Treatment Guidelines
For
Accident and Emergency Care

Tamil Nadu Accident and Emergency Care Initiative
National Health Mission
Health and Family Welfare Department
Government of Tamil Nadu,
Chennai.
*
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Contents

Help Needed . . .

1. This is a Draft Manual.
2. We need your Inputs
3. Contribution can be Scientific, Technical, Administrative etc
4. You can Suggest Additions, Deletions, Modifications, Rearrangement of Topics (Insertions, Deletion, Substitution, and Frameshift if you like Genetics)

5. In addition to the above You can also Copy Edit (ie Correct the Grammar) or Proof Read (ie Correct the Typos)
6. You can send in your Contributions Online at http://www.taeionline.com/book or by mail to mail@taeionline.com mentioning the Version Number (Version Number of this draft is α.3.1) and Page Number (found in the top right)

Introduction

This Book has three Sections.

Section I describes the Various Stages in Treatment of an Accident (or Emergency) Patient and the Protocols / Guidelines / Instructions / Checklists at each stage. General Guidelines to be followed for any patient who needs Emergency Care in included in this Section. Guidelines Regarding Rehabilitation are also included

Section II Deals with Guidelines / Protocols / Instructions / Checklists for Specific Conditions like

1. Accidents
2. Chest Pain
3. Cerebrovascular Accidents (Stroke)
4. Snake Bite, Scorpion Sting
5. Poisons
6. Emergencies in Paediatric Patients

Section III gives an Overview of the Tamil Nadu Accident and Emergency Care Initiative. In this Section, we see the need for a separate Accident and Emergency Department at Institution Level as well as the need for a vertical programme to monitor these departments.

This Section also includes the Operational Guidelines as well as the Monitoring and Evaluation Mechanisms at State, District and Hospital Level.

Guidelines for Setting up of an Emergency Room (ER) are included in this Section

In Short

1. This Book on Treatment Guidelines is designed to give concise information for Administrators, Medical practitioners and Paramedical Staff and not intended to provide comprehensive scientific information
2. For detailed and up to date information as well as to know the current developments, users are requested to go through the original articles, review papers, case reports, related publications, websites etc.,
3. For administration of each drug, users are informed to go through the latest product information leaflets provided by the manufacturers
4. Users are reminded to recall the contraindications before using any drug.
5. Users have been motivated to make use of their experience and knowledge of patients before deciding the dosage and treatment of each patient
6. The hand book has been revised as on August 2017
7. The publisher (Commissioner of Trauma Care), Health and Family Welfare Department, the contributors and reviewers do not assume liability for any injury and / or any damage to persons or property arising out of this publication
8. Readers are requested to submit their suggestions, views, feed back to mail@taeionline.com which will be helpful for modifying / revising future editions.

Abbreviations

Abbreviation	Full Form
DTNC	Duty Trauma Nurse Coordinator
HTNC	Hospital Trauma Nurse Coordinator
RMO	Resident Medical Officer
ARMO	Assistant Resident Medical Officer
KBW	Kilogram Body Weight

Section I : Common Guidelines / Protocols / Instructions / Check Lists for All Patients

The Entire TimeLine From the moment of Incident to Discharge of the patient from the Hospital after completion of treatment can be divided into various stages. These stages are for ease of understanding and are not discrete events. They overlap each other and happen simultaneously and the patient receives care in continuum. For Example, Triage and Primary Survey overlap. Primary Survey and Resuscitation happen together. It is again emphasised that the care the patient receives is in continuum.

Incident

Incident denotes the accident or event (assault, snakebite etc) that led to the emergency, or the first symptom (Chest pain, Stomach pain, Breathlessness, Fits, Weakness, Unconsciousness, Vomiting etc) that has necessitated the visit to health care facility.

Time is the most important factor in the management of any medical or surgical emergency. **At time zero the person/patient is at their normal baseline.** In case of Injuries, There is then some interaction with an external factors (mechanical forces or chemicals or heat) leading to "injury". In case conditions like Stroke or Heart Attack, the disease process may start spontaneously or facilitated by factors like Dehydration, Hypertension, Exertion etc. The subsequent development of pathology, the response of the body by way of compensation and healing, and the external responses by health professionals all have a timeline; that timeline originates at time zero, the moment of "injury". The timeline may be used to compare and consider the progress from time zero to other significant events or deadlines that follow.

Some problems tend to lead to earlier death than others. An obstructed airway, a tension pneumothorax, an extradural haematoma or an ischaemic limb will all tend to progress along a characteristic time-line after the moment

of initial injury. This creates an 'imperative of time' that shapes and provides a basis for the hierarchy of our initial medical response to the injured patient. **Thus, an obstructed airway will need emergency initial management at the scene of the accident.** An ischaemic limb may be dealt with urgently once the patient has reached a definitive treatment centre. The order ABCD, that is airway, breathing, circulation and disability (neurology), of the ATLS (Advanced Trauma Life Support) system is founded upon this time dependence.

Understanding and assessing the nature of the problem usually hinges on diagnosing the injury. An injury may be discoverable by special investigation or careful physical examination, or be very obvious at different points on its timeline. An example is an evolving extradural haematoma: the initial skull fracture may be visible on radiography or computerised tomography (CT); as the haematoma develops it will first be visible on CT; later, it will be suspected on careful clinical examination; and, finally, it will become clinically very obvious.

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The next feature to add to the timeline is the response time. Once an obstructed airway is identified the response time to carry out a life-saving simple airway manoeuvre may be a matter of seconds. Thus, even at the stage when the diagnosis is clinically obvious there may still be time to resolve the problem before irretrievable damage occurs.

However, when the diagnosis is an extradural haemorrhage, the average response time from identification of the problem to surgical resolution may be measured in hours. This may seem an unduly long time, but bringing the patient to an operating theatre with a neurosurgeon takes time to arrange. If we now combine the various features of a timeline for the single condition of extradural haematoma, difficulties become apparent. If the response is only initiated once the diagnosis is very obvious there may be insufficient time left to resolve the problem before death.

This seems to suggest that we need to initiate a response to a problem before we are sure of its existence. It can be likened to the need to identify

a cancer at an early stage to give the best chance of successful treatment. A common approach to such a problem is to screen the at-risk population, and the same principle applies in trauma.

As we will see, much of the medical preparation and planning related to trauma is aimed at reducing the diagnosis time and the response time so that they will fit into the time available before death or irretrievable damage. To revise the meanings of these terms, **the diagnosis time is the time between injury and recognition of the problem** and **the response time is the time that elapses between identifying the problem and the intervention required to deal with it being completed.** We can reduce these times by **using a practised approach to the initial stages** of the management of a polytrauma patient. This does not absolve us from thinking but it does mean that we can **(1) have a pre-existing structure** upon which to build. This allows us to **(2)move forward more rapidly**. This structured initial approach allows for **(3)more straightforward teamwork** and **(4) standardisation of the equipment** required. This practised familiarity **(5) brings confidence to a difficult situation**.

The pressure of time determines the manner in which we deal with the multiply injured patient. The normal sequence of history, examination, provisional diagnosis, special investigations, diagnosis and management plan is not appropriate. When dealing with the multiply injured a quite different approach is needed. As will be seen, the primary survey used in ATLS combines the identification of life-threatening problems with their management. **It has evolved to improve the chances of the necessary actions being taken within the available time to save life and limb.** The system has to allow diagnosis and response within the timeline for the injuries sustained.

The model of a timeline need not be restricted to the multiply injured. The role of time when dealing with an elderly person who has been injured is still present but is frequently ignored. There may be hidden urgent issues. Thus, when dealing with the elderly we too readily label a patient with the most obvious problem (such as a hip fracture) without performing the vital initial

physiological triage. **They may have a primary cardiac, respiratory or neurological problem that has resulted in a fall and the response to this may be the most urgent issue.** Therefore, the timeline is not only relevant to the acute and obviously urgent clinical issues. As noted at the beginning of this chapter a timeline may be used to compare and consider the progress from time zero to other significant events or deadlines that follow.

The response time to arrange a discharge from hospital for the elderly patient may be protracted. With such a long response time, to allow for discharge at the appropriate clinical time the social planning needs to commence almost at the time of admission. This is well before it would seem clinically reasonable but to achieve an efficient system it is quite necessary. This approach allows an emergency unit to get as close as is possible to the practice of effective elective units where discharge plans are made before the patient is admitted.

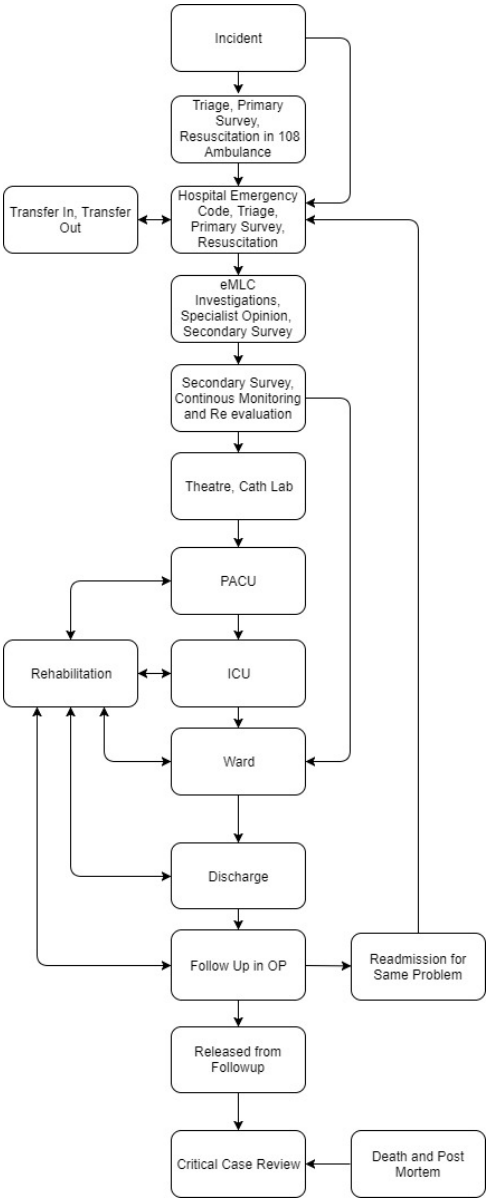
Time also plays a part in how we deal with more minor injuries. There is a need and expectation that these patients will be dealt with rapidly; however, there is then a danger, especially with inexperienced doctors, that corners will be cut and key problems missed. Focusing on the important issues without risking missing problems is a difficult skill. However, the risks can be reduced. Although not all patients will be seen by more than one doctor, another health professional, usually a nurse, will see them and their insights should not be ignored.

Timelines reveal that things change. As a consequence, reassessment can be of vital importance. An observation, a radiograph or a blood test are only snapshots in time. Repeated observation will reveal trends that may make a diagnosis more straightforward. Modern monitoring allows this continuing vigilance to be carried out more straightforwardly. Graphical recording of results in the HMIS Website as well as App makes trends easier to follow.

Stages in Patient Care

		Stage	Description	Time	
		Incident			
Pre Hospital	PH.1	Call	Patient or Relative Calling 108		
	PH.2	Reach	From Call to Picking Up the Patient by 108 Ambulance		
	PH.3	Transit	Picking Up the Patient by 108 Ambulance to Reception in Trauma Care Centre		
Hospital Emergency Codes	HE.1	Pre Intimation to Hospital and Hospital Preparation	Hospital Being Ready to Immediately Start Treatment	15 Minutes	
ER Care	ER.1	Triage	Red, Yellow or Green	2 Minutes	
	ER.2	Primary Survey	Check ABCDE	2 Minutes	
	ER.3	Resuscitation	Manage ABCDE	15 minutes	
	ER.4	AR Entry	AR Entry / eMLC	10 minutes	
	ER.5	Secondary Survey	Detailed Examination	30 minutes	
	ER.6	Investigations	Imaging and Blood Investigations	2 hours	
	ER.7	Specialist Opinion	Opinion and Management if needed	4 hours	
	ER.8	Monitoring and Re evaluation	Continuous post resuscitation monitoring and	6 hours	

			re evaluation		
Transfer	RE.1	Referral	Referral Out from One Hospital to Referral In to Next Hospital		
Hospital Care	HC.1	Emergency Intervention	Emergency Surgery / Thrombolysis / Angio/ Shifting to Ward		
	HC.2	Elective Intervention	Elective Surgery		
	HC.3	PACU Care	PACU		
	HC.4	ICU Care	ICU		
	HC.5	Post Op Care	Post Op Ward		
	HC.6	Ward Care	Ward		
	HC.7	Outcome	Discharge / Death		
Care Post Discharge	PD.1.a	Follow Up	Following Discharge		
	PD.1.b	Post Mortem	Following Death		
	PD.2	Completion	Released to Primary Care		
Administrative Follow Up	AD.1	Critical Case Review	To Modify the Protocols and to Improve the Patient Care	Before the completion of Next Calendar Month	


Incident
Triage, Primary Survey, Resuscitation in 108 Ambulance
Transfer In, Transfer Out
Hospital Emergency Code, Triage, Primary Survey, Resuscitation
eMLC Investigations, Specialist Opinion, Secondary Survey
Secondary Survey, Continous Monitoring and Re evaluation
Theatre, Cath Lab
PACU
Rehabilitation
ICU
Ward
Discharge
Follow Up in OP
Readmission for Same Problem
Released from Followup
Critical Case Review
Death and Post Mortem

Pre Hospital Care

This includes the Care received by the Patient from the Moment of Onset of the Symptoms till he steps into or is received into the ER in a Trauma Care Centre

This Pre Hospital Care has the Following Stages

1. PH.1 Call : From the Time of Accident / Onset of Symptom(s) to the Time of Patient or Relative Calling 108
2. PH.2 Reach : From the Time of First Call to 108 to "Picking Up" of the Patient by 108 Ambulance
3. PH.3 Transit : From the Time of Picking Up the Patient by 108 Ambulance to Reception in Trauma Care Centre

If the patient does not use 108 Ambulance Services, but reaches hospital by some other means, then PH.1, PH.2 and PH.3 can be considered as a single entity

The Guidelines and Protocols to be followed will be the same as those being followed by 108 Ambulance Services

Call

The 108 Guidelines to be followed

Reach

The 108 Guidelines to be followed

Transit

The 108 Guidelines to be followed

The EMT in consultation with emergency physicians will

1. Triage the Patient into Red, Yellow or Green
2. If the Patient qualifies for one of the 5 Sub Categories of Code Blue, he will inform the DTNC of the hospital and alert them regarding the Correct Code
    a. Code Blue Brain – Head Injuries and Stroke
    b. Code Blue Heart – Chest Injuries, Chest Pain, Breathlessness
    c. Code Blue Abdomen – Abdominal Injuries (Blunt as well as penetrating), Pain Abdomen
    d. Code Blue Poison – Snake Bite, Scorpion Sting, Poisoning
    e. Code Blue Burns - Burns
3. Do Primary Survey
4. Administer emergency care
5. Start Filling the TAEI Case Sheet
6. Continue Care as Directed by 108 Call Centre or Doctor from the Receiving Hospital
7. Confirm the Correct Building to which the patient needs to go

TAEI Case Sheet.

