Summer Training at
Indraprastha Apollo Hospital,
New Delhi

Guidelines to Establish a Comprehensive Stroke Centre

By
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Under the guidance of
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MBA Hospital and Health Management
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INSTITUTE OF HEALTH MANAGEMENT RESEARCH
(WHO Collaborating Centre for District Health System Based on Primary Health Care)

IIHMR UNIVERSITY

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Dr. Shashank Shanker Sharma**, student of MBA in Hospital and Health Management from The IIHMR University, Jaipur has undergone summer training at **Indraprastha Apollo Hospitals, New Delhi** from **1st April 2016** to **31st May 2016.**

The candidate has successfully carried out the study designated to his during summer training and his approach to the study has been sincere, scientific and analytical.

The summer training is in fulfillment of the course requirements.

I wish him all success in all her future endeavors.

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Date: May 31, 2016

To Whom So Ever It May Concern

This is to certify that Dr. Shashank Shanker Sharma, student of "Institute of Health Management Research, Jaipur" has successfully completed two months internship, which is a part of his course curriculum, in MBA-Health & Hospital Management program, from April 1, 2016 to May 31, 2016 at Indraprastha Apollo Hospitals, New Delhi.

During this period he was posted in Medical Superintendent's office and was involved in accomplishment of following assignments:

- Assisted and coordinated in preparation of guidelines for Establishment of Comprehensive Stroke Centre
- Assisted in preparation of report on Medico-Legal cases
- Did a study on Surgical Day Care patient turn-over in coordination with Quality team
- Assisted and coordinated in organizing Transplant Authorization Committee meetings
- Assisted and coordinated in Primary source verification of Doctors

We wish him all success in his future endeavor.

for **Indraprastha Medical Corporation Limited**
(Indraprastha Apollo Hospitals)

Anupam Srivastava

Anupam Srivastava
Manager - T & D

ACKNOWLEDGEMENTS

Words are inadequate to record my profound gratitude to the almighty for his countless blessings on me. He remains the driving force in my life.

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Dr ShashankShanker Sharma (MBBS, PGDHHM)
MBA- Hospital and Health Management
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TABLE OF CONTENTS

OBSERVATIONAL LEARNING

INTRODUCTION

Apollo Hospitals is the forerunner of integrated healthcare in Asia, as well as globally. Its presence encompasses over 10,000 beds across 64 hospitals, more than 2200 pharmacies, over 100 primary care & diagnostic clinics, 115 telemedicine units across 9 countries, health insurance services, global projects consultancy, 15 academic institutions and a Research Foundation with a focus on global clinical trials, epidemiological studies, stem-cell and genetic research.

IndraprasthaApollo hospital is a 718 beddedultra-modern multispecialty hospital situated in the heart of the country, New Delhi and is one of the most sought after destinations in Asia for healthcare. A state-of-the art modern facility in the heart of the capital, it is spread over 15 acres and has a built-up area of over 600,000 square feet. It is equipped with all the basic and latest facilities for the treatment and care of patients visiting the hospital from over 120 countries. The Hospital is JCI accredited since 2005 and is the first JCI accredited hospital of India.

OBJECTIVES

- To study the working of all the major departments of the hospitals, both clinical and non-clinical.
- To meet and interact with the various people working in the hospital.
- To prepare an observation report on the basis of these findings.

MODE OF DATA COLLECTION

Data collection involved discussions with the Administrative staff, the HODs on the managerial issues, communicating with the other staff and going through the records.

<u>Sources of Data</u>

➢ Primary

- By interacting with the HODs, executives, Doctors, Nursing staff and other valuable employees of the hospital.
- Through direct observations.

➢ Secondary

- Through the registered records
- Through the website of the hospital.
- Literature available about the hospital like magazines, pamphlets and brochures.

GENERAL FINDINGS

COMMITTEES AT APOLLO

The Committees that guide the smooth functioning of the hospital and help building the painstaking attitude in the employees:

- Quality Steering Committee
- Infection Control Committee
- Safety Committee
- Credentialing Committee
- Authorization Committee
- Appraisal Committee
- Medical Audit Committee
- Ethical Committee for Clinical Trials
- Ethics Committee
- Code Blue Committee
- Drug Committee
- Transfusion Committee
- Death Review Committee
- OT Committee

CODES

Blue:	Individual disaster	Call 66
Grey:	Internal disaster	Call 5555, 1926, 1983
Pink:	Baby disaster	Call 5555, 1926, 1983
Purple:	Fight likely	Call 5555, 1926, 1983
Black : Bomb Threat		Call 5555, 1926, 1983
Red	External Disaster	CMO to Activate
Orange:	Indication of deterioration in patient's condition	Call 66

In case you cannot recall the above numbers, please call/dial “9” or ‘66’

FIRE SAFETY

Upon discovering a fire, Call out the code word - Code Grey
(This will alert nearby staff members to the emergency situation)
In case of fire, first inform 5555 and then remember the mnemonic:**RACE**

R **:** Rescue

A **:** Alarm

C **:** Confine the fire

E **:** Extinguish (if trained) and evacuate

Type of Extinguishers:

1. WATER CO_2 TYPE- Used for ‘A’ CLASS FIRE – Used for general fire by wood, Cloth & Paper

(“A” written on fire extinguisher)Note: Do not use water co2 Type on electrical fire

2. CO_2 TYPE - Used for ‘BCE’ CLASS FIRE – Used for fire by Flammable Liquid, Burnable Gas, Metals &Electrical appliances
(“BCE” written on extinguisher)

3. Dry Chemical Powder (DCP) Type – Used in any type of fire including gaseous / electrical / fire.(Multipurpose use)
(“ABC" written on extinguisher)

UNIVERSAL PRECAUTION -Hand washing is the single most important factor to prevent and control infection.

