BATHING	0	Total dependence in bathing self.
	1	Assistance is required in all aspects of bathing, but patient is able to make some contribution.
	3	Assistance is required with either transfer to shower/bath or with washing or drying; including inability to complete a task because of condition or disease, etc.
	4	Supervision is required for safety in adjusting the water temperature, or in the transfer.
	5	The patient may use a bathtub, a shower, or take a complete sponge bath. The patient must be able to do all the steps of whichever method is employed without another person being present.
DRESSING	0	The patient is dependent in all aspects of dressing and is unable to participate in the activity.
	2	The patient is able to participate to some degree, but is dependent in all aspects of dressing.
	5	Assistance is needed in putting on, and/or removing any clothing.
	8	Only minimal assistance is required with fastening clothing such as buttons, zips, bra, shoes, etc.
	10	The patient is able to put on, remove, corset, braces, as prescribed.
PERSONAL HYGIENE (Grooming)	0	The patient is unable to attend to personal hygiene and is dependent in all aspects.
	1	Assistance is required in all steps of personal hygiene, but patient able to make some contribution.
	3	Some assistance is required in one or more steps of personal hygiene.
	4	Patient is able to conduct his/her own personal hygiene but requires minimal assistance before and/or after the operation.
	5	The patient can wash his/her hands and face, comb hair, clean teeth and shave. A male patient may use any kind of razor but must insert the blade, or plug in the razor without help, as well as retrieve it from the drawer or cabinet. A female patient must apply her own make-up, if used, but need not braid or style her hair.
FEEDING	0	Dependent in all aspects and needs to be fed, nasogastric needs to be administered.
	2	Can manipulate an eating device, usually a spoon, but someone must provide active assistance during the meal.
	5	Able to feed self with supervision. Assistance is required with associated tasks such as putting milk/sugar into tea, salt, pepper, spreading butter, turning a plate or other "set up" activities.
	8	Independence in feeding with prepared tray, except may need meat cut, milk carton opened or jar lid etc. The presence of another person is not required.
	10	The patient can feed self from a tray or table when someone puts the food within reach. The patient must put on an assistive device if needed, cut food, and if desired use salt and pepper, spread butter, etc.

SCORE	INTERPRETATION
00 - 20	Total Dependence
21 - 60	Severe Dependence
61 - 90	Moderate Dependence
91 - 99	Slight Dependence
- 100	Independence

SCORE	PREDICTION
Less Than 40	Unlikely to go home - Dependent in Mobility - Dependent in Self Care
60	Pivotal score where patients move from dependency to assisted independence.
60 - 80	If living alone will probably need a number of community services to cope.
More Than 85	Likely to be discharged to community living - Independent in transfers and able to walk or use wheelchair independently.

Mobilization of stroke patients

Contraindications:

- Level of consciousness of patient
 - Richmond Agitation Sedation Scale score: -4, -5, 3, 4
- Recent myocardial ischemia
- Heart rate <40 and >130 beats/min
- Mean arterial pressure < 60 mmHg and > 110 mmHg
- Intracranial Pressure >20mmHg
- Oxygen saturation < 90%
- Respiratory reserve <200
- Parameters of ventilation
 - Fractional concentration of inspired oxygen > 0.6
 - Positive end expiratory pressure >10 cm H₂O
 - Partial pressure of arterial carbon dioxide >50 mm Hg
- Respiratory frequency > 40 breath/min
- Respiratory distress
- Haemoglobin < 7gm/dl
- Platelet count < 20,000
- High inotrope doses
 - Dopamine ≥10 mcg/kg/min
 - Nor/adrenaline ≥ 0.1 mcg/kg/min
- Temperature >38.5°C or <36°C
- Spinal instability
- Patients with active bleeding
- Untreated deep venous thrombosis
- Medically uncontrolled seizures
- Ongoing renal replacement therapy
- Ongoing intravenous sedation

Relative Contraindications:

- Patient unwillingness
- Emotional instability
- Inadequate safety measures
- Fatigue
- Disturbance in monitoring
- Untractable pain
- Orthostatic hypotension
- ICP monitoring

Termination Criteria:

- Oxygen Desaturation <88% with supplemental oxygen during activity, unless otherwise specified by physician
- Hypotension associated with dizziness, fainting, and/or diaphoresis

- Tachycardia > 130 bpm
- Change in heart rhythm
- Worsening of breathing pattern with an increase in accessory muscle use, paradoxical pattern, nasal flaring, or an appearance of facial distress
- Extreme fatigue
- Severe intolerable dyspnea with respiratory rate greater than baseline by > 20/min
- Significant chest pain
- Excessive pallor or flushing of skin
- Request of patient to stop

Annexure XV

Modified Ashworth Scale for Grading Spasticity

Score	Description
0	no increase in muscle tone
1	slight increase in muscle tone, manifested by a catch and release or by minimal resistance at the end of the range of motion when the affected part(s) is moved in flexion or extension
1+	slight increase in muscle tone, manifested by a catch, followed by minimal resistance throughout the remainder (less than half) of the ROM
2	more marked increase in muscle tone through most of the ROM, but affected part(3) easily moved
3	considerable increase in muscle tone, passive movement difficult
4	affected part(s) rigid in flexion or extension

Bohannon, R. Smith, M. Interrater Reliability of a Modified Ashworth Scale of Muscle Spasticity Phys Ther 1987, 67 ;2 206-207

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Directorate General of Health Services
Ministry of Health and Family Welfare
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