This 8 Page TAEI Case Sheet should travel with the patient from EMRI till discharge and attached to the regular case sheet

- The TAEI Case Sheet has to be filled with Carbon Paper
- in Ambulance,
    - The Entry will be made in Trauma Case sheet and the Copy will be in the EMT Register
- in Hospital
    - They will have to fill with trauma case sheet and with the carbon paper, and the carbon copy will be in the case sheet
- Hence there is no need of a separate referral form

The advantages are

1. Time delay that happens in preparing the referral discharge summary will be avoided
2. The entire past treatment will be available to the hospital which receives the treatment

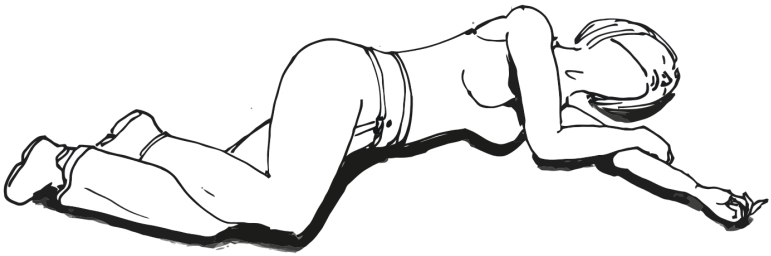
Position

The Patient has to be in the Recovery Position

Recovery Position

- The recovery position refers to one of a series of variations on a lateral recumbent or three-quarters prone position of the body, in to which an unconscious but breathing casualty can be placed as part of first aid treatment.
- An unconscious person, a person who is assessed on the Glasgow Coma Scale (GCS) at eight or below, in a supine position (on the back) may not be able to maintain an open airway as a conscious person would.
- This can lead to an obstruction of the airway, restricting the flow of air and preventing gaseous exchange, which then causes hypoxia, which is life-threatening.
- Thousands of fatalities occur every year in casualties where the cause of unconsciousness was not fatal, but where airway obstruction caused the patient to suffocate.
- The cause of unconsciousness can be any reason from trauma to intoxication from alcohol.
- The recovery position is designed to prevent suffocation through obstruction of the airway, which can occur in unconscious supine patients. The supine patient is at risk of airway obstruction from two routes:
    - **Mechanical obstruction:** In this instance, a physical object obstructs the airway of the patient. In most cases this is the patient's own tongue, as the unconsciousness leads to a loss of control and muscle tone, causing the tongue to fall to the back of the pharynx, creating an obstruction. This can be controlled (to an extent) by a trained person using airway management techniques.
    - **Fluid obstruction:** Fluids, usually vomit, can collect in the pharynx, effectively causing the person to drown. The loss of

muscular control which causes the tongue to block the throat can also lead to the stomach contents flowing into the throat, called passive regurgitation. Fluid which collects in the back of the throat can also flow down into the lungs. Another complication can be stomach acid burning the inner lining of the lungs, causing aspiration pneumonia.



- Placing a patient in the recovery position gives gravity assistance to the clearance of physical obstruction of the airway by the tongue, and also gives a clear route by which fluid can drain from the airway.
- The International Liaison Committee on Resuscitation does not recommend one specific recovery position, but advises on six key principles to be followed:
    1. The Patient should be in as near a true lateral position as possible with the head dependent to allow free drainage of fluid.
    2. The position should be stable.
    3. Any pressure of the chest that impairs breathing should be avoided.
    4. It should be possible to turn the victim onto the side and return to the back easily and safely, having particular regard to the possibility of cervical spine injury.
    5. Good observation of and access to the airway should be possible.

6. The position itself should not give rise to any injury to the casualty.

Hospital Emergency Codes

Golden Hour

Cases of severe trauma, especially internal bleeding, require surgical intervention. Complications such as shock may occur if the patient is not managed appropriately and expeditiously. In case of Head Injuries with Hematomas which cause Mass Effect, Rapid Decompression is needed. In case of Ischemic Stroke and Myocardial Infarction (MI), immediate restoration of Blood Flow is required. Every Minute or in fact every second delayed leads to more neurons or myocardial cells getting damaged. Even if the patient survives, the quality of life is affected.

In emergency medicine, the golden hour (also known as golden time) refers to a time period lasting for one hour, or less, following traumatic injury being sustained by a casualty or medical emergency, during which there is the highest likelihood that prompt medical treatment will prevent death and reduce residual deficit. It is well established that the patient's chances of survival are greatest if they receive care within a short period of time after a severe injury. The late Dr. R Adams Cowley is credited with promoting this concept, first in his capacity as a military surgeon and later as head of the University of Maryland Shock Trauma Center. The concept of the "Golden Hour" may have been derived from French military World War I data. The R Adams Cowley Shock Trauma Center section of the University of Maryland Medical Center's website quotes Cowley as saying, "There is a golden hour between life and death. If you are critically injured you have less than 60 minutes to survive. You might not die right then; it may be three days or two weeks later — but something has happened in your body that is irreparable." [Tribute to R Adams Cowley, M.D.," Archived 2005-12-24 at the Wayback Machine. University of Maryland Medical Center, R Adams Cowley Shock Trauma Center]

It therefore becomes a priority to not just transport patients suffering from severe trauma as fast as possible to hospital, but also for the hospital to be

ready to immediately start definition treatment of a patient who is in the Golden Hour.

Introduction to Hospital Codes

Hospitals and health care facilities all over the world utilise a nationally recognised set of codes to prepare, plan, respond and recover from internal and external emergencies. TAEI proposes to introduce such a standard set of Codes and Protocols Associated with the Codes

Code Colour	Code Description	Description of Emergency	Authority to Activate	Authority to Execute
Code Red	Fire	Fire or smoke emergency.	RMO	Duty Trauma Nurse Co Ordinator
Code Blue General	Collapsed Patients Requiring Resuscitation	Medical Emergency other than Code Blue Brain. Code Blue Heart, Code Blue Abdomen, Code Blue Poison, Code Blue Burs	Duty Trauma Nurse Co Ordinator	Duty Trauma Nurse Co Ordinator
Code Blue Brain		Patient with suspected Head Injury or Stroke	Duty Trauma Nurse Co Ordinator	Duty Trauma Nurse Co Ordinator
Code Blue Heart		Patient with Chest Pain, Breathlessness, ECG Changes	Duty Trauma Nurse Co Ordinator	Duty Trauma Nurse Co Ordinator
Code Blue Abdomen		Patients with Abdominal Injuries	Duty Trauma Nurse Co Ordinator	Duty Trauma Nurse Co Ordinator
Code Blue Poison		Patients with Snake Bite, Scorpion Sting	Duty Trauma	Duty Trauma

		or Other Poisoning	Nurse Co Ordinator	Nurse Co Ordinator
Code Blue Burns		Patients with Burns	Duty Trauma Nurse Co Ordinator	Duty Trauma Nurse Co Ordinator
Code Yellow	Mass Casualties	A multi-casualty incident that stretches or overwhelms the available health resources like Bus Accidents, Building Collapse	Duty Trauma Nurse Co Ordinator	Duty Trauma Nurse Co Ordinator
Code Pink	Abducted Infants	Abducted Neonates	RMO	Duty Trauma Nurse Co Ordinator
Code Violet	Violent Patients / Bystanders	Uncontrollable patients / bystanders	RMO	Duty Trauma Nurse Co Ordinator
Code Orange	Hazardous Spills		RMO	Duty Trauma Nurse Co Ordinator

Phases of an Hospital Emergency Codes

In some emergencies, such as a Code Blue following Cardiac Arrest in a Patient already in the hospital, an immediate response is required and First two Stages of Alert and Standby are byepassed. In other cases, consideration should be given to phase the emergency in one of the following four categories:

1. Alert: there is a possible emergency.
2. Standby: the emergency is imminent.
3. Response: the emergency exists and a response is required.
4. Stand down: the emergency has abated and recovery activities can begin.

Further, Each of the Hospital Emergency Codes will be described under three headings, aka 3Ps

1. Purpose
2. Policy
3. Procedures

Responsibilities of the Team Members

1. Duty Trauma Nurse Co Ordinator.
    a. The Duty Trauma Nurse Co Ordinator is the Senior Most Staff Nurse of the ER / Trauma Ward.
    b. He / She will be supervised by the Hospital Trauma Nurse Co Ordinator
    c. He / She will be the single point of contact for TAEI activities
    d. During his / her duty timings, she will be in possession of the Hospital TAEI Mobile.
    e. After completion of his / her shift, he / she will handover the mobile and charger to the next person on shift.
    f. It is his / her duty to ensure that the mobile is charged and reachable all the time.

g. He / She will liaison with the Other Hospitals and Ambulances for Transfer, Referral and Reception of patients
h. He / She Can Initiate All Variants of Code Blue Herself based on the Call from 108 or Other Hospitals.
i. He / She will Receive Pre Arrival Intimation from EMT
j. He / She will follow up the survival status and recovery of the cases in the referral hospitals
k. He / She will alert the TAEI Team during emergencies, mass casualty incidents and disasters
l. He / She will furnish everyday TAEI app details – Daily Reporting

2.

Code Blue Brain

Purpose

1. To Save As Many Neurons as Possible following Stroke or Head Injury or other causes of Raised Intracranial Tension
2. The purpose of the "Code Blue Brain" team is to assure the prompt and skilled resuscitation of persons
3. The formation of a "Code Blue Brain" team shall provide for trained personnel and relieve other hospital staff members of the responsibilities of attending this condition.

Policy

1. The "Code Blue Brain" Team of a hospital shall respond to all "Code Blue Brain" Calls that are called in that hospital

Procedure

1. Initiation of Code Blue Brain
    a. When ?
    b. By Whom ?
2. Composition of the Team
    a. Who ?
3. Procedures to be done
    a. What ?
    b. Where ?
4. Responsibilities of the Team Members
    a. How ?
5. Termination of Code Blue Brain

Initiation of Code Blue Brain

1. Code Blue Brain is initiated for
    a. Head Injuries
    b. Stroke

   c. Patient is Not Conscious
2. It is initiated by
   a. Duty Trauma Nurse Co Ordinator. The Duty Trauma Nurse Co Ordinator is the Senior Most Staff Nurse of the ER / Trauma Ward. During her duty timings, she will be in possession of the Hospital TAEI Mobile. After completion of her duty, she will handover the mobile and charger to the next person on shift. It is her duty to ensure that the mobile is charged and reachable all the time. The Hospitla Trauma Nurse Co Ordinator will supervise this
3. It is initiated for
   a. Patients Brought by 108
   b. Patients brought by other ambulances when Prior Hospital Intimation has been given
   c. Patients sustaining Injuries inside hospital or suddenly becoming unconscious inside the hospital

Composition of the Code Blue Brain Team

1. Duty Trauma Nurse Co Ordinator
2. Stretcher Bearers, Hospital Workers
3. CT Technician
4. DAP (Duty Assistant Physician) or Resident
5. DANS (Duty Assistant Neurosurgeon), DANP (Duty Assistant Neurophysician) if Available or Resident
6. Duty Assistant Anaesthesiologist
7. Duty Pharmacist
8. TAEI Nurses
9. Nurses from ER, Casualty, ICU
10. Emergency OT

Alert

1. Calls
   a. As soon as the DTNC received the Possibility of a patient for whom Code Blue Brain is likely to be needed, he or she will sound the First Call over Public Address System

b. The Code Blue Brain will be given a Number. New Numbers will start from 7 AM on that day (as per the Shift timing of Staff Nurse) Today's First Code Blue Brain, Today's Second Code Blue Brain etc
c. Second Call will be given 5 minutes after that
d. Third and Final Call will be given five minutes before the Ambulance reaches
e. If the emergency is inside the Hospital, the First Call will be mentioned as First and Final Call for In Hospital Emergency

Standby

2. Assembly
    a. As soon as the Call is given The Team will Assemble
    b. Theatre Team will assemble in theatre
    c. ICU Team will assemble in ICU
    d. Cath Lab Team will assemble in Cath Lab
    e. Rest of Team will assemble in the CT Scan Room
3. Incharge
    a. The DANS, DANP, DAP will be the person incharge of Conduct of Code Blue Brain Protocol
4. CT Scan
    a. If the CT Machine is not in use, it is to be Switched on and kept ready
    b. If it is being used, the procedure is completed and no fresh patients are admitted and the gantry is kept ready for the incoming emergency
5. Drugs
    a. Drugs for Thrombolysis are brought to the CT Room / ICU
    b. Emergency Tray is brought to the CT Room (or should we maintain a tray there ?)
6. ICU
    a. One Bed with Ventilator and IV Fluids will be made ready
7. EOT
    a. Table and Equipments will be made ready

Response

8. Reception
    a. The patient will be received in the Ambulance Bay and taken to CT Scan Room immediately **in the AMBULANCE Stretcher itself.**
    b. **If Needed, the patient will be intubated in the Ambulance stretcher itself.**
    c. **If Hemodynamically unstable, IV Fluids and Drugs will be given in the Ambulance stretcher itself**
    d. **The patient is shifted to the Gantry from the Ambulance Stretcher.**
    e. If the CT Scan is in some other building, or some other campus, instructions will be given to the 108 Team by the DTNC to directly bring the patient to the CT Room
9. CT Scan
    a. is taken using the EMRI Number or TAEI Number.
    b. Only After CT Scan is taken, the patient is shifted from the Gantry in the hospital stretcher
10. Decisions :
    a. Once Scan is Done, the following two questions are to be answered
        i. Does the Patient Require Surgery
        ii. Does the patient require thrombolysis
        iii. Can be patient be managed conservatively
11. Thrombolysis
    a. If the Patient requires Thrombolysis, the process is initiated as per Stroke Guidelines
12. If the patient requires surgery and if surgery can be done at that hospital
    a. The Patient is wheeled into the EOT and Surgery done with the EMRI Number
13. If the Patient requires surgery and if surgery cannot be done at that hospital

   a. Patient is immediately referred to the hospital where surgery can be done and Code Blue Brain is activated in that hospital
14. If the patient is to be managed conservatively, patient is shifted to ICU
15. AR Entries and Admission Procedures are done ONLY AFTER the above steps are completed

Stand Down

16. The Code Blue Brain Stand Down is done when
    a. Patient is shifted to EOT
    b. Thrombolysis is initiated
    c. Patient is shifted to ICU
    d. Patient is referred out to another hospital
17. Anouncements are again made that the Particular Code Blue Brain has been stood down. Eg "Stand down of Code Today's Second Code Blue Brain"
18. AR Entry and other admission procedures can be made only after Stand down is initiated
19. No AR Entry or other procedures are to be done till the stand down is initiated for a Code Blue Patient

1.