SMOKING POLICY - Smoking in hospital premises is prohibited

CLINICAL SERVICES

OPD DEPARTMENT

Apollo has got 7 centralized OPD wings

Functions

Offers a complete facility of healthcare to the individual of all ages

Quality Indicators

- Patient's seen within scheduled appointment time
- Turnover time between two patients
- Patient's Satisfaction

Shortcoming's observed

- Poor maintenance of Flow of Patients
- High Waiting Time

EMERGENCY DEPARTMENT

The EMR department at Apollo is located on the Ground floor facing the main road and has a Separate Entrance. It has Waiting Lounge at its Entrance and EMR reception.
EMR is provided with its own Drugs and Stores. It is divided into two divisions:

- Observational: Minute and less severe cases are taken care of here. Such cases do not require admission and can be discharged after a few hours.
- Triage: Here severe cases are taken care of. This area is well equipped with all kinds of equipment to perform even a minor surgery.

Staffing-

- 1 HOD
- 5 CMO's
- Patient to Nurse ration- 1:1

OT DEPARTMENT

Apollo hospital has 16 OT's distributed in 3 locations namely OT complex 1 and OT complex 2 on the First floor and Ortho OT complex located on the Ground floor next to EMR

Functions

OT is committed to provide the highest standards of surgical care to the patients
Scope and Complexity of Services

- Cardiac
- Neuro
- Opthal
- ENT
- Gynae
- Plastic
- Ortho
- Micro disc
- Laproscopies
- Transplant
- Oncological and other General surgeries

There are 2 OT Complexes

OT No. 1, 2, 3- Cardiac OTs
4, 6- liver transplant OTs
5, 9- kidney transplant OTs
7, 8- NeuroOTs

9, 10, 11, 12, 13- Robotic OTs
14- Pediatric OT
15- Oncology OT
16, 17, 18- Ortho OTs
19- Gynae OT
20- Urology OT

No of cases/day- 70-80 cases

Days and hours of operations:

The OT department is functional from 8:00 to 20:00 hrs six days a week and EMR cases are taken on Sunday.

Quality Indicators

- Cases Load/month
- Needle stick injuries
- Same day cancellation/100 surgeries
- Unplanned returns to OT/100 surgeries
- Number of recovery room delays/100 surgeries

INTENSIVE CARE UNIT

An intensive care unit is a specialty staffed and equipped, separate, and self contained action of the hospital for the management of patients with life threatening or potentially life threatening clinical conditions.

Apollo has following ICU'S

- Surgical
- Medical
- Neuro
- Paediatric
- Stroke

- Coronary care unit
- Gastro care unit
- Organ transplant
- Neonatal ICU

DIALYSIS UNIT

Staffing
34 technicians
16-18 nurses
1 doctor on duty

No of beds- 26(2 as isolation beds)

No of patients/day- 90-100 patients

SUPPORT SERVICES

RADIOLOGY DEPARTMENT

Functions:

- Provides complete diagnostic and imaging services of high quality and minimum error.
- Has developed standard operating procedures(SOP)
- Has established goals, objectives and standards of performance that are consistent with both the hospitals philosophy of patient care and practice of professional service delivery and match international standards.

Services provided:

1. Common X-rays
2. Fluoroscopy
3. Ultrasound
4. Color Doppler
5. Fatal Medicine Unit
6. CT Unit
7. CT single disc
8. CT 64 Slice
9. MRI 3 Tesla

10. Ultrasound and CT guided invasive procedures
11. Nuclear Medicine

STAFF:

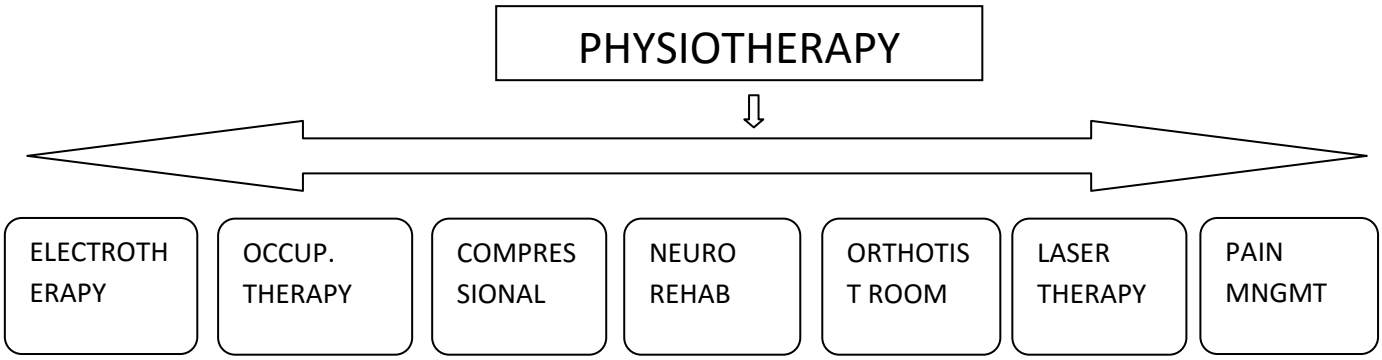
Doctors	23
Admin staff	17
Technician	29
Nurses	05
Housekeeping staff	17

NO.OF CASES:

PROCEDURE	DAILY AVERAGE
MAMMOGRAPHY	25
X-RAYS	250-300
PET SCANS	10-15
CT-SCAN	40-45
ULTRASOUND	153
MRI	30-35

PHYSIOTHERAPY

The patients are registered as referral and pre scheduled patients. It consists of 20 doctors and serves patients of 4 departments.



BLOOD BANK

Goal

- To have sufficient blood of all types to support an emergency, IPD, OPD, OT
- To maintain higher standards in all products and activities following GLP (Good Laboratory Practices) and GMP (Good Manufacturing Practices)

- To recreate ready accessible records of in-house eligible donors according to their blood group
- To upgrade Aphaeresis technology and maintain its continuous supply.