Code Blue Heart

Purpose

1. To Save As Much Myocardium as Possible following Ischemia or Infarction
2. To Maintain Oxygen Supply to the Maximum Possible Extent
3. The purpose of the "Code Blue Heart" team is to assure the prompt and skilled resuscitation of persons
4. The formation of a "Code Blue Heart" team shall provide for trained personnel and relieve other hospital staff members of the responsibilities of attending this condition.

Policy

1. The "Code Blue Heart" Team of a hospital shall respond to all "Code Blue Heart" Calls that are called in that hospital

Procedure

1. Initiation of Code Blue Heart
    a. When ?
    b. By Whom ?
2. Composition of the Team
    c. Who ?
3. Procedures to be done
    d. What ?
    e. Where ?
4. Responsibilities of the Team Members
    f. How ?
5. Termination of Code Blue Heart

Initiation of Code Blue Heart

1. Code Blue Brain is initiated for
    a. Chest Pain (traumatic as well as non traumatic)

   b. Breathlessness (traumatic as well as non traumatic)
2. It is initiated by
   a. Duty Trauma Nurse Co Ordinator. The Duty Trauma Nurse Co Ordinator is the Senior Most Staff Nurse of the ER / Trauma Ward. During her duty timings, she will be in possession of the Hospital TAEI Mobile. After completion of her duty, she will handover the mobile and charger to the next person on shift. It is her duty to ensure that the mobile is charged and reachable all the time. The Hospitla Trauma Nurse Co Ordinator will supervise this
3. It is initiated for
   b. Patients Brought by 108
   c. Patients brought by other ambulances when Prior Hospital Intimation has been given
   d. Patients sustaining Injuries inside hospital or suddenly developing Chest Pain or Breathlessness

Composition of the Code Blue Heart Team

1. Duty Trauma Nurse Co Ordinator
2. Stretcher Bearers, Hospital Workers
3. ECG Technician
4. X Ray Technician
5. CT Technician
6. DAP (Duty Assistant Physician), DAS (Duty Assistant Surgeon) or Resident
7. DAC (Duty Assistant ardiologist), DACTS (Duty Assistant Cardiothoracic Surgeon) if Available or Resident
8. Duty Pharmacist
9. TAEI Nurses
10. Nurses from ER, Casualty, ICU
11. Emergency OT

Alert

1. Calls

a. As soon as the DTNC received the Possibility of a patient for whom Code Blue Heart is likely to be needed, he or she will sound the First Call over Public Address System
b. The Code Blue Heart will be given a Number. New Numbers will start from 7 AM on that day (as per the Shift timing of Staff Nurse) Today's First Code Blue Heart, Today's Second Code Blue Heart etc
c. Second Call will be given 5 minutes after that
d. Third and Final Call will be given five minutes before the Ambulance reaches
e. If the emergency is inside the Hospital, the First Call will be mentioned as First and Final Call for In Hospital Emergency

Standby

2. Assembly
    a. As soon as the Call is given The Team will Assemble
    b. Cath Lab Team will assemble in Cath Lab
    c. Theatre Team will assemble in theatre
    d. ICU Team will assemble in ICU
    e. Rest of Team will assemble in the ER
3. Incharge
    a. The DAC, DAP, DACTS, DAS will be the person incharge of Conduct of Code Blue Heart Protocol
4. X Ray
    a. If the X Ray Machine is not in use, it is to be Switched on and kept ready
    a. If it is being used, the procedure is completed and no fresh patients are admitted and the gantry is kept ready for the incoming emergency
5. CT Scan
    b. If the CT Machine is not in use, it is to be Switched on and kept ready

c. If it is being used, the procedure is completed and no fresh patients are admitted and the gantry is kept ready for the incoming emergency

6. Drugs
    a. Drugs for Thrombolysis are brought to the CT Room / ICU
    b. Emergency Tray is brought to the CT Room (or should we maintain a tray there ?)
7. Cath Lab
    a. Cath Lab will be made Ready
8. ICU
    a. One Bed with Ventilator and IV Fluids will be made ready
9. EOT
    a. Table and Equipments will be made ready

Response

10. Reception
    b. The patient will be received in the Ambulance Bay and taken to ER immediately **in the AMBULANCE Stretcher itself.**
11. ECG
    a. ECG will be done and decision for thrombolysis will be taken by the DAC / DAP immediately
12. CT Scan
    c. In Case of Trauma, CT is taken using the EMRI Number or TAEI Number.
    a. Patient is taken to CT Scan Room immediately **in the AMBULANCE Stretcher itself.**
    b. **The patient is shifted to the Gantry from the Ambulance Stretcher.**
    d. Only After CT Scan is taken, the patient is shifted from the Gantry in the hospital stretcher
13. X Ray
    a. If CT Scan is not available, X Ray is taken
    b. Patient is taken to X Ray Room immediately **in the AMBULANCE Stretcher itself.**

c. **The patient is shifted to the X Ray from the Ambulance Stretcher.**

14. Only After CT Scan or X Ray is taken, the patient is shifted from the Gantry in the hospital stretcher
15. Decisions :
    e. Once Scan is Done, the following two questions are to be answered
        i. Does the Patient Require Thrombolysis
        ii. Does the patient require ICD
        iii. Does the patient require any other surgery
        iv. Can be patient be managed conservatively
16. Thrombolysis
    a. If the Patient requires Thrombolysis, the process is initiated as per STEMI Guidelines
17. ICD
    a. If the patient requires ICD, it is done in the ER itself in the Resuscitation Bay
18. If the patient requires surgery and if surgery can be done at that hospital
    a. The Patient is wheeled into the EOT and Surgery done with the EMRI Number
19. If the Patient requires surgery and if surgery cannot be done at that hospital
    b. Patient is immediately referred to the hospital where surgery can be done and Code Blue Heart is activated in that hospital
20. If the patient is to be managed conservatively, patient is shifted to ICU
21. AR Entries and Admission Procedures are done ONLY AFTER the above steps are completed

Stand Down

22. The Code Blue Heart Stand Down is done when
    c. Patient is shifted to EOT
    d. Thrombolysis is initiated
    e. Patient is shifted to ICU

f. Patient is referred out to another hospital

23. Anouncements are again made that the Particular Code Blue Heart has been stood down. Eg "Stand down of Today's Second Code Blue Heart"
24. AR Entry and other admission procedures can be made only after Stand down is initiated
25. No AR Entry or other procedures are to be done till the stand down is initiated for a Code Blue Patient

Code Blue Abdomen

Purpose

1. To Reduce Mortality and Morbidity following Abdominal Trauma and other Causes of "Acute Abdomen"
2. The purpose of the "Code Blue Abdomen" team is to assure the prompt and skilled resuscitation of persons
3. The formation of a "Code Blue Abdomen" team shall provide for trained personnel and relieve other hospital staff members of the responsibilities of attending this condition.

Policy

1. The "Code Blue Abdomen" Team of a hospital shall respond to all "Code Blue Abdomen" Calls that are called in that hospital

Procedure

1. Initiation of Code Blue Abdomen
    g. When ?
    h. By Whom ?
2. Composition of the Team
    i. Who ?
3. Procedures to be done
    j. What ?
    k. Where ?
4. Responsibilities of the Team Members
    l. How ?
5. Termination of Code Blue Abdomen

Initiation of Code Blue Abdomen

1. Code Blue Abdomen is initiated for
    a. Abdominal and Pelvic Trauma
    b. Acute Abdomen
2. It is initiated by

   a. Duty Trauma Nurse Co Ordinator. The Duty Trauma Nurse Co Ordinator is the Senior Most Staff Nurse of the ER / Trauma Ward. During her duty timings, she will be in possession of the Hospital TAEI Mobile. After completion of her duty, she will handover the mobile and charger to the next person on shift. It is her duty to ensure that the mobile is charged and reachable all the time. The Hospitla Trauma Nurse Co Ordinator will supervise this
3. It is initiated for
   a. Patients Brought by 108
   b. Patients brought by other ambulances when Prior Hospital Intimation has been given
   c. Patients sustaining Injuries inside hospital or suddenly developing Acute Abdoment inside the hospital

Composition of the Code Blue Abdomen Team

1. Duty Trauma Nurse Co Ordinator
2. Stretcher Bearers, Hospital Workers
3. Radiologist
4. CT Technician
5. DAS (Duty Assistant Surgeon) or Resident
6. TAEI Nurses
7. Nurses from ER, Casualty, ICU
8. Emergency OT

Alert

1. Calls
   a. As soon as the DTNC received the Possibility of a patient for whom Code Blue Abdomen is likely to be needed, he or she will sound the First Call over Public Address System
   b. The Code Blue Abdomen will be given a Number. New Numbers will start from 7 AM on that day (as per the Shift timing of Staff Nurse) Today's First Code Blue Abdomen, Today's Second Code Blue Abdomen etc
   c. Second Call will be given 5 minutes after that

d. Third and Final Call will be given five minutes before the Ambulance reaches
e. If the emergency is inside the Hospital, the First Call will be mentioned as First and Final Call for In Hospital Emergency

Standby

1. Assembly
    a. As soon as the Call is given The Team will Assemble
    b. Theatre Team will assemble in theatre
    c. ICU Team will assemble in ICU
    d. Rest of Team will assemble in the ER
2. Incharge
    a. The DAS will be the person in charge of Conduct of Code Blue Abdomen Protocol
3. USG
    a. If the USG Machine is not in use, it is to be Switched on and kept ready
    b. If it is being used, the procedure is completed and no fresh patients are admitted and the gantry is kept ready for the incoming emergency
4. X Ray
    a. If the X Ray Machine is not in use, it is to be Switched on and kept ready
    b. If it is being used, the procedure is completed and no fresh patients are admitted and the gantry is kept ready for the incoming emergency
5. CT Scan
    a. If the CT Machine is not in use, it is to be Switched on and kept ready
    b. If it is being used, the procedure is completed and no fresh patients are admitted and the gantry is kept ready for the incoming emergency
6. ICU
    c. One Bed with Ventilator and IV Fluids will be made ready

7. EOT
    d. Table and Equipments will be made ready

Response

8. Reception
    e. The patient will be received in the Ambulance Bay and taken to ER Immediately and eFAST will be done.
9. USG
    a. If needed, USG will be done by the Radiologist
10. Decisions :
    f. Once Scan is Done, the following two questions are to be answered
        v. Does the Patient Require Surgery
        vi. Can be patient be managed conservatively
11. If the patient requires surgery and if surgery can be done at that hospital
    g. The Patient is wheeled into the EOT and Surgery done with the EMRI Number
12. If the Patient requires surgery and if surgery cannot be done at that hospital
    h. Patient is immediately referred to the hospital where surgery can be done and Code Blue Abdomen is activated in that hospital
13. If the patient is to be managed conservatively, patient is shifted to ICU
14. AR Entries and Admission Procedures are done ONLY AFTER the above steps are completed

Stand Down

15. The Code Blue Abdomen Stand Down is done when
    i. Patient is shifted to EOT
    j. Patient is shifted to ICU
    k. Patient is referred out to another hospital

16. Anouncements are again made that the Particular Code Blue Abdomen has been stood down. Eg "Stand down of Code Today's Second Code Blue Abdomen"
17. AR Entry and other admission procedures can be made only after Stand down is initiated
18. No AR Entry or other procedures are to be done till the stand down is initiated for a Code Blue Patient

2.

Code Blue Poison

Purpose

4. To Reduce Mortality and Morbidity following Poisoning / Snake Bite / Scorpion Sting
5. The purpose of the "Code Blue Poison" team is to assure the prompt and skilled resuscitation of persons
6. The formation of a "Code Blue Poison" team shall provide for trained personnel and relieve other hospital staff members of the responsibilities of attending this condition.

Policy

2. The "Code Blue Poison" Team of a hospital shall respond to all "Code Blue Poison" Calls that are called in that hospital

Procedure

6. Initiation of Code Blue Poison
    m. When ?
    n. By Whom ?
7. Composition of the Team
    o. Who ?
8. Procedures to be done
    p. What ?
    q. Where ?
9. Responsibilities of the Team Members
    r. How ?
10. Termination of Code Blue Poison

Initiation of Code Blue Poison

4. Code Blue Poison is initiated for
    d. Poisons Intake
    e. Snake Bite
    f. Scorpion Sting

5. It is initiated by
    g. Duty Trauma Nurse Co Ordinator. The Duty Trauma Nurse Co Ordinator is the Senior Most Staff Nurse of the ER / Trauma Ward. During her duty timings, she will be in possession of the Hospital TAEI Mobile. After completion of her duty, she will handover the mobile and charger to the next person on shift. It is her duty to ensure that the mobile is charged and reachable all the time. The Hospitla Trauma Nurse Co Ordinator will supervise this
6. It is initiated for
    h. Patients Brought by 108
    i. Patients brought by other ambulances when Prior Hospital Intimation has been given
    j. Envenomation or Poisoning inside hospital

Composition of the Code Blue Poison Team

9. Duty Trauma Nurse Co Ordinator
10. Stretcher Bearers, Hospital Workers
11. DAP (Duty Assistant Physician) or Resident
12. Duty Pharmacist
13. TAEI Nurses
14. Nurses from ER, Casualty, ICU
15. Emergency OT

Alert

19. Calls
    l. As soon as the DTNC received the Possibility of a patient for whom Code Blue Poison is likely to be needed, he or she will sound the First Call over Public Address System
    m. The Code Blue Poison will be given a Number. New Numbers will start from 7 AM on that day (as per the Shift timing of Staff Nurse) Today's First Code Blue Poison, Today's Second Code Blue Poison etc
    n. Second Call will be given 5 minutes after that

o. Third and Final Call will be given five minutes before the Ambulance reaches
p. If the emergency is inside the Hospital, the First Call will be mentioned as First and Final Call for In Hospital Emergency

Standby

20. Assembly
    q. As soon as the Call is given The Team will Assemble
    r. ICU Team will assemble in ICU
    s. Rest of Team will assemble in the ER
21. Incharge
    t. The DAP will be the person incharge of Conduct of Code Blue Poison Protocol
22. CT/BT
    u. Bed Site CT / BT are to be done by the TAEI Nurse
23. Drugs
    v. ASV is brought to the ER / ICU
    w. Emergency Tray is brought to the ER Room
24. ICU
    x. One Bed with Ventilator and IV Fluids will be made ready

Response

25. Reception
    y. The patient will be received in the Ambulance Bay and taken to ER immediately
    z.
26. CT / BT
    aa. is taken in the ER using the EMRI Number or TAEI Number.
27. ECG
    a. Is taken in the ER
28. Can be patient be managed conservatively
29. ASV

bb. If the Patient requires ADV, it is given

30. Stomach Wash
    cc. Is given
31. If the patient is to be managed conservatively, patient is shifted to ICU
32. AR Entries and Admission Procedures are done ONLY AFTER the above steps are completed

Stand Down

33. The Code Blue Poison Stand Down is done when
    dd. Patient is shifted to EOT
    ee. Thrombolysis is initiated
    ff. Patient is shifted to ICU
    gg. Patient is referred out to another hospital
34. Anouncements are again made that the Particular Code Blue Poison has been stood down. Eg "Stand down of Code Today's Second Code Blue Poison"
35. AR Entry and other admission procedures can be made only after Stand down is initiated
36. No AR Entry or other procedures are to be done till the stand down is initiated for a Code Blue Patient

3.