Days and hours of operation:

24 hours working 365 days a year

Quality Indicators

- Platelet count sent to Hematology lab for verification
- Fixed SOP for every procedure
- Equipment Calibration
- Chart maintained for temperature monitoring

MEDICAL RECORDS DEPARTMENT

It is to provide efficient storing, maintaining, coding and verification of medical records

Services Provided

- For storing of all medical records
- Verification of all records
- Issue of duplicate records
- Receipts and reply of mails
- Preparation and coordination in providing records for court cases and consumer cases
- Maintenance of MTP records
- Maintenance of MLC, Birth and Death registers
- Coordination with IT department for Backup of scanned records

UTILITY SERVICES

CENTRAL STERILE SUPPLY DEPARTMENT

It provides steady and effective supply of sterile linen and instruments of various departments in the hospital

Operations of the Department

- Sterile supplies are dispatched to the wards as when required and Used instruments are collected for cleaning and autoclaving by CSSD staff
- Sterile Supply to OT and Emergency a day prior before 8:00 Pm and as when required.

1. Receiving of the used material
2. Cleaning- a) Manual b) Mechanical by using Ultrasonic Machine or Washer
3. Packaging – Linen packing, Graft paper packing and sterilization wraps packing
4. Sterilization- a) High Temperature sterilization using Autoclave
   b) Low temperature sterilization using ETO/ Plasma
5. Storage

Equipment check is done by-

- Bouviedick test
- Chemical indicator
- Biological indicator

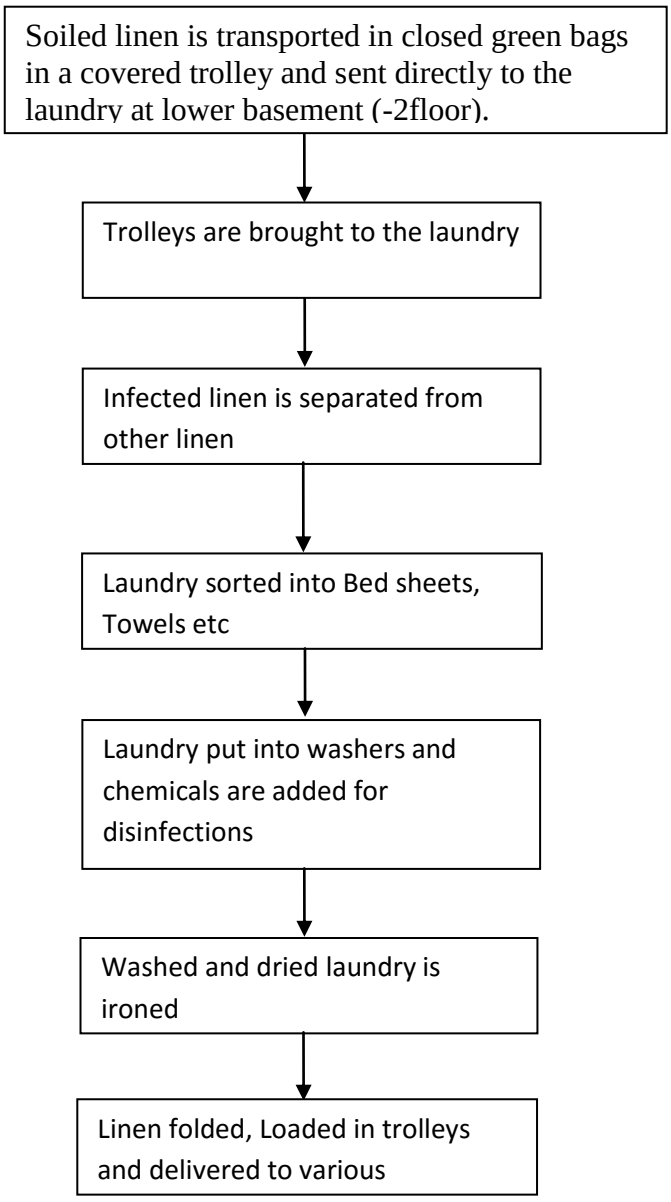
Equipment
CSSD- 3 autoclaves
TSSU OT 1- 2 autoclaves and 2 ETO sterilizers
In OT 2- 1 plasma sterilizer

Staff
12 technicians
3 nurses
9 housekeeping

LAUNDARY

It provides fresh linen to all hospital. It has a major role maintaining hygienic environment and in infection control. The staff of laundry is a mix of Contract labor and IMCL workers.

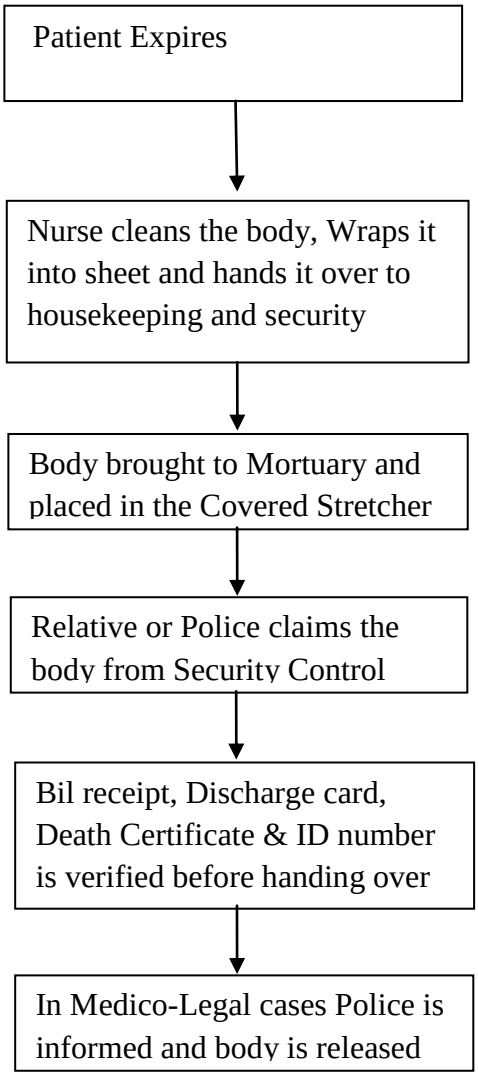
Work Flow



MORTUARY

It is a place where dead bodies are kept before they are claimed by the relative of the patients or added over to the police in Medico-Legal cases. It is located in the basement with a capacity of keeping 6 dead bodies at a given time. The security guards posted are responsible for releasing the body to the concerned person.