Code Blue Burns

Purpose

7. To Reduce Mortality and Morbidity following Burns
8. The purpose of the "Code Blue Burns" team is to assure the prompt and skilled resuscitation of persons
9. The formation of a "Code Blue Burns" team shall provide for trained personnel and relieve other hospital staff members of the responsibilities of attending this condition.

Policy

3. The "Code Blue Burns" Team of a hospital shall respond to all "Code Blue Burns" Calls that are called in that hospital

Procedure

11. Initiation of Code Blue Burns
    s. When ?
    t. By Whom ?
12. Composition of the Team
    u. Who ?
13. Procedures to be done
    v. What ?
    w. Where ?
14. Responsibilities of the Team Members
    x. How ?
15. Termination of Code Blue Burns

Initiation of Code Blue Burns

7. Code Blue Burns is initiated for
    k. Burns
8. It is initiated by
    l. Duty Trauma Nurse Co Ordinator. The Duty Trauma Nurse Co Ordinator is the Senior Most Staff Nurse of the ER /

Trauma Ward. During her duty timings, she will be in possession of the Hospital TAEI Mobile. After completion of her duty, she will handover the mobile and charger to the next person on shift. It is her duty to ensure that the mobile is charged and reachable all the time. The Hospitla Trauma Nurse Co Ordinator will supervise this

9. It is initiated for
    m. Patients Brought by 108
    n. Patients brought by other ambulances when Prior Hospital Intimation has been given
    o. Patients sustaining Burns inside hospital

Composition of the Code Blue Burns Team

16. Duty Trauma Nurse Co Ordinator
17. Stretcher Bearers, Hospital Workers
18. CT Technician
19. DAS (Duty Assistant Surgeon) or Resident
20. TAEI Nurses
21. Nurses from ER, Casualty, ICU

Alert

37. Calls
    hh. As soon as the DTNC received the Possibility of a patient for whom Code Blue Burns is likely to be needed, he or she will sound the First Call over Public Address System
    ii. The Code Blue Burns will be given a Number. New Numbers will start from 7 AM on that day (as per the Shift timing of Staff Nurse) Today's First Code Blue Burns, Today's Second Code Blue Burns etc
    jj. Second Call will be given 5 minutes after that
    kk. Third and Final Call will be given five minutes before the Ambulance reaches
    ll. If the emergency is inside the Hospital, the First Call will be mentioned as First and Final Call for In Hospital Emergency

Standby

38. Assembly
    mm. As soon as the Call is given The Team will Assemble in the ER
39. Incharge
    nn. The DAS will be the person incharge of Conduct of Code Blue Burns Protocol
40. Burns Ward
    oo. One Bed will be readied in the Burns Ward

Response

41. Reception
    pp. The patient will be received in the Ambulance Bay and taken to ER
    qq.
42. Cut Down will be made
43. Patient is shifted to Burns Ward
44. AR Entries and Admission Procedures are done ONLY AFTER the above steps are completed

Stand Down

45. The Code Blue Burns Stand Down is done when
    rr. Patient is shifted to Burns Ward
    ss. Patient is referred out to another hospital
46. Anouncements are again made that the Particular Code Blue Burns has been stood down. Eg "Stand down of Code Today's Second Code Blue Burns"
47. AR Entry and other admission procedures can be made only after Stand down is initiated
48. No AR Entry or other procedures are to be done till the stand down is initiated for a Code Blue Patient

4.

Hospital Care

The Hospital Care includes Care in ER Room and Care in the Respective Departments.

Care in ER Room

The action in the ER Room can be broadly classified as assessment and response. Although the two concepts overlap and intertwine it is helpful to explore them separately. They can be further subdivided into following Stages

1. ER.1 Triage : Categorisation of Patient into Red, Yellow or Green Categories
2. ER.2 Primary Survey : Check ABCDE
3. ER.3 Resuscitation : Manage ABCDE
4. ER.4 AR Entry : eMLC
5. ER.5 Secondary Survey : Detailed Examination
6. ER.6 Investigations : Imaging and Blood Investigations
7. ER.7 Specialist Opinion : From Specialists
8. ER.8 Definitive Care : Continuous post resuscitation monitoring and re evaluation

Of the above eight stages of Management in ER,

- 1,2,5,6,7 are Assessment Events
- 3,8 are Responses

Triage

Triage is the process of determining the priority of patients' treatments based on the severity of their condition. This rations patient treatment efficiently

when resources are insufficient for all to be treated immediately. The term comes from the French verb trier, meaning to separate, sift or select.

Triage is an important concept in modern health-care systems, and three essential phases have developed:

1. Pre-hospital triage – in order to despatch ambulance and prehospital care resources; (This is done by the 108 Call Centre and hence is not explained here)
2. At the scene of trauma;
3. On arrival at the receiving hospital.

The term triage may have originated during the Napoleonic Wars from the work of Dominique Jean Larrey. The term was used further during World War I by French doctors treating the battlefield wounded at the aid stations behind the front. The brief behind establishing these systems focused on the identification of those immediately at risk of loss of life, then moving to the management of urgent cases and prioritising these into clinically stable but seriously ill and into the most appropriate order for evacuation, and identifying the most appropriate receiving unit.

There are discrepancies in the local availability of services such as neurosurgery, vascular surgery, plastic surgery, orthopaedic surgery and intensive care facilities in various hospitals. We are in the process of establishing Trauma Care Centres and specialised trauma units that cater for those seriously injured. Hence the concept of triage is an important one and should be understood, and it remains the entry point to an organised system of care to maximise outcome in any medical framework.

In trauma, two types of triage situation usually exist:

1. Multiple casualties. Here, the number and severity of injuries do not exceed the ability of the facility to render care. Priority is given to the life-threatening injuries followed by those with polytrauma.
2. Mass casualties. The number and severity of the injuries exceed the capability and facilities available to the staff. In this situation, those

with the greatest chance of survival and the least expenditure of time, equipment and supplies are prioritised

All Patients coming to the ER are at first "Triaged" and are sorted out into Red, Yellow or Green Categories as per the Guidelines Given Below. AR Entry and Registration are made after Triage.

The Following Parameters are used for sorting

1. Physiological Parameters like
    a. Breathing / Airway
    b. Respiratory Rate
    c. Radial Pulse
    d. BP
    e. Capillary Refilling Time
    f. AVPU Scale
    g. GCS Scale
2. Nature of Injuries (as found during Examination)
3. Mechanism of Occurrence of Injuries (from History)

The Following Table Gives the Criteria

	Red Criteria	**Yellow Criteria**	**Green Criteria**
Physiological Assessment of Airway, Breathing, Circulation, Deformity	A : Noisy Breathing	A : Patent Airway	A : Patent Airway
	B : RR <10 or > 24/min	B : RR 10 – 24 / min SPO2 > 95 %	B : RR 10 – 24 / min SPO2 > 95 %
	C : Radial Pulse – Present / Absent Pulse < 50 or > 100/min SBP < 90 mm Hg Capillary Refill > 2 sec	C : Pulse 50 to 100 SBP > 90 mm Hg Capillary Refill < 2 Sec	C : Pulse 50 to 100 SBP > 90 mm Hg Capillary Refill < 2 Sec
	D : Responding only to Pain on AVPU GCS <13 Spine Injury with Single Breath count More than 15	D : Responding to Verbal on AVPU GCS 13,14,15 Spine Injury with Single Breath Count < 15	D : Alert on AVPU Scale GCS 15
Injuries Identified	• Gun Shot • Stab • Obvious Major Vascular Injuries	• Open Fractures or Closed Fractures of Hand and feet • Isolated Long Bone	• Abrasions • Lacerations • Bruises • Isolated

	• Open Fractures (excluding hand and feet)
	• Two or More long bone Fractures
	• Pelvic Fracture
	• Flail Chest with paradoxical Respiration
	• Chest trauma with
	  ○ Surgical Emphysema
	  ○ Seat Belt Mark
	  ○ CCT Positive
	• Traumatic Amputation (Above Wrist or Ankle) Major Crush or Degloving Injuries, Extremities without pulse
	• Multiple Injured
	• Visible Neck Swelling
	• Burns > 15% apart from limbs
	• Inconclusive
		Fracture
		• GCS 15 with
		  ○ Alcohol
		  ○ Anti coagulant
		  ○ LOC / Vomiting
		  ○ Nasal / ENT Bleed
		  ○ Limb Weakness
		• Burns < 15 %
			Fracture of Small Bones of Hand and feed

Mechanism of Injury	• Suspected Sexual Assault • All Penetrating Injuries • Blunt Trauma Abdomen • Fall from more than three times the height of the patient • Fall from more than five steps • Struck between heavy vehicles / Roll Over • Railway Track • Co Passenger Dead • Ejected from Vehicle • Steering Wheel • Prolonged Extraction Time (> 5 minutes) from Vehicle • Pedestrian vs Motor Vehicle • Inhalational Injury , Drowning, Suicide Attempt • Mechanism of Injury Not Known	• Suspected Child Abuse • Suspected Elderly Abuse • Significant Assault • Fall from more than double the height of the patient • Fall from less than five steps • Pregnancy	• Came for Medicolegal examination

Primary Survey

In case of Patients who are admitted directly to the Casualty, the patients are shifted to the ER after triage. In the ER, Primary Survey and Resuscitation are carried out

In case of Patients who have been transported in 108 Ambulance, Primary Survey and Resuscitation would have begun in the Ambulance itself.

Primary Survey involves Checking ABCDE and Resuscitation involves Management to Maintain ABCDE. Though they are being dealt with separately in this manual, in practice, during the primary survey cum resuscitation, life threatening conditions are identified and management is begun simultaneously.

ABCDE means

- A-Airway maintenance with cervical spine control
- B-Breathing and ventilation
- C-Circulation, Hemorrhage control
- D-Disability: Neurological status, Consciousness, Focal Neurological Deficit
- E-Exposure: To Check for Poisons, Trauma

Time

The Primary Survey can be done in less than 10 seconds by two simple questions

- Ask the patient his or her name?
- Ask the patient what happened?

If the Patient is able to answer immediately and correctly, it is assumed that

- Airway is Patent
- There is Sufficient air reserve to permit speech
- There is Sufficient perfusion
- Sensorium is Clear

Patient Moving All Four Limbs to Commands and Presence of Bilateral Radial and Bilateral Dorsalis Pedis Pulsations confirm the C and D

Physiological Variations

can Occur in special populations like

- Elderly
- Infants and Children
- Pregnant Women
- Obese
- Athletes

B-Breathing and ventilation

Once Airway is secured, the attention is diverted to Breathing and Ventilation

- Airway patency alone does not ensure adequate ventilation.
- Adequate gas exchange is required to maximize oxygenation and carbon dioxide elimination.
- Ventilation requires adequate function of the lungs, chest wall, and diaphragm.
- Each component must be rapidly examined and evaluated.
- The patient's neck and chest should be exposed to adequately assess jugular venous distention, position of the trachea, and chest wall excursion.
- Auscultation should be performed to ensure gas flow in the lungs.
- Visual inspection and palpation can detect injuries to the chest wall that may compromise ventilation.
- Percussion of the thorax can also identify abnormalities, but during a noisy resuscitation this may be difficult or produce unreliable results.
- Assess
    - Jugular venous distension
    - Position of trachea
    - Respiratory rate
    - Percussion findings of chest

  - Air entry
  - Oxygen saturation
- Injuries that severely impair ventilation in the short term include tension pneumothorax, flail chest with pulmonary contusion, massive hemothorax, and open pneumothorax.
- These injuries should be identified during the primary survey and may require immediate attention for ventilatory efforts to be effective.
- Simple pneumothorax or hemothorax, fractured ribs, and pulmonary contusion can compromise ventilation to a lesser degree and are usually identified during the secondary survey.
- Recognise and treat early –
  - Tension pneumothorax
  - Flail chest with pulmonary contusion
  - Massive haemothorax
  - Open pneumothorax
- Immediate Chest decompression with Oxygen delivery
- **Remember that After excluding tension pneumothorax, cause of hypotension is hypovolemia until proved otherwise**
- Differentiating between ventilation problems and airway compromise can be difficult:
  - Patients who have profound dyspnea and tachypnea appear as though their primary problem is related to an inadequate airway. However, if the ventilation problem is caused by a pneumothorax or tension pneumothorax, intubation with vigorous bag-mask ventilation can rapidly lead to further deterioration of the patient.
  - When intubation and ventilation are necessary in an unconscious patient, the procedure itself can unmask or aggravate a pneumothorax, and the patient's chest must be reevaluated. Chest x-rays should be obtained as soon after intubation and initiation of ventilation as is practical.

C-Circulation, Hemorrhage control

- Circulatory compromise in trauma patients can result from many different injuries.
- Blood volume, cardiac output, and bleeding are major circulatory issues to consider.
- **Bilateral Carotid, Radial, Dorsalis Pedis Pulse along with SpO2 and Hematocrit can help in earlier identification of Problems in Circulation**
- Blood Volume and Cardiac Output :
    - Hemorrhage is the predominant cause of preventable deaths after injury.
    - Identifying and stopping hemorrhage are therefore crucial steps in the assessment and management of such patients.
    - Once tension pneumothorax has been eliminated as a cause of shock, hypotension following injury must be considered to be hypovolemic in origin until proven otherwise.
    - Rapid and accurate assessment of an injured patient's hemodynamic status is essential.
- The elements of clinical observation that yield important information within seconds are level of consciousness, skin color, and pulse
    - Level of Consciousness When circulating blood volume is reduced, cerebral perfusion may be critically impaired, resulting in altered levels of consciousness. However, a conscious patient also may have lost a significant amount of blood.
    - Skin Color Skin color can be a helpful sign in evaluating injured hypovolemic patients. A patient with pink skin, especially in the face and extremities, rarely has critical hypovolemia after injury. Conversely, the patient with hypovolemia may have ashen, gray facial skin and pale extremities.
    - Pulse The pulse, typically an easily accessible central pulse (e.g., femoral or carotid artery), should be assessed bilaterally for quality, rate, and regularity. Full, slow, and regular

peripheral pulses are usually signs of relative normovolemia in a patient who is not taking ß-adrenergic blocking medications. A rapid, thready pulse is typically a sign of hypovolemia, but the condition may have other causes. A normal pulse rate does not necessarily indicate normovolemia, but an irregular pulse does warn of potential cardiac dysfunction.

- Absent central pulses that are not attributable to local factors signify the need for immediate resuscitative action to restore depleted blood volume and effective cardiac output.

- Bleeding :
  - The source of bleeding should be identified as either external or internal.
  - External hemorrhage is identified and controlled during the primary survey.
  - Rapid, external blood loss is managed by direct manual pressure on the wound.
  - Tourniquets are effective in massive exsanguination from an extremity, but carry a risk of ischemic injury to that extremity and should only be used when direct pressure is not effective.
  - The use of hemostats can result in damage to nerves and veins.
  - The major areas of internal hemorrhage are the
    - chest,
    - abdomen,
    - retroperitoneum,
    - pelvis, and
    - long bones.
  - The source of the bleeding is usually identified by physical examination and imaging (e.g., chest x-ray, pelvic x-ray, or focused assessment sonography in trauma [FAST]).
  - Management may include chest decompression, pelvic binders, splint application, and surgical intervention.

- Trauma respects no patient population barrier. The elderly, children, athletes, and individuals with chronic medical conditions do not respond to volume loss in a similar or even in a "normal" manner.
    - Elderly patients have a limited ability to increase their heart rate in response to blood loss, which obscures one of the earliest signs of volume depletion—tachycardia. Blood pressure has little correlation with cardiac output in older patients. Anticoagulation therapy for medical conditions such as atrial fibrillation, coronary artery disease, and transient ischemic attacks can increase blood loss.
    - Children usually have abundant physiologic reserve and often have few signs of hypovolemia, even after severe volume depletion. When deterioration does occur, it is precipitous and catastrophic.
    - Well-trained athletes have similar compensatory mechanisms, may have bradycardia, and may not have the usual level of tachycardia with blood loss.
    - Often, the AMPLE history is helpful
        - Allergies
        - Medications currently used
        - Past illnesses/Pregnancy
        - Last meal
        - Events/Environment related to the injury
    -
- Anticipation and an attitude of skepticism regarding the patient's "normal" hemodynamic status are appropriate.

D-Disability: Neurological status, Consciousness, Focal Neurological Deficit

- A rapid neurologic evaluation is performed at the end of the primary survey.
- This neurologic evaluation establishes the patient's
    - level of consciousness,

  - pupillary size and reaction,
  - lateralizing signs, and
  - spinal cord injury level.
- The GCS is a quick, simple method for determining the level of consciousness that is predictive of patient outcome, particularly the best motor response.
- A decrease in the level of consciousness may indicate decreased cerebral oxygenation and/or perfusion, or it may be caused by direct cerebral injury.
- An altered level of consciousness indicates the need for immediate reevaluation of the patient's oxygenation, ventilation, and perfusion status.
- Hypoglycemia and alcohol, narcotics, and other drugs also can alter the patient's level of consciousness.
- However, if these factors are excluded, changes in the level of consciousness should be considered to be of traumatic central nervous system origin until proven otherwise.
- Primary brain injury results from the structural effect of the injury to the brain.
- Prevention of secondary brain injury by maintaining adequate oxygenation and perfusion are the main goals of initial management.

E-Exposure: To Check for Poisons, Trauma

- The patient should be completely undressed, usually by cutting off his or her garments to facilitate a thorough examination and assessment. After the patient's clothing has been removed and the assessment is completed, the patient should be covered with warm blankets or an external warming device to prevent hypothermia in the trauma receiving area.
- Intravenous fluids should be warmed before being infused, and a warm environment (i.e., room temperature) should be maintained.

- The patient's body temperature is more important than the comfort of the healthcare providers.

Resuscitation

As being stressed again and again, Resuscitation is a part and parcel of primary survey and again follows the same ABCDE Pattern

Airway – Establishing Patent airway with c-spine protection

GOAL :
The Aim is to have Room Air Oxygen Saturation of 100 % and if that is not possible 100 % SpO2 with Oxygen Supplementation

As well, immobilization of the cervical spine is the accepted standard of care to prevent secondary neurologic injury. The most effective device for this purpose is the halo vest although it tends to be inappropriate in the emergency setting. The most practical apparatus is a combination of a hard collar and sandbags on opposite sides of the head. Tape is then extended from one side of the spine board over the forehead of the patient to the opposite side of the board. This provides near complete cessation of movement. On its own, a hard collar provides only moderate protection and a soft collar offers minimal benefit.

STEPS :
The following steps are to be followed

- Clear the airway using wide bore suction
- Chin lift / Jaw thrust manoeuvre
- Oropharyngeal / nasopharyngeal airway
- Definitive airway (Cuffed, Secured endotracheal tube)
- Surgical airway

Wide Bored Suction

- First and Foremost, the Airway is cleared with a wide bored suction and the secretions, and blood (if any) are removed.

Head Tilt / Chin lift and Jaw thrust manoeuvre

- The two most common methods for opening the airway are the head-tilt/chin-lift and jaw-thrust maneuvers.

	Head Tilt / Chin Lift	Jaw Thrust
Advantages	Easy to do	Can be used in Case of Cervical Spine Injury
Disadvantages	Dangerous is Patient has Cervical Spine Injury	Needs Training

Head Tilt / Chin Lift Manoeuvre

- While the head-tilt/chin-lift is the preferred method, it can be dangerous to use on a patient who may have a cervical spine injury.
- To perform the head-tilt maneuver, approach the patient from the side and place the palm of one hand on the patient's forehead and push down gently, rolling the patient's head towards the top. Then, using the fingers of your free hand, lightly lift the chin even further up.
- The International Liaison Committee on Resuscitation's "Treatment Recommendation" under "Opening the Airway" says, "Rescuers should open the airway using the head tilt–chin lift maneuver."

Jaw thrust manoeuvre

- The jaw-thrust maneuver is a first aid and medical procedure used to prevent the tongue from obstructing the upper airways.
- The maneuver is used on a **supine patient.**
- It is performed by placing the index and middle fingers to physically push the posterior aspects of the mandible upwards while their thumbs push down on the chin to open the mouth.
- When the mandible is displaced forward, it pulls the tongue forward and prevents it from obstructing the entrance to the trachea.
- Traditionally, the jaw-thrust maneuver has been considered the better alternative (rather than the head-tilt/chin-lift maneuver) when a first aider suspects that the patient may have a spinal injury (especially one to the neck portion of the spine).
- If the patient is in danger of pulmonary aspiration, he or she should be placed in the recovery position, or advanced airway management should be used.

Oropharyngeal / nasopharyngeal airway

Oropharyngeal Airway

- An oropharyngeal airway (also known as an oral airway, OPA or Guedel pattern airway) is a medical device called an airway adjunct used to maintain or open a patient's airway. It does this by preventing the tongue from covering the epiglottis, which could prevent the person from breathing. When a person becomes unconscious, the muscles in their jaw relax and allow the tongue to obstruct the airway

- Oropharyngeal airways come in a variety of sizes, from infant to adult, and are used commonly in pre-hospital emergency care and for short term airway management post anaesthetic or when manual methods are inadequate to maintain an open airway.
- This piece of equipment is utilized when tracheal intubation is either not available, not advisable or the problem is of short term duration.
    - Lifts the tongue off the posterior pharyngeal wall to prevent airway obstruction
    - bite block
    - assist oropharyngeal suctioning
    - promotes moulding of the face of a mask for manual ventilation
- Oropharyngeal airways are indicated only in unconscious people, because of the likelihood that the device would stimulate a gag reflex in conscious or semi-conscious persons. This could result in vomit and potentially lead to an obstructed airway. Nasopharyngeal airways are mostly used instead as they do not stimulate a gag reflex.

- In general, oropharyngeal airways need to be sized and inserted correctly to maximize effectiveness and minimize possible complications, such as oral trauma.

- Parts:
    - flange to prevent overinsertion
    - reinforced bite section
    - curved body to conform over tongue/palate
    - tubular air channel
- Sizes:
    - equal to length in cm
    - colour coded bite portions can aid easy size identification (children – 00, 1, 2; adults – 4, 5, 6)
    - sized by measuring from the center of the mouth between the first incisors to the angle of the mandible in an adult
- The correct size OPA is chosen by measuring from the first incisors to the angle of the jaw. The airway is then inserted into the person's mouth upside down. Once contact is made with the back of the throat, the airway is rotated 180 degrees, allowing for easy insertion, and assuring that the tongue is secured. An alternative method for insertion, the method that is recommended for OPA use in children and infants, involves holding the tongue forward with a tongue depressor and inserting the airway right side up.
- METHOD OF INSERTION/ USE
    - Children – insert directly over the tongue ideally with aid of a tongue depressor (no twisting through 180 degrees)
    - Adults – rotate 180 degrees from concave upwards position as it is inserted over the tongue
    - Lubricant may aid insertion
    - The device is removed when the person regains swallow reflex and can protect their own airway, or it is substituted for an advanced airway. It is removed simply by pulling on it without rotation.

- Use of an OPA does not remove the need for the recovery position and ongoing assessment of the airway and it does not prevent obstruction by liquids (blood, saliva, food, cerebrospinal fluid) or the closing of the glottis. It can, however, facilitate ventilation during CPR (cardiopulmonary resuscitation) and for persons with a large tongue.
- The main risks of its use are:
    - if the person has a gag reflex, they may vomit
    - when it is too large, it can close the glottis and thus close the airway
    - improper sizing can cause bleeding in the airway

Nasopharyngeal Airway

- Nasopharyngeal airway, also known as an NPA, nasal trumpet (because of its flared end), or nose hose, a type of airway adjunct, is a tube that is designed to be inserted into the nasal passageway to secure an open airway. When a patient becomes unconscious, the muscles in the jaw commonly relax and can allow the tongue to slide back and obstruct the airway. This makes airway management necessary, and an NPA is one of the available tools. The purpose of the flared end is to prevent the device from becoming lost inside the patient's nose.
- Sizes : As with other catheters, NPAs are measured using the French catheter scale, but sizes are usually also quoted in millimeters. Typical sizes include: 6.5 mm/28FR, 7.0 mm/30FR, 7.5 mm/32FR, 8.0 mm/34FR, and 8.5 mm/36FR
- Indications

  - where an artificial form of airway maintenance is necessary, but tracheal intubation is impossible, inadvisable, or outside the practitioner's scope of practice.
  - An NPA is often used in conscious patients where an oropharyngeal airway would trigger the gag reflex.
- Contraindications
  - Nasal pharyngeal airways are not recommended for patients with possible head injury.
- Insertion
  - The correct size airway is chosen by measuring the device on the patient: the device should reach from the patient's nostril to the earlobe or the angle of the jaw. The outside of the tube is lubricated with a water-based lubricant so that it enters the nose more easily. The device is inserted until the flared end rests against the nostril. Some tubes contain a safety pin to prevent inserting the tube too deeply. Care must be taken to ensure the pin does not stick into the nostril. In the event that a pin is not available, you may also stop insertion just short of the natural gag reflex and tape the remaining exposed portion of the NPA to the surrounding facial tissue.

Definitive airway (Cuffed, Secured endotracheal tube)

If Airways cannot be secured with the methods mentioned above, Intubation is needed

- Rapid Sequence of Intubation (RSI) is the standard or care in emergency airway management for intubations not anticipated to be difficult
- RSI is virtually simultaneous administration of a sedative and a neuromuscular blocking agent to render a patient rapidly unconscious and flaccid in order to facilitate urgent endotracheal intubation and to minimize the risk of aspiration
- RSI Protocol for Hemodynamically Stable Patient
  - Preoxygenate with 100 % Oxygen
  - Midazolam 5mg (0.1mg/KBW)

  - Fentanyl upto 100 μg (2 μg/KBW)
  - SuccinylCholine 100 mg (2mg/KBW)
  - Wait for 60 seconds and then intubate
- RSI Protocol for Hemodynamically unstable Patient
  - Preoxygenate with 100 % Oxygen
  - Ketamie 100 mg (1-2 mg/KBW)
  - SuccinylCholine 100 mg (2mg/KBW)
  - Wait for 60 seconds and then intubate
- Midazolam and Fentanyl can cause hypotension and hence should be avoided in hemodynamically unstable patients
- SCh induces Rapid, Complete and Predictable Paralysis with Spontaneous Recovery in about 5 minutes. But, if can cause Potassium release from muscles and hence dangerous hyperkalemia, especially in those with extensive burns and soft tissues injuries. It is imperative to Either Avoid SCh or Check K^+ levels before using SCh with the following conditions
  - Known Case of CKD
  - Extensive Burns (Can be given if patient presents within 24 hours)
  - Spinal Shock after 24 hours
- If SCh is absolutely contraindicated in hemodynamically unstable patients, a small dose of midazolam (2mg) can be given during RSI

Difficult Intubation

If Intubation is not possible, The plans for Alternate Airway are considered. They are

1. Laryngeal Mask Airway
2. Intubating Laryngeal Mask Airway
3. Surgical Airway

Laryngeal Mask Airway

Intubating laryngeal Mask Airway

- The Laryngeal Mask Airway has been developed further as intubating Laryngeal Mask Airway
- The Steps are
    a. Preoxygenation
    b. Induction with Fentanyl 1 microgram / KBW and Propofol 3 mg / KBW
-
-
-
-

4.
5. AlterSurgical Airway can be done. This can be

Surgical airway
If Intubation is not possible, AlterSurgical Airway can be done. This can be

The inability to intubate the trachea is a clear indication for an alternate airway plan, including laryngeal mask airway, intubating laryngeal mask airway, or a surgical airway. A surgical airway (i.e., cricothyroidotomy or tracheostomy) is established when edema of the glottis, fracture of the larynx, or severe oropharyngeal hemorrhage obstructs the airway or an endotracheal tube cannot be placed through the vocal cords. A surgical cricothyroidotomy is preferable to a tracheostomy for most patients who require establishment of an emergency surgical airway, because it is easier to perform, associated with less bleeding, and requires less time to perform than an emergency tracheostomy.