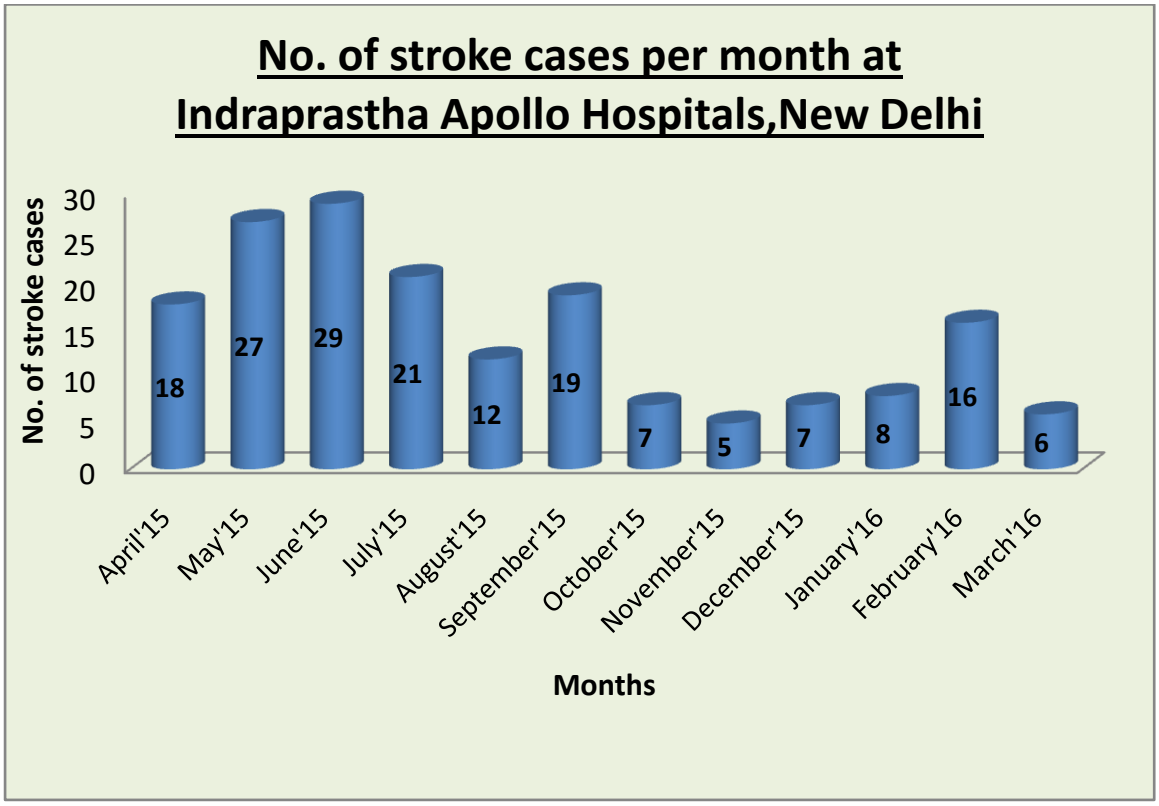
Work Flow


Patient Expires
Nurse cleans the body, Wraps it into sheet and hands it over to housekeeping and security
Body brought to Mortuary and placed in the Covered Stretcher
Relative or Police claims the body from Security Control
Bil receipt, Discharge card, Death Certificate & ID number is verified before handing over
In Medico-Legal cases Police is informed and body is released

PROJECT REPORT ON THE GUIDELINES TO ESTABLISH A COMPREHENSIVE STROKE CENTRE

INTRODUCTION

A stroke is a "brain attack" which occurs when blood flow to an area in the brain is cut off. Without blood and the oxygen it carries, part of the brain starts to die and the part of the body controlled by the damaged area of the brain does not work properly.
In India Stroke is the 3rd leading cause of death. 1.5 million people suffer from stroke in our country every year. So it's very important to streamline the processes to ensure the early management of stroke cases based on the acuity. Thus the establishment of more and more stroke centres is the need of the hour



The Neurosciences department of the hospital is amongst the hospital's centres of excellence providing the highest level of professional expertise and leadership through a galaxy of eminent faculty in the field of Neurology, Neurosurgery, Neuro Anaesthesia and Interventional Neurology along with rehabilitation. All types of patients with the Neurological/Neurosurgical problems including stroke cases are treated and taken care of with the world class expertise of doctors and other healthcare professionals.

For the treatment and care of stroke patients all the facilities are available and efficiently utilized by the hospital personnel. Hospital has a Stroke ICU with 6 beds and Neuro ICU

with 18 beds. An Acute Stroke Stat Sheet is present in the Emergency Triage of the hospital which is to be filled whenever a stroke patient comes to the hospital.

OBJECTIVES

- To study the already available facilities and treatment procedures for the stroke patients currently in the hospital setting.
- To lay down the Ideal Comprehensive Stroke Centre guidelines as per the International standards.
- To prepare the SOPs for each and every department and personnel concerned with the stroke treatment and care.