Needle- Cricothyroidotomy Needle cricothyroidotomy involves insertion of a needle through the cricothyroid membrane or into the trachea in an emergency situation to provide oxygen on a short-term basis until a definitive airway can be placed. Needle cricothyroidotomy can provide temporary,

supplemental oxygenation so that intubation can be accomplished on an urgent rather than an emergent basis. The jet insufflation technique is performed by placing a large-caliber plastic cannula, 12- to 14-gauge for adults, and 16- to 18-gauge in children, through the cricothyroid membrane into the trachea below the level of the obstruction

The cannula is then connected to oxygen at 15 L/min (40 to 50 psi) with a Y-connector or a side hole cut in the tubing between the oxygen source and the plastic cannula. Intermittent insufflation, 1 second on and 4 seconds off, can then be achieved by placing the thumb over the open end of the Y-connector or the side hole. The patient can be adequately oxygenated for 30 to 45 minutes using this technique, and only patients with normal pulmonary function who do not have a significant chest injury may be oxygenated in this manner

During the 4 seconds that the oxygen is not being delivered under pressure, some exhalation occurs. Because of the inadequate exhalation, CO2 slowly accumulates, limiting the use of this technique, especially in patients with head injuries.

Jet insufflation must be used with caution when complete foreign-body obstruction of the glottic area is suspected. Although high pressure can expel the impacted material into the hypopharynx, where it can be removed readily, significant barotrauma can occur, including pulmonary rupture with tension pneumothorax. Therefore, particular attention must be paid to effective airflow, and low flow rates (5 to 7 L/min) should be used when persistent glottic obstruction is present.

The inability to intubate a patient expediently, provide a temporary airway with a supraglottic device, or establish a surgical airway resultsin hypoxia and patient deterioration. Remember that performing a needle cricothyroidotomy with jet insufflation can provide the time necessary to establish a definitive airway.

Surgical cricothyroidotomy is performed by making a skin incision that extends through the cricothyroid membrane. A curved hemostat may be inserted to dilate the opening, and a small endotracheal tube or tracheostomy tube (preferably 5 to 7 mm OD) can be inserted.

When an endotracheal tube is used, the cervical collar can be reapplied. It is possible for the endotracheal tube to become malpositioned and therefore easily advanced into a bronchus. Care must be taken, especially with children, to avoid damage to the cricoid cartilage, which is the only circumferential support for the upper trachea. Therefore, surgical cricothyroidotomy is not recommended for children under 12 years of age.

Tracheostomy

1. Assemble the necessary Equipment (tracheostomy tray, tube, suture, cuffed disposable tracheostomy tube)
2. Place the patient supine with the next extended
3. Surgically prepare and anaesthetize the area locally
4. Make a transverse skin incision over the lower nect over the trachea – preferably below the second tracheal ring
5. Incise the deep cervical fascia, retract the strap muscles laterally
6. Expose the trachea
7. beware of the thyroid isthmus, retract is superiorly, ligate any vessels carefully
8. Incise the tracheal cartilate after confirming by aspiration of air, removing a cuff of the trache
9. Insert a cuffed tracheostomy tube
10. Inflate the cuff and ventilate the patient
11. Close the incision
12. Secure the tube to prevent dislodgement

In recent years, percutaneous tracheostomy has been reported as an alternative to open tracheostomy. This is not a safe procedure in the acute trauma situation, because the patient's neck must be hyperextended to properly position the head to perform the procedure safely. Percutaneous tracheostomy requires the use of a heavy guidewire and sharp dilator, or a

guidewire and multiple or single large-bore dilators. This procedure can be dangerous and time-consuming, depending on the type of equipment used.

B-Breathing and ventilation

Once Airway is secured, the attention is diverted to Breathing and Ventilation

- Airway patency alone does not ensure adequate ventilation.
- A tension pneumothorax compromises ventilation and circulation dramatically and acutely; if one is suspected,
- chest decompression should follow immediately.
- Every injured patient should receive supplemental oxygen.
- If not intubated, the patient should have oxygen delivered by a mask-reservoir device to achieve optimal oxygenation.
- The pulse oximeter should be used to monitor adequacy of oxygen hemoglobin saturation.

Needle Thoracentesis procedure is appropriate for patients in critical condition with rapid deterioration who have a life-threatening tension pneumothorax and in whom placement of an expeditious chest tube is not possible. Success rate in the presence of a tension pneumothorax is 50–75% due to length of needle and catheter, size of chest wall,and kinking of the catheter. If this technique is used and the patient does not have a tension pneumothorax, a pneumothorax and/or damage to the lung may occur.

- STEP 1. Assess the patient's chest and respiratory status.
- STEP 2. Administer high-flow oxygen and apply ventilation as necessary.
- STEP 3. Identify the second intercostal space, in the midclavicular line on the side of the tension pneumothorax.
- STEP 4. Surgically prepare the chest.
- STEP 5. Locally anesthetize the area if the patient is conscious and if time permits.

- STEP 6. Place the patient in an upright position if a cervical spine injury has been excluded.
- STEP 7. Keeping the Luer-Lok in the distal end of the catheter, insert an over-the-needle catheter (2 in. [5 cm] long) into the skin and direct the needle just over (i.e., superior to) the rib into the intercostal space
- STEP 8. Puncture the parietal pleura.
- STEP 9. Remove the Luer-Lok from the catheter and listen for the sudden escape of air when the needle enters the parietal pleura, indicating that the tension pneumothorax has been relieved.
- STEP 10. Remove the needle and replace the LuerLok in the distal end of the catheter. Leave the plastic catheter in place and apply a bandage or small dressing over the insertion site.
- STEP 11. Prepare for a chest tube insertion. The chest tube is typically inserted at the nipple level just anterior to the midaxillary line of the affected hemithorax.
- STEP 12. Connect the chest tube to an underwaterseal device or a flutter-type valve apparatus and remove the catheter used to relieve the tension pneumothorax initially.
- STEP 13. Obtain a chest x-ray film.

COMPLICATIONS OF NEEDLE THORACENTESIS

- Local hematoma
- Pneumothorax
- Lung laceration

Chest Tube Insertion

- STEP 1. Determine the insertion site, usually at the nipple level (fifth intercostal space), just anterior to the midaxillary line on the affected side. A second chest tube may be used for a hemothorax.

- STEP 2. Surgically prepare and drape the chest at the predetermined site of the tube insertion.
- STEP 3. Locally anesthetize the skin and rib periosteum.
- STEP 4. Make a 2- to 3-cm transverse (horizontal) incision at the predetermined site and bluntly dissect through the subcutaneous tissues, just over the top of the rib.
- STEP 5. Puncture the parietal pleura with the tip of a clamp and put a gloved finger into the incision to avoid injury to other organs and to clear any adhesions, clots, and so on. Once the tube in the proper place, remove the clamp from the tube.
- STEP 6. Clamp the proximal end of the thoracostomy tube and advance it into the pleural space to the desired length. The tube should be directed posteriorly along the inside of the chest wall.
- STEP 7. Look for "fogging" of the chest tube with expiration or listen for air movement.
- STEP 8. Connect the end of the thoracostomy tube to an underwater-seal apparatus.
- STEP 9. Suture the tube in place.
- STEP 10. Apply an occlusive dressing and tape the tube to the chest.
- STEP 11. Obtain a chest x-ray film.
- STEP 12. Obtain arterial blood gas values and/or institute pulse oximetry monitoring as necessary.

COMPLICATIONS OF CHEST TUBE INSERTION

- Laceration or puncture of intrathoracic and/or abdominal organs, which can be prevented by using the finger technique before inserting the chest tube n Introduction of pleural infection—for example, thoracic empyema
- Damage to the intercostal nerve, artery, or vein:
    - Converting a pneumothorax to a hemopneumothorax
    - Resulting in intercostal neuritis/ neuralgia
- Incorrect tube position, extrathoracic or intrathoracic

- Chest tube kinking, clogging, or dislodging from the chest wall, or disconnection from the underwater-seal apparatus
- Persistent pneumothorax:
    - Large primary leak
    - Leak at the skin around the chest tube; suction on tube too strong
    - Leaky underwater-seal apparatus
- Subcutaneous emphysema, usually at tube site n
- Recurrence of pneumothorax upon removal of chest tube; seal of thoracostomy wound not immediate
- Lung fails to expand because of plugged bronchus; bronchoscopy required n Anaphylactic or allergic reaction to surgical preparation or anesthetic

Pericardiocentesis

- STEP 1. Monitor the patient's vital signs and electrocardiogram (ECG) before, during, and after the procedure.
- STEP 2. Surgically prepare the xiphoid and subxiphoid areas, if time allows.
- STEP 3. Locally anesthetize the puncture site, if necessary.
- STEP 4. Using a 16- to 18-gauge, 6-in. (15-cm) or longer over-the-needle catheter, attach a 35-mL empty syringe with a three-way stopcock.
- STEP 5. Assess the patient for any mediastinal shift that may have caused the heart to shift significantly.
- STEP 6. Puncture the skin 1 to 2 cm inferior to the left of the xiphochondral junction, at a 45-degree angle to the skin.
- STEP 7. Carefully advance the needle cephalad and aim toward the tip of the left scapula.
- STEP 8. If the needle is advanced too far (i.e., into the ventricular muscle), an injury pattern known as the "current of injury"

appears on the ECG monitor (e.g., extreme ST-T wave changes or widened and enlarged QRS complex). This pattern indicates that the pericardiocentesis needle should be withdrawn until the previous baseline ECG tracing reappears. Premature ventricular contractions also can occur, secondary to irritation of the ventricular myocardium.

- STEP 9. When the needle tip enters the blood-filled pericardial sac, withdraw as much nonclotted blood as possible.
- STEP 10. During the aspiration, the epicardium approaches the inner pericardial surface again, as does the needle tip. Subsequently, an ECG current of injury pattern may reappear. This indicates that the pericardiocentesis needle should be withdrawn slightly. Should this injury pattern persist, withdraw the needle completely.
- STEP 11. After aspiration is completed, remove the syringe and attach a three-way stopcock, leaving the stopcock closed. Secure the catheter in place.
- STEP 12. Option: Applying the Seldinger technique, pass a flexible guidewire through the needle into the pericardial sac, remove the needle, and pass a 14-gauge flexible catheter over the guidewire. Remove the guidewire and attach a three-way stopcock.
- STEP 13. Should the cardiac tamponade symptoms persist, the stopcock may be opened and the pericardial sac reaspirated. This may be repeated as the symptoms of tamponade recur, prior to definitive treatment. The plastic pericardiocentesis catheter can be sutured or taped in place and covered with a small dressing to allow for continued decompression en route to surgery or transfer to another care facility.

COMPLICATIONS OF PERICARDIOCENTESIS

- Aspiration of ventricular blood instead of pericardial blood
- Laceration of ventricular epicardium/ myocardium
- Laceration of coronary artery or vein
- New hemopericardium, secondary to lacerations of the coronary artery or vein, and/or ventricular epicardium/ myocardium

- Ventricular fibrillation
- Pneumothorax, secondary to lung puncture
- Puncture of great vessels with worsening of pericardial tamponade
- Puncture of esophagus with subsequent mediastinitis
- Puncture of peritoneum with subsequent peritonitis or false positive aspirate

C-Circulation, Hemorrhage control

- Circulatory compromise in trauma patients can result from many different injuries.
- Definitive bleeding control is essential along with appropriate replacement of intravascular volume. A minimum
- of two large-caliber intravenous (IV) catheters should be introduced.
- The maximum rate of fluid administration is determined by the internal diameter of the catheter and inversely by its length—not by the size of the vein in which the catheter is placed.
- Establishment of upper-extremity peripheral IV access is preferred.
- Other peripheral lines, cutdowns, and central venous lines should be used as necessary in accordance with the skill level of the clinician who is caring for the patient.
- At the time of IV insertion, blood should be drawn for type and crossmatch and baseline hematologic studies, including a pregnancy test for all females of childbearing age.
- Blood gases and/or lactate level should be obtained to assess the presence and degree of shock.
- Aggressive and continued volume resuscitation is not a substitute for definitive control of hemorrhage.
- Definitive control includes surgery, angioembolization, and pelvic stabilization.
- IV fluid therapy with crystalloids should be initiated.

- A bolus of 1 to 2 L of an isotonic solution may be required to achieve an appropriate response in the adult patient.
- All IV solutions should be warmed either by storage in a warm environment (i.e., 37°C to 40°C, or 98.6°F to 104°F) or fluid-warming devices.
- Shock associated with injury is most often hypovolemic in origin.
- If the patient is unresponsive to initial crystalloid therapy, blood transfusion should be given.
- Hypothermia may be present when the patient arrives, or it may develop quickly in the ED if the patient is uncovered and undergoes rapid administration of room-temperature fluids or refrigerated blood.
- Hypothermia is a potentially lethal complication in injured patients, and aggressive measures should be taken to prevent the loss of body heat and restore body temperature to normal.
- The temperature of the resuscitation area should be increased to minimize the loss of body heat.
- The use of a high-flow fluid warmer or microwave oven to heat crystalloid fluids to 39°C (102.2°F) is recommended.
- However blood products should not be warmed in a microwave oven.
- Injured patients can arrive in the ED with hypothermia, and hypothermia can develop in some patients who require massive transfusions and crystalloid resuscitation despite aggressive efforts to maintain body heat.
- The problem is best minimized by early control of hemorrhage.
- This can require operative intervention or the application of an external compression device to reduce the pelvic volume in patients with certain types of pelvic fractures.
- Efforts to rewarm the patient and prevent hypothermia should be considered as important as any other component of the primary survey and resuscitation phase.

Peripheral Venous Access

- STEP 1. Select an appropriate site on an extremity (antecubital, forearm, or saphenous vein).
- STEP 2. Apply an elastic tourniquet above the proposed puncture site.
- STEP 3. Clean the site with antiseptic solution.
- STEP 4. Puncture the vein with a large-caliber, plastic, over-the-needle catheter. Observe for blood return.
- STEP 5. Thread the catheter into the vein over the needle.
- STEP 6. Remove the needle and tourniquet.
- STEP 7. If appropriate, obtain blood samples for laboratory tests.
- STEP 8. Connect the catheter to the intravenous infusion tubing and begin the infusion of warmed crystalloid solution.
- STEP 9. Observe for possible infiltration of fluids into the tissues.
- STEP 10. Secure the catheter and tubing to the skin of the extremity.

Femoral Venipuncture: Seldinger Technique
Note: Sterile technique should be used when performing this procedure.

- STEP 1. Place the patient in the supine position.
- STEP 2. Cleanse the skin around the venipuncture site well and drape the area.
- STEP 3. Locate the femoral vein by palpating the femoral artery. The vein lies directly medial to the femoral artery (remember the mnemonic NAVEL, from lateral to medial: nerve, artery, vein, empty space, lymphatic). Keep a finger on the artery to facilitate anatomical location and avoid insertion of the catheter into the artery. Ultrasound can be used as an adjunct for placement of central venous lines.
- STEP 4. If the patient is awake, use a local anesthetic at the venipuncture site.
- STEP 5. Make a small skin incision at the entry point of wire or dilatation of central vein to insert large bore catheter.
- STEP 6. Introduce a large-caliber needle attached to a 12-mL syringe with 0.5 to 1 mL of saline. The needle, directed toward the patient's

head, should enter the skin directly over the femoral vein (n-FIGURE-IV-1A). Hold the needle and syringe parallel to the frontal plane.

- STEP 7. Directing the needle cephalad and posteriorly, slowly advance it while gently withdrawing the plunger of the syringe.
- STEP 8. When a free flow of blood appears in the syringe, remove the syringe and occlude the needle with a finger to prevent air embolism. If the vein is not entered, withdraw the needle and redirect it. If two attempts are unsuccessful, a more experienced clinician should attempt the procedure, if available.
- STEP 9. Insert the guidewire and remove the needle. Use an introducer if required
- STEP 10. Insert the catheter over the guidewire
- STEP 11. Remove the guidewire and connect the catheter to the intravenous tubing.
- STEP 12. Affix the catheter in place (with a suture), apply antibiotic ointment, and dress the area.
- STEP 13. Tape the intravenous tubing in place.
- STEP 14. Obtain chest and abdominal x-ray films to confirm the position and placement of the intravenous catheter.
- STEP 15. Change the catheter as soon as it is practical.

MAJOR COMPLICATIONS OF FEMORAL VENOUS ACCESS

- Deep-vein thrombosis n Arterial or neurologic injury
- Infection n Arteriovenous fistula

Subclavian Venipuncture: Infraclavicular Approach

Note: Sterile technique should be used when performing this procedure.

- STEP 1. Place the patient in the supine position, with the head at least 15 degrees down to distend the neck veins and prevent air embolism. Only if a cervical spine injury has been excluded can the patient's head be turned away from the venipuncture site.
- STEP 2. Cleanse the skin around the venipuncture site well and drape the area.
- STEP 3. If the patient is awake, use a local anesthetic at the venipuncture site.
- STEP 4. Introduce a large-caliber needle, attached to a 12-mL syringe with 0.5 to 1 mL of saline, 1 cm below the junction of the middle and medial one-third of the clavicle. Ultrasound can be used as an adjunct for the placement of central venous lines
- STEP 5. After the skin has been punctured, with the bevel of the needle upward, expel the skin plug that can occlude the needle.
- STEP 6. Hold the needle and syringe parallel to the frontal plane.
- STEP 7. Direct the needle medially, slightly cephalad, and posteriorly behind the clavicle toward the posterior, superior angle of the sternal end of the clavicle (toward the finger placed in the suprasternal notch).
- STEP 8. Slowly advance the needle while gently withdrawing the plunger of the syringe.
- STEP 9. When a free flow of blood appears in the syringe, rotate the bevel of the needle caudally, remove the syringe, and occlude the needle with a finger to prevent air embolism. If the vein is not entered, withdraw the needle and redirect it. If two attempts are unsuccessful, a more experienced clinician should attempt the procedure, if available.
- STEP 10. Insert the guidewire while monitoring the electrocardiogram for rhythm abnormalities.
- STEP 11. Remove the needle while holding the guidewire in place.
- STEP 12. Insert the catheter over the guidewire to a predetermined depth (the tip of the catheter should be above the right atrium for fluid administration).

- STEP 13. Connect the catheter to the intravenous tubing.
- STEP 14. Affix the catheter securely to the skin (with a suture), apply antibiotic ointment, and dress the area.
- STEP 15. Tape the intravenous tubing in place.
- STEP 16. Obtain a chest x-ray film to confirm the position of the intravenous line and identify a possible pneumothorax.

Internal Jugular Venipuncture: Middle or Central Route

Note: This procedure is frequently difficult to perform in injured patients because they are often immobilized to protect the cervical spine. Sterile technique should be used when performing this procedure.

- STEP 1. Place the patient in the supine position, with the head at least 15 degrees down to distend the neck veins and prevent an air embolism. Only if the cervical spine has been cleared radiographically can the patient's head be turned away from the venipuncture site.
- STEP 2. Cleanse the skin around the venipuncture site well and drape the area.
- STEP 3. If the patient is awake, use a local anesthetic at the venipuncture site.
- STEP 4. Introduce a large-caliber needle, attached to a 12-mL syringe with 0.5 to 1 mL of saline, into the center of the triangle formed by the two lower heads of the sternomastoid and the clavicle. Ultrasound can be used as an adjunct for the placement of central venous lines.
- STEP 5. After the skin has been punctured, with the bevel of the needle upward, expel the skin plug that can occlude the needle.
- STEP 6. Direct the needle caudally, parallel to the sagittal plane, at an angle 30 degrees posterior to the frontal plane.
- STEP 7. Slowly advance the needle while gently withdrawing the plunger of the syringe.
- STEP 8. When a free flow of blood appears in the syringe, remove the syringe and occlude the needle with a finger to prevent air

embolism. If the vein is not entered, withdraw the needle and redirect it 5 to 10 degrees laterally.

- STEP 9. Insert the guidewire while monitoring the electrocardiogram (ECG) for rhythm abnormalities.
- STEP 10. Remove the needle while securing the guidewire and advance the catheter over the wire. Connect the catheter to the intravenous tubing.
- STEP 11. Affix the catheter in place to the skin with suture, apply antibiotic ointment, and dress the area.
- STEP 12. Tape the intravenous tubing in place.
- STEP 13. Obtain a chest film to confirm the position of the intravenous line and identify a possible pneumothorax.

COMPLICATIONS OF CENTRAL VENOUS PUNCTURE

- Pneumothorax or hemothorax
- Venous thrombosis
- Arterial or neurologic injury
- Arteriovenous fistula
- Chylothorax
- Infection
- Air embolism

Intraosseous Puncture/Infusion: Proximal Tibial Route

Note: Sterile technique should be used when performing this procedure. This procedure is appropriate for all ages when venous access is impossible because of circulatory collapse or when percutaneous peripheral venous cannulation has failed on two attempts. Intraosseous infusions (blood and crystalloids) should be limited to emergency resuscitation discontinued as soon as other venous access has been obtained.
Swelling around the intraosseous needle should prompt discontinuation of fluid infusion and removal of the intraosseous device.

- STEP 1. Place the patient in the supine position. Select an uninjured lower extremity, place sufficient padding under the knee to effect approximate 30-degree flexion of the knee, and allow the patient's heel to rest comfortably on the gurney or stretcher.
- STEP 2. Identify the puncture site—the anteromedial surface of the proximal tibia, approximately one fingerbreadth (1 to 3 cm) below the tubercle.
- STEP 3. Cleanse the skin around the puncture site well and drape the area.
- STEP 4. If the patient is awake, use a local anesthetic at the puncture site.
- STEP 5. Initially at a 90-degree angle, introduce a short (threaded or smooth), large-caliber, bone-marrow aspiration needle (or a short, 18-gauge spinal needle with stylet) into the skin and periosteum, with the needle bevel directed toward the foot and away from the epiphyseal plate.
- STEP 6. After gaining purchase in the bone, direct the needle 45 to 60 degrees away from the epiphyseal plate. Using a gentle twisting or boring motion, advance the needle through the bone cortex and into the bone marrow.
- STEP 7. Remove the stylet and attach to the needle a 12-mL syringe with approximately 6 mL of sterile saline. Gently draw on the plunger of the syringe. Aspiration of bone marrow into the syringe signifies entrance into the medullary cavity.
- STEP 8. Inject the saline into the needle to expel any clot that can occlude the needle. If the saline flushes through the needle easily and there is no evidence of swelling, the needle is likely located in the appropriate place. If bone marrow was not aspirated as outlined in Step 7, but the needle flushes easily when injecting the saline and there is no evidence of swelling, the needle is likely in the appropriate place. In addition, proper placement of the needle is indicated if the needle remains upright without support and intravenous solution flows freely without evidence of subcutaneous infiltration.

- STEP 9. Connect the needle to the large-caliber intravenous tubing and begin fluid infusion. Carefully screw the needle further into the medullary cavity until the needle hub rests on the patient's skin and free flow continues. If a smooth needle is used, it should be stabilized at a 45- to 60-degree angle to the anteromedial surface of the patient's leg.
- STEP 10. Apply antibiotic ointment and a 3 3 sterile dressing. Secure the needle and tubing in place.
- STEP 11. Routinely reevaluate the placement of the intraosseous needle, ensuring that it remains through the bone cortex and in the medullary canal. Remember, intraosseous infusion should be limited to emergency resuscitation of the patient and discontinued as soon as other venous access has been obtained.

COMPLICATIONS OF INTRAOSSEOUS PUNCTURE

- Infection
- Through-and-through penetration of the bone
- Subcutaneous or subperiosteal infiltration
- Pressure necrosis of the skin
- Physeal plate injury n Hematoma

D-Disability: Neurological status, Consciousness, Focal Neurological Deficit

- Prevention of secondary brain injury by maintaining adequate oxygenation and perfusion are the main goals of initial management.
- In Case of Quadriplegia or Paraplegia, Urgent MRI Spine is Indicated
- Patient to be shifted in Spine Board
- CT Scan Brain is indicated in History of

  - Loss of Consciousness
  - ENT Bleed
  - Vomiting
  - Headache
- Immediate CT Brain is Indicated in
  - Unconscious Patients
  - Lucid Interval

E-Exposure: To Check for Poisons, Trauma

- The patient's body temperature is more important than the comfort of the healthcare providers.

Others

Urinary-Catheters

- Urinary output is a sensitive indicator of the patient's volume status and reflects renal perfusion.
- It is Indicated for All Patients in RED Category
- Monitoring of urinary output is best accomplished by the insertion of an indwelling bladder catheter.
- Transurethral bladder catheterization is contraindicated in patients in whom urethral injury is suspected.
- Urethral injury should be suspected in the presence of one of the following:
  - Blood at the urethral meatus
  - Perineal ecchymosis
  - High-riding or nonpalpable prostate
- Accordingly, a urinary catheter should not be inserted before the rectum and genitalia have been examined, if urethral injury is suspected.
- Urethral integrity should be confirmed by a retrograde urethrogram before the catheter is inserted

Sometimes anatomic abnormalities (e.g., urethral stricture or prostatic hypertrophy) preclude placement of an indwelling bladder catheter, despite meticulous technique. Nonspecialists should avoid excessive manipulation of the urethra or use of specialized instrumentation. Consult a urologist early

Gastric-Catheters

- A gastric tube is indicated
    - to reduce stomach distention,
    - to decrease the risk of aspiration, and
    - to assess for upper gastrointestinal hemorrhage from trauma.
    - In All patients in Red
- Decompression of the stomach reduces the risk of aspiration, but does not prevent it entirely.
- Thick or semisolid gastric contents will not return through the tube, and actual passage of the tube can induce vomiting.
- For the tube to be effective, it must be positioned properly, be attached to appropriate suction, and be functional. Blood in the gastric aspirate can be indicative of oropharyngeal (swallowed) blood, traumatic insertion, or actual injury to the upper digestive tract.
- If the cribriform plate is known to be fractured or a fracture is suspected, the gastric tube should be inserted orally to prevent intracranial passage.
- In this situation, any nasopharyngeal instrumentation is potentially dangerous.

Head Shave

- Is Indicated for All patients in Red Category

- Is Indicated when there is a scalp Injury
- Is Indicated in patients who are under observation for conditions which pay potentially require surgery

Indications for Monitoring
SpO2 : All Patients in Red and Yellow
ECG : All Patients in Red and Yellow
BP : All Patients in Red and Yellow
ICP <<Get from Neurosurgery>>

AR Entry / eMLC

After Resuscitation, AR Entry is Made through the eMLC Platform of the NIC
The Findings are made online, photos are taken using the Tablets and a Printout is taken and signed by the Medical Officer and attached to the Regular Case Sheet

At the end of the above steps, the following Check Lists in Page 3 of Trauma Case Sheet is used

S.No	Step	Responsibility	✓ on Completion
1.	Triage	ER Medical Officer EMO Casualty Medical Officer	
2.	Entry in Accident Register	Casualty Medical Officer	
3.	Inj TT ½ cc IM Stat	ER Staff Nurse	
4.	Starting intravenous	ER Staff Nurse	

	Line		
5.	Intubation (GCS < 8 must be intubated)	ER Medical Officer EMO Anaesthesiologist	
6	Investigations	ER Staff Nurse	
7	Injections / Tablets	ER Staff Nurse	

Check List for Past History

	Yes	No	If Yes,
H/o Drug Allergy			
H/o Diabetes			Modify our Prescription
H/o Hypertension			Modify our Prescription
H/o Asthma, COPD			Modify our Prescription **JUDICIOUS FLUIDS** **AVOID NSAID**
H/o Heart Diseases			
H/o Thyroid Disorders			
H/o Alcohol / Drug Abuse			
H/o HIV			
H/o HBsAg			
H/o Headache			Urgent CT Brain
H/o Vomiting			Urgent CT Brain
H/o Weakness			Urgent Intervention
H/o Seizures			Start Anticonvulsants
H/o Bladder Involvement			Urgent Intervention
H/o Bowel Involvement			Urgent Intervention
H/o Previous Surgeries			
H/o Long term Medical Treatment			
H/o Amenorrhea			

Secondary Survey

While the Primary Survey evaluated the Physiology, the secondary Survey evaluates the Anatomy

Imaging and Blood Investigations

Investigation Check List

For All Patients	✓ on Completion
1. Urine (Dipstick)	
2. ABG	
3. CBC, Hematocrit	
4. Random Blood Sugar	
5. RFT	
6. Serum Electrolytes	
7. HIV	
8. HBsAg	
9. HCV	
10. Blood Group / Typing	
11. CT / BT	
12. PT / aPTT / INR	
13. ECG	
14. CXR PA View, X Rays	
15. eFAST / USG	
16. ECHO	
17. CT Scan / MRI	
18. Specialist Opinion	

Specialist Opinions and Management

Monitoring and Re evaluation

The
Indications for Monitoring
SpO2 : All Patients in Red and Yellow
ECG : All Patients in Red and Yellow
BP : All Patients in Red and Yellow
ICP <<Get from Neurosurgery>>

Transfer

The Protocols for Transfer of Patients are given Below

Transfer Out

Reasons	Lack of Specialist Lack of Infrastructure Lack of Consumables Theatre is Occupied
Who takes the Decision to Transfer	EMO : ER Doctor Specialist
Who takes the Decision about the Institute to	EMO : ER Doctor

which the patient is referred	Specialist
Who Co Ordinates	Trauma Nurse Co Ordinator
Who decides the Order in which Patients are transferred out	Trauma Nurse Co Ordinator
Mode of Transfer Out	108 Ambulance
Steps to be Followed	1. Decision to Transfer 2. Order of Transfer (Which Patient First) 3. Call 108 for Transfer 4. Call the Trauma Nurse Co Ordinator of the Recipient Institution and Check for Availability of Resourc

	es

Hospital Care : in Respective Departments

To Be Given by the Respective Departments

Emergency Interventions

To be Given by the Respective Departments

Elective Interventions

To be Given by the Respective Department

PACU Care

To be Given by the Department of Anaesthesiology and Respective Departments

ICU Care

To be Given by the Department of Anaesthesiology and Respective Departments

Post Op Care

To be Given by the Respective Departments

Ward Care

To be Given by the Respective Departments

Outcome

The Outcome can be
1. Discharge
2. Death

Care Post Discharge

To be Given by the Respective Departments

Follow Up in OP (for Discharge)

To be Given by the Respective Departments

Post Mortem (for Death)

As per current practice

Completion of Treatment

After Adequate Number of Follow Up Visits in the OP, the Patient is Released to Primary Care. That marks the completion of Treatmemtn

Critical Case Review

The Management of a Trauma Patient is not complete without learning the Best Practices by evaluation of the case sheet. For this, Critical Case Reviews are done

Accident → 108 Call → Ambulance Despatched → Ambulance Picks up Patient

Section II : Guidelines / Protocols / Instructions / Checklists for Specific Conditions

This Section e Entire TimeLine From the moment of Accident (or Onset of Symptoms) to Discharge of the patient from the Hospital after completion of treatment can be divided into various stages. This division is for ease of understanding and it has to be emphaised that the care the patient receives is in continuum.