METHODOLOGY

- Type of Study: Descriptive Type of Study
- Place of Study: Indraprastha Apollo Hospitals, New Delhi
- Duration of Study: 15 days
- Method of Data Collection:

1. Discussion with the Director Medical Services, Dy. Director Medical Services, Neurologists, Neurosurgeons,Neuro Interventionists, ET Physicians and Nurses.
2. The study of various articles and journals for theinternational guidelines on stroke centre. The guidelines of American Heart Association/ American Stroke Association, European Stroke Organisation, Joint Commission International and Indian Stroke Association have been considered mainly.

GUIDELINES FOR THE COMPREHENSIVE STROKE CENTRE

Emergency care of the acute stroke victim depends on a 4-step chain: (1) rapid recognition of and reaction to stroke signs and symptoms (2) immediate Ambulance contact and priority dispatch (3) priority transport with prenotification to the receiving hospital and

(4) immediate emergency room triage, clinical, laboratory and imaging evaluation, and accurate diagnosis and administration of appropriate treatments at the receiving hospital.

Recommendations for the establishment of a Comprehensive stroke centre consist of 11 major elements that help an organization to achieve the level of collaboration among services required to rapidly identify and treat acute stroke patients. These 11 elements consist of the following:-

- Ambulance Services
- Emergency Triage
- Acute stroke team
- Neuroimaging
- Laboratory services
- Neurosurgical services
- Stroke unit
- Hospital and Administrative support
- Written care protocols
- Outcomes/Quality improvement
- Educational programs

Ambulance Services

- Ambulance services have a vital role in the rapid transportation and survival of stroke patients. Improved coordination between hospitals and ambulance services is a cornerstone of a well-developed Stroke Centre.

- Ambulance Service providers must be trained in the recognition of stroke and in prioritizing the patient with stroke for rapid transport to the hospital.

- Ambulance Service providers can assist the treatment process further by establishing the time of onset of stroke symptoms

- Ambulance Service staff members should be reminded not to over treat high blood pressure in the stroke patient, in whom maintaining perfusion pressure to the brain is vital.

- Stroke patients should be transported to the hospital with the same level of urgency as those with myocardial infarction (sometimes referred to as "load and go"). Early notification of ET personnel can shorten the time to evaluation so that treatment can start as soon as the patient arrives in the ET.

- Patients with strokes who arrive by Ambulance Service instead of private transport were more likely to receive brain imaging and physician interpretation of the imaging within recommended target times as the hospital has prenotification of the same.

- Air Medical Transport

  Air transport service is particularly useful to facilitate stroke care in remote areas. Activation of air medical transport for stroke is reasonable when ground transport to the hospital is >1 hour. In-flight stroke management protocols to be made to ensure safe and appropriate patient transports.

Emergency Triage

- ET personnel should be trained to diagnose and treat all types of stroke.
- ET personnel should have good communication with the Ambulance services and the acute stroke team
- ET personnel should undergo educational activities related to stroke diagnosis and management at least twice a year.
- As soon as the stroke patient comes to the ET, the ET physician after confirming the diagnosis should activate the **Stroke Code**. A call should be made to the Neurologist, Neurosurgeon, laboratory technician, Neuro Interventionist and MRI and CT scan Lab immediately.
- The efficiency of the ET evaluation and treatment can be enhanced by following the multidisciplinary written care protocol that outlines the role of each ET member and the steps to be followed.
- Standard orders may save valuable time and prevent omissions in the care of the patient with acute stroke.
- ET personnel can be helpful in locating family members who might have additional information about the time of onset of stroke and other issues concerning the patient.
- The initial evaluation of a potential stroke patient is similar to that of other critically ill patients:-

a) Immediate stabilization of the airway, breathing, and circulation (ABCs).

b) This is quickly followed by an assessment of neurological deficits and possible comorbidities.

c) The overall goal is not only to identify patients with possible stroke but also to exclude stroke mimics (conditions with stroke like symptoms), identify other conditions that require immediate intervention, and determine potential causes of the stroke for early secondary prevention.

d) Importantly, early implementation of stroke pathways and/or stroke team notification should occur at this point.

- Use of a standardized assessment and stroke scale i.e. National Institutes of Health Stroke Scale(NIHSS) helps quantify the degree of neurological deficits, facilitate communication, identify the location of vessel occlusion, provide early prognosis, help select patients for various interventions, and identify the potential for complications.

Emergency Triage Stroke Care Process Measure Assessment Tool	
Activity	**Time Targets**
Door to notification of Acute Stroke Team (AST), i.e., making the call to the team	Within 5 minutes of arrival
Door to Acute Stroke Team arrival	Within 15 minutes of arrival
Door to CT/ MRI initiation	Within 25 minutes
Door to CT/MRI interpretation	Within 45 minutes
Door to completion of ECG and interpretation	Within 45 minutes
Door to completion of lab results/interpretation	Within 30 minutes
Results (labs, CT) to tPA decision time	Within 10 minutes
Door to drug/needle (≥80% compliance)	Within 60 minutes
Door to stroke unit admission	Within 3 hours

Acute Stroke Team

It is the team which is first called upon immediately after the diagnosis of stroke is confirmed/suspected and should be present 24*7 within 15 minutes at the bedside of the patient.

- The Acute Stroke Team consists of an ET physician, a trained nurse, a neurologist and a radiologist.
- Team personnel should have experience and expertise in diagnosis and treatment of stroke patients.

- Treatment Capabilities- IV thrombolytics; Microsurgical neurovascular clipping of aneurysms; Neuroendovascular coiling of aneurysms; Stenting of extracranial carotid arteries; Carotid endarterectomy; Endovascular therapy

Neuroimaging

- The ability to perform brain imaging studies on acute stroke patients is vital for physicians to make a fast, accurate diagnosis of stroke patients. Brain imaging studies include CT, MRI and DSA.

- An Advanced Stroke Centre must be capable of performing an imaging study within 25 minutes of the patient's arrival. The image should be evaluated by a physician within 20 minutes of completion.

Imaging studies that should be availableare:-

1. 64 slice CT scan 24/7
2. Extra cranial Doppler/ Duplex sonography 24/7
3. Transthoracic/Trans oesophageal echocardiography
4. 3 Tesla MRI 24/7
5. 3D Rotational Cerebral angiography(DSA) Lab with XPER CT Facility 24/7
6. Digital X- Ray

Recommendations for Patients With Acute Cerebral Ischemic Symptoms That Have Not Yet Resolved:-

1. Emergency imaging of the brain is recommended before initiating any specific therapy to treat acute ischemic stroke. In most instances, NECT will provide the necessary information to make decisions about emergency management.
2. Either NECT or MRI is recommended before intravenous tPA administration to exclude ICH (absolute contraindication) and to determine whether CT hypodensity or MRI hyperintensity of ischemia is present.
3. Intravenous fibrinolytic therapy is recommended in the setting of early ischemic changes (other than frank hypodensity) on CT regardless of their extent.
4. A non-invasive intracranial vascular study is strongly recommended during the initial imaging evaluation of the acute stroke patient if either intra-arterial fibrinolysis or mechanical thrombectomy is contemplated for management but should not delay intravenous tPA if indicated.
5. In intravenous fibrinolysis candidates, the brain imaging study should be interpreted within 45 minutes of patient arrival in the ET by a physician with expertise in reading CT and MRI studies of the brain parenchyma.
6. CT perfusion and MRI perfusion and diffusion imaging, including measures of infarct core and penumbra, may be considered for the selection of patients for acute reperfusion therapy beyond the time windows for intravenous fibrinolysis. These techniques provide additional information that may improve diagnosis, mechanism, and severity of ischemic stroke and allow more informed clinical decision making.
7. Frank hypodensity on NECT may increase the risk of haemorrhage with fibrinolysis and should be considered in treatment decisions. If frank hypodensity involves more than one third of the MCA territory, intravenous tPA treatment should be withheld.

Recommendations for Patients With Cerebral Ischemic Symptoms That Have Resolved:-

1. Non-invasive imaging of the cervical vessels should be performed routinely as part of the evaluation of patients with suspected TIAs.
2. Non-invasive imaging by means of CTA or MRA of the intracranial vasculature is recommended to exclude the presence of proximal intracranial stenosis and/or occlusion and should be obtained when knowledge of intracranial steno occlusive disease will alter management. Reliable diagnosis of the presence and degree of intracranial stenosis requires the performance of catheter angiography to confirm abnormalities detected with non-invasive testing.
3. Patients with transient ischemic neurological symptoms should undergo neuroimaging evaluation within 24 hours of symptom onset or as soon as possible in patients with delayed presentations. MRI is the preferred brain diagnostic imaging modality. If MRI is not available, head CT should be performed.

Laboratory Services

- Standard laboratory services should be available around-the-clock, seven days a week at the Comprehensive Stroke Centre.

- Laboratory tests should be ordered and performed promptly so that the results are available within 30 minutes.
- A limited number of hematologic, coagulation, and biochemistry tests are recommended during the initial emergency evaluation, and only the assessment of blood glucose must precede the initiation of intravenous tPA.
- Baseline electrocardiogram and troponin assessment is recommended in patients presenting with acute ischemic stroke but should not delay initiation of intravenous tPA.

Immediate Diagnostic Studies to de done
All patients:-

- Blood glucose
- Serum electrolytes/renal function tests
- Complete blood count
- Prothrombin time/INR
- Activated PTT
- ECG

Selected patients:-

- Hepatic function tests
- Toxicology screen
- Blood alcohol level
- Pregnancy test
- Arterial blood gas tests (if hypoxia is suspected)
- Chest radiography (if lung disease is suspected)
- Lumbar puncture (if subarachnoid haemorrhage is suspected and CT scan is negative for blood)
- EEG (if seizures are suspected)

- Cardiac Markers.

Neurosurgical Services

- Advanced Stroke Centres should be able to provide neurosurgical services to stroke patients within two hours of when the services are deemed necessary.
- Comprehensive stroke care facilities should have 24 × 7 on call neurosurgeon to evaluate and operate in cases requiring such consultation and neurosurgery.
- There should be 24 hours operating facility and support personnel (anaesthesia, radiology, laboratory services, etc.) available.

Stroke Unit

Dedicated Stroke ICU for complex stroke patients should be available 24/7.Three basic principles of organized stroke unit care have been proven to be highly effective in terms of improved outcome. They include:-

1. Dedicated stroke ICU care means that acute stroke patients are treated in a geographically defined area of the hospital admitting exclusively stroke and TIA patients and not patients with other disorders. The reason for this principle is to specifically focus on the needs of the stroke patients and to allow the entire staff to develop expertise in stroke care.

2. The multiprofessional team approach implicates that stroke units must be staffed with physicians, nurses, physiotherapists, occupational therapists, speech therapists and neuropsychologists where available with special interest, training, and expertise in stroke care. This multiprofessional stroke team must work together in an organized and systematic way and cooperate as specified by the criteria. Stroke units must have specialized trained nurses dedicated to stroke patient care.

3. Comprehensive stroke unit care means that acute stroke management, that is, diagnostic work-up and treatment, is seamlessly combined with early mobilization and rehabilitation and secondary prevention, according to the needs of the patient (out of bed within 24-hour principle). The level of acute stroke care is enhanced and offers more possibilities and advanced care compared with a general ward or medical ICU.

- Stroke Unit monitoring :-
  Automated ECG monitoring (bedside)
  Automated monitoring of pulsoximetry
  Automated monitoring of blood pressure
  Automated monitoring of breathing
  Monitoring of temperature.

- Stroke Unit assessment :-
  Early rehabilitation assessment
  Food and fluid management
  Speech therapy start <2 days
  Pathway for dysphagia management
  Physiotherapy start <2 days
  Physiological management
  Early mobilization
  Skilled stroke nursing.

Hospital and Administrative Support

Development of the team often requires early input from the hospital's administration to enhance problem solving and integration between services.

Certain guidelines can be laid down by the administration as:-

1. Designation of resources in the form of a specific individual to lead the initiative is beneficial for keeping the process organized and consistently moving forward.
2. Written protocols should be there for the assignment of the responsibilities of each and every individual involved in the patient care and treatment.
3. A competent and satisfactory billing/payment procedure as the first priority of the hospital is to treat the patient urgently.

Written Care Protocols

Hospitals should have written procedures to streamline and accelerate the diagnosis and treatment of stroke patients. The availability of such protocols is a key step in reducing time to treatment as well as complications from treatment.

- Protocols should be made available for tPA use in acute stroke.
- Protocols for emergency care, diagnostic tests, stabilization of vital functions and use of medication should be made available.
- Protocols should be reviewed and updated at least once a year.
- 24 hour roster for Neuro Interventionist, Neurosurgeons and neurologists should be made daily and circulated to the respective departments.
- Patient should be shifted immediately to the ICU after the intervention is done and not kept in the emergency ward.
- A certain protocol should be made for the laboratory technicians to report immediately to prevent any delays.
- A Stamp for stroke alert should be made.
- Regular training of the MRI, CT and Cath Lab Technicians for the DSA Lab.

Outcomes/Quality Improvement

Advanced Tertiary level Stroke Centres should have a database or registry for tracking the number and type of stroke patients seen, their treatments, timeline for treatments and some measurement of patient outcome.

The practical documentation of the quality of stroke care is routinely guaranteed by:-

1. The multidisciplinary meeting group once a week and documentation in a logbook that each stroke patient was discussed by the multiprofessional team at least once.
2. The organization of an annual teaching course for nurses and nonmedical staff
3. The availability of a written stroke care protocol for acute stroke intervention and standard stroke management, including the prehospital phase, emergency department care, acute treatments, monitoring, early neurorehabilitation, discharge planning, and post hospital follow-up.
4. Monitoring of theEmergency Triage Stroke Care Process Measure Assessment Tool from the arrival of the patient till the needle/drug time.

Education Programs

- The professional staff of a Tertiary level Stroke Centre should receive at least eight hours per year of continuing medical education credit.
- In addition to professional education, the Tertiary level Stroke Centre should plan and implement at least two annual programs to educate the public about stroke prevention, diagnosis and availability for emergency treatment.
- Patient and public education regarding stroke symptoms and the need to call the emergency for these symptoms is imperative.
- All the health workers also must be educated on the availability of therapy for acute stroke and the critical 3-hour time frame for treatment with intravenous t-PA and the window (up to 8 hrs) for intra-arterial t-PA or clot extraction manoeuvres.

TIMESAVING RECOMMENDATIONS

- Ambulance Services prenotification: Ambulance Service providers should provide early prenotification to the receiving hospital when stroke is recognized in the field.
- Stroke tools: A stroke toolkit containing guidelines and other stroke tools should be available and utilized for each patient.
- Rapid triage protocol and stroke team notification: Acute triage protocols facilitate the timely recognition of stroke and reduce time to treatment.
- Transfer directly to imaging: Guided by prespecified protocols, eligible stroke patients can be transported from the Emergency Triage area directly to the scanner for initial neurologic examination and brain imaging to determine tPA eligibility, bypassing the ET bed.
- Rapid acquisition and interpretation of brain imaging: It is essential to initiate brain imaging as soon as possible after patient arrival.
- Rapid laboratory testing (including point-of-care testing, if indicated): INR, PT, and PTT results should be available as quickly as possible as and no later than 30 minutes after ET arrival.
- Rapid access and administration of intravenous tPA: Once eligibility has been determined and intracranial haemorrhage has been excluded, intravenous tPA should be promptly administered without delay.
- Team-based approach: The team approach based on standardized stroke pathways and protocols has proven to be effective in enhancing the number of eligible patients treated and reducing time to treatment in stroke.
- Prompt data feedback: Accurately measuring and tracking your hospital's door-to-needle (DTN) times, IV tPA treatment rates in eligible patients, other time intervals, and performance on other stroke performance/quality measures equip the stroke team to identify areas for improvement and take action.

RESPONSIBILITIES OF THE TREATING/ATTENDING PERSONNEL

ET Nurse Responsibilities

- Identifies patients with symptoms of acute stroke based on clinical presentation or entry notification from prehospital ambulance personnel.
- Notify Acute Stroke Team via call on cell phone.

Primary Nurse in ET/ICU

- Document vital signs every 15 minutes
- Place IVcanula
- Check O2 saturation and deliver oxygen as and when needed to maintain O2 sat > 94%
- Do ECG as early as possible
- Send orders for labs as follows:

1. Blood glucose
2. Serum electrolytes/renal function tests
3. Complete blood count
4. Prothrombin time/INR
5. Activated PTT

- Perform Glucometry
- Immediately prepare for patient to travel to CT/MRI/DSA with portable monitor
- Travel with patient to CT/MRI/DSA
- Document hourly neurologic reassessment
- Maintain strictly NPO untilfurther orders from the neurologist.
- Anticipate order for IV tPA to be started in CT/MRI/DSA
- Do not insert NG tube or Foley Catheter unless ordered
- Nursing care focuses on careful positioning and handling of the patients with pressure-area risk evaluation, neurological monitoring by means of scales, fluid balance assessment, monitoring of excretions and body temperature, and assessment of dysphagia.
- Nurses should also involve patients next to kin and caregivers in the training and care at home, and they should provide information on stroke, stroke recovery, and post stroke services, including access to stroke patients support organizations.

ET Physician Responsibilities

- As soon as information is available for Acute Stroke patient, activate the stroke code and ask a particular triage nurse to call the stroke team immediately and other required people as:-

1. Neurologist
2. Neuro Interventionist

3. CT and MRI technologist
4. Neurosurgeon
5. Pharmacy
6. Laboratory Technician

- Rapid evaluation of patient for ABC's to assess medical stability.
- Brief neurologic examination
- Write Orders for CT, MRI & Lab investigations
- Review treatment plan with Acute Stroke Team and any potential contraindications.

Neurologist Responsibilities

- Respond as soon as possible to patient bedside.
- Examine patient, document NIHSS, establish time of onset, review indications/contraindications/warnings for IV tPA and document reasons for non-treatment if appropriate.
- Obtain the informed consent for giving IV/IA tPA.
- Review non-contrast CT with radiologist and be prepared to start IV tPA in the CT suite if the NCCT does not demonstrate a contraindication and the diagnosis of acute ischemic stroke is considered highly likely. Do not delay initiation of tPA for further imaging (e.gCTA or MRI) unless diagnosis of stroke is unlikely or uncertain and further imaging is required to confirm appropriateness of treatment. Discuss risks and benefits of tPA and other treatment options with family/patient from standard tPA information sheet and obtain written consent when appropriate at the discretion of the treating physician. If patient is an endovascular candidate then introduce the concept to the family.
- Screen for indications for catheter-based reperfusion. If indications are present, call the Neuroendovascular surgeon immediately. In a transfer patient with suspected eligibility for intra-arterial intervention, the Neuroendovascular surgeon should be alerted by call prior to the patient's arrival.
- Management of blood pressure in acute stroke:

✓ If IV tPA eligible, then manage BP to achieve SBP/DBP less than 185/110

✓ If not eligible, then caution should be exercised when lowering BP.

Radiologist Responsibilities

- Respond as soon as possible to the call.
- Call CT/MRI to make sure that the scanner is available on the urgent basis and communicate this information to the ET and Neurology teams.
- Discuss imaging plan with ET and Neurology teams.
- Provide immediate interpretation of CT/MRI images.
- Supervise the administration of IV contrast for DSA, if performed.
- Obtain the consent for doing Neurointerventional studies.

Radiology CT/MRI/DSA Technician Responsibilities:

- Upon receiving a call, hold a CT/MRI scanner open until instructed otherwise by the neuroradiologist.

- Facilitate the immediate access of acute stroke patients into the scanner.
- Assist in obtaining IV access for contrast if none present.
- Execute the standard acute stroke CT/MRI/DSA protocols in collaboration under the supervision of the neuroradiologist. Intravenous contrast may be injected even if serum creatinine measurement is unavailable, or higher than usual guidelines, if and only if medical necessity is declared by the neurologist, and confirmed by the neuroradiologist.

TREATMENT RECCOMENDATIONS

STROKE TREATMENT OPTIONS

1. Medical Management
- IV-tPA is the clot busting drug used with stroke patients.
- Patients must be within the time window of 0-3 (or 3-4.5 hour window (in certain eligible patients) hours from symptom onset.
- There are other contraindications associated with the use of the drug .
2. Intra-arterial Thrombolysis
- IA thrombolysis is a technique where the doctor uses a catheter (like a heart catherization) to administer tPA directly into the blood clot blocking blood flow to part of the brain.
- This treatment can be administered up to 6 hours after stroke symptoms onset .
- Patients must meet strict criteria in order to receive this procedure.
3. Mechanical Thrombectomy
- This procedure uses a device to retrieve the clot .
- The time window for mechanical thrombectomy is up to 8 hours from symptom onset .
- If the patient fails IV-tPA or is ineligible for IV-tPA, they may be eligible for mechanical thrombectomy.

Rehabilitation for Stroke

Rehabilitation is the process of helping an individual achieve the highest level of independence and quality of life possible — physically, emotionally, socially, and spiritually. Rehabilitation does not reverse or undo the damage caused by a stroke, but rather helps restore the individual to optimal health, functioning, and well-being.

The stroke rehabilitation team

The stroke rehabilitation team revolves around the patient and family. The team helps set short- and long-term treatment goals for recovery and is made up of many skilled professionals, including the following:-

- Physicians such as a neurologist (a physician who treats conditions of the nervous system such as stroke) and physiotherapist (a physician who specializes in physical medicine and rehabilitation)
- Neuro Physiotherapists

- Rehabilitation nurses
- Speech and language Therapists
- Dieticians
- Social workers and chaplains
- Psychologists, neuropsychologists, and psychiatrists

The stroke rehabilitation program

The outlook for stroke patients today is more hopeful than ever due to advances in both stroke treatment and rehabilitation. Stroke rehabilitation works best when the patient, family, and rehabilitation staff works together as a team. Family members must learn about impairments and disabilities caused by the stroke and how to help the patient achieve optimal function again.

Some general treatment components for stroke rehabilitation programs include the following:-

- Treating the basic disease and preventing complications
- Treating the disability and improving function
- Providing adaptive tools and altering the environment
- Teaching the patient and family and helping them adapt to lifestyle changes

The success of stroke rehabilitation depends on many variables, including the following:

- The cause, location, and severity of stroke
- The type and degree of any impairments and disabilities from the stroke
- The overall health of the patient
- Family and community support.

CONCLUSION

- Laid down the Ideal Comprehensive Stroke Centre guidelines as per the International standards.

- Prepared the SOPs for each department and personnel concerned with the stroke treatment and care.