Accident and Trauma

Will be finalised during NTRI Workshop on 9th and 10th November

Chest Pain

STEMI Protocol will be followed

Stroke / Cerebro Vascular Accidents

Stroke Protocol will be followed

Poisoning

Poison Treatment Protocols already in force will be followed

Snake Bite

Snake Bite Treatment Protocols already in force will be followed
www-snake-scorpion.com

Scorpion Sting

Scorpion Sting Management Protocols already in force will be followed
www-snake-scorpion.com

Children

PEMC Book Will be followed

Section III

Section IIIgives an Overview of the Tamil Nadu Accident and Emergency Care Initiative. In this Section, we see the need for a separate Accident and Emergency Department at Institution Level as well as the need for a vertical programme to monitor these departments.

This Section also includes the Operational Guidelines as well as the Monitoring and Evaluation Mechanisms at State, District and Hospital Level.

Guidelines for Setting up of an Emergency Room (ER) are included in this Section

Government Order

Mission Director
National Health Mission
22 JUN 2017
Tamilnadu
Chennai-600 006

ABSTRACT

State Health Society – Tamil Nadu – National Health Mission – Implementation of Trauma care network in the name of "Tamil Nadu Accident and Emergency Care Initiative (TAEI)" and Designation of Mission Director, State Health Society as ex-officio Commissioner of Trauma care – Orders – Issued.

Health and Family Welfare (EAP II-2) Department

G.O.(Ms)No.231

Dated : 22.06.2017
Heyvilambi, Aani-8
Thiruvalluvar Aandu 2048

Read:

From the Mission Director, State Health Society, letter Ref. No. 3632 / National Health Mission / Trauma care / 2017, dated: 25.04.2017.

ORDER:

The Government established a 24 Hours Comprehensive Emergency Obstetric & Newborn Care Centres (CEmONC) and Neonatal Intensive Care Unit (NICU) in Government Hospitals to bring down MMR & IMR rate. The Mission Director, National Health Mission has stated that on the same line, to reduce the road traffic accident deaths, the Government of India have funded Trauma Care Centers in 14 Secondary care Hospitals in National Highways and 7 Medical College Hospitals. The ultimate aim of the Government is to have one 24 Hours Comprehensive Emergency Orthopedic and Trauma Care Centre for every 50 to 60 kilometers stretch in the National and major State Highways.

2. The main objective of the Trauma Care Center is as follows:-

a. to provide comprehensive emergency care to the accident casualties.
b. to treat the major injuries like head injury, cardiothoracic injury etc. wherever the specialists and facilities are available based on the level of trauma care center.
c. to stabilize the more serious injuries like head injury, cardiothoracic injury, gastroenterological cases etc, before transportation to the appropriate higher centers.

3. The Mission Director, National Health Mission has also stated that as per the Government of India guidelines the Hospitals will be upgraded in the following levels for providing Trauma care services:-

i. Level IV Trauma care: This level will be provided in 108 ambulance service in coordination with 108 Ambulance Service MoRTH / NHAI / NHM / State Government, etc.,
ii. Level III Trauma care Centre: This level will be provided in the District / Taluk Hospitals with a bed capacity of 100 to 200 beds. Such Hospitals will have limited intensive care facility, diagnostic capacity, blood bank and other supportive services.

iii. Level II Trauma care centre: This level will be provided in existing Medical college Hospitals / Hospitals with bed strength of 300 to 500 beds. The centre is equipped with emergency department, intensive care unit, blood bank rehabilitation services, etc,.

iv. Level I Trauma care centre: This level will be provided with highly specialized Medical care where the services of all major super specialties associated with Trauma care services would be available on 24 X 7 basis.

v. Concept of Emergency Stabilization centre (ESC): ESC provide stabilization to both trauma and non-trauma patients and helps to mitigate the challenges of transporting critically ill medical patients and severely injured trauma patients to the higher centers.

4. The Mission Director, National Health Mission has therefore requested Government orders for implementing the Trauma care network in the name of 'Tamil Nadu Accident and Emergency Care Initiative (TAEI)' and to designate him as the ex-officio Commissioner of Trauma care.

5. After careful examination, the Government have decided to accept the proposal of Mission Director, National Health Mission and accordingly issue the following orders:-

i) permission is accorded to implement the Trauma care network in the name of 'Tamil Nadu Accident and Emergency Care Initiative (TAEI)'.

ii) the Mission Director, National Health Mission is designated as ex-officio Commissioner of Trauma care.

6. The logo and tagline (Saving Lives Is Our Mission) of Tamil Nadu Accident and Emergency Care Initiative (TAEI) is annexed to this order.

(BY ORDER OF THE GOVERNOR)

J.RADHAKRISHNAN
PRINCIPAL SECRETARY TO GOVERNMENT

To

The Mission Director, National Health Mission,Chennai-600 006.
The Project Director, Tamil Nadu Health Systems Project, Chennai-600 006.
The Director of Medical Education, Chennai–600 010.
The Director of Public Health and Preventive Medicine, Chennai–600 006.
The Director of Medical and Rural Health Service, Chennai-600 006.

Copy to:

The Special Personal Assistant to Hon'ble Minister (Health and Family Welfare), Chennai-600 009.
The Health and Family Welfare(Data Cell) Department, Chennai-600 009.
Sf/Sc's

//Forwarded by Order//

N. Latha.
SECTION OFFICER

Need for TAEI

1. Tamil Nadu is lauded for being the forerunner in the health front of the country and is continuously striving hard in setting up health for all of its people. It is well known for effective planning and implementation of strategies with which various health care challenges are overcome.
One such success behind substantially reducing maternal deaths and infant mortality in the state was by a special program called the 24 Hours Comprehensive Emergency Obstetric & Newborn Care Centers (CEmONC) in Government hospitals @ 2 to 3 per district and establishment of Neonatal Intensive Care Unit (NICU) Services in many hospitals.

The Burden of RTA in Tamil Nadu:

Tamil Nadu is the seventh most populous and highly urbanized state in the country with 14,257 km of National and State highways.
RTA has been an overwhelming Public health challenge of the era disproportionately killing and maiming many in the economically productive age group. It results in serious physical, mental and psycho-social impairment, bringing huge catastrophic expense to the family, crashing down its peace and security.

During 2016, Tamil Nadu accounted for 17,311 which is 12% higher as compared to 2015. TN constitutes to a share of 15.9% injuries and 10.7% deaths in India (MoRTH, 2015).

Trauma Care So Far

The Government has initiated various measures to reduce the increasing fatality due to RTA by establishing:

a) Accident and Emergency wards in all major hospitals located in its National and State Highways.

(b) Specialized Trauma care centres in 22 hospitals located in the Golden Quadrilateral highways with assistance from Government of India under the 11th five year plan.

The list of hospitals under DME and DMS are as follows:

S.No	Name of the hospitals under DME (GOI funded for non-recurring cost)
1	Villupuram Medical College Hospital, Villupuram
2	Karur Medical College Hospital, Karur
3	Kilpauk Medical College Hospital, Chennai-10
4	Vellore Medical College and Hospital, Vellore
5	Government Rajaji Hospital, Madurai
6	Tirunelveli Medical College Hospital, Tirunelveli
7	Kanniyakumar Medical College Hospital, Nagercoil

SN	Name of the hospitals under DMS (GOI funded for non-recurring cost)
1	Govt. Taluk Hospital, Melur, Madurai district.
2	Dist. Head Quarters Hospital, Padhmanabhapuram
3	Dist. Head Quarters Hospital, Tenkasi
4	Dist. Head Quarters Hospital, Namakkal
5	Dist. Head Quarters Hospital, Kovilpatti
6	Dist. Head Quarters Hospital, Wallajah, Vellore
7	Dist. Head Quarters Hospital, Cuddalore
8	Dist. Head Quarters Hospital, Dindigul
9	Government Taluk Hospital, Omalur, Salem district
10	Dist. Head Quarters Hospital, Perambalur
11	Dist. Head Quarters Hospital, Krishnagiri
12	Govt. HospitalTambaram, Kanjeepuram
13	Dist.Head Quarters Hospital, Kancheepuram, (State Funded)
14	Dist,Head Quarters Hospital, Thiruvallur (State Funded)
15	Govt. Hospital Palani, Dindigul district (State Funded)

(C) State funded Trauma care centres are:

- Government Head Quarters Hospitsl, Tiruvallur
- Government Head Quarters Hospital, Kanchipuram and
- Government Hospital, Palani as per ref. cited 2,3,4 above

(d) Seat belt and helmet laws in the State.

(e) Prehospital care component through 108 Emergency Ambulance Services under a Public Private Partnership Scheme to transport road traffic accidents and other emergency cases to the appropriate hospital within a short time period at absolutely free of cost.

(f) Emergency Care Centers have been set up for early stabilization and care of the Trauma casualties in case of long distance drive on the highways through EMRI. They are:

SN	Name of the Emergency Care Center :
1	Emergency Care center , Tambaram, Chennai
2	Emergency Care center , Padyanallur, Tiruvallur district
3	Emergency Care center ,Injambakkam, Kancheepuram district.

(g) "Road Safety Committee" under the chairmanship of the Principal Secretary, Home department who is designated as Road Safety Commissioner of the State

(g) Administrative Approval for 24 hours comprehensive emergency Trauma care centres in 59 hospitals as per G.O. cited under ref. no. 1 above

Thus the ultimate aim of the Government is to have one 24 Hours Comprehensive Emergency Trauma Care

Centre for every 50 to 60 kms stretch in the National and major State Highways.

Challenges in providing Comprehensive Trauma care:

There are several pre-hospital and Health system challenges identified in the State.

(a) Pre hospital care

The "Scene to Hospital Time" which is the response time needs to be improved and

Patients referred to Multiple Centres: No Standard Trauma Treatment Centres and there is delay in accessing the Correct Centre therby Loss of Golden Hour

(b) At the Institution level

There is a demand and Supply mismatch with more accidents. There is no protocol for standard emergency care resulting in Low Quality of Care. Moreover there is confusion in Hospitals over prioritisation of treatment as there is no proper system of Triage and Patients relatives swarm inside ICUs because of apprehension and lack of communication about the status of the Patient or the treatment being given.

Lack of Co Ordination between various Medical and Paramedical Staff involved in Trauma Care aggravates the issue on hand. Moreover, lack of Standard Treatment Protocols and Training for the Stake Holder results in poor outcomes for the victims.

Hence it is proposed to roll out a State level trauma care initiative called the Tamil Nadu Accident and Emergency Care Initiative.

The Tamil Nadu State Trauma Care Policy:

SDG Goal:

To halve the number of deaths and injuries from road traffic accidents by the year 2020 globally.

State Goal:

To achieve halve the number of deaths (8500) and injuries from road traffic accidents by year 2023 in Tamil Nadu State.

Objective of State Trauma care policy:

- To ensure definitive treatment for the injured within the Golden Hour
- To identify and designate Trauma Care Centres as Level-1, Level-2, Level-3 centres in Tamil Nadu State after a feasibility analysis of existing trauma care facilities with assured referral linkages based on the hub and spoke model.
- To establish "State Trauma Surveillance Centre" with real time reporting of accident & trauma cases to provide evidence based decision for policy formulation on road safety, injury preventive interventions with component for improving of quality care and better out comes and rational utilization of resources.
- To converge and co-ordinatre with engineering, road safety, law enforcement departments.

- Selection of Govt. Hospitals for developing various levels of Trauma Care Centres on the basis of road infrastructure and connectivity (State Govt. hospitals on the national highways, Connecting two capital cities, Connecting major cities other than capital city, Connecting ports to capital city, Connecting industrial townships with capital city).
- To develop rehabilitation centers for trauma casualties.
- To initiate the development of a state-wide referral network with both public and private hospitals through empanelment of CMCHIS Insurance Scheme with forward and backward linkages.
- To incorporate on-going initiatives of multiple sectors like road transport authority and highways authority & EMR division for successful management of trauma.
- To install the Basic Life Support Ambulances Level -IV on an evidence based approach along the Highways and Advanced Life Support Ambulance at Trauma Care Facilities for inter facility transfer and expand the ECC facilities provided already to all high accident density areas.
- To initiate IEC/ BCC activities for educating the public about the risk factors and to reduce the incidence of road traffic accidental injuries and spread awareness regarding injury prevention and road safety.
- Continuous physical & financial monitoring of the programme.

Trauma Centres and Levels

6. As per the Government of India guidelines the State Governm
ent has committed to upgrade the hospitals for providing trauma care in terms of Level I, Level II and Level III based on the Hub and Spoke model.

- Level I Trauma care Centre: Facility will provide the highest level of definitive and comprehensive care for patient with complex injuries. Emergency physicians, nurses and surgeons would be in-house and available to the trauma patient immediately on their arrival. The services of all major super specialties associated with trauma care would be available 24 * 7. These should be tertiary care centers to which patients requiring highly specialized medical care are referred.
- Level II Trauma care centre : Provides definitive are for severe trauma patients. Emergency physicians, surgeons, Orthopaedicians and Anesthetists are in-house and available to the trauma patients immediately on arrival. It would also have on-call facility for neurosurgeons, pediatricians. If neurosurgeons are not available, general surgeons trained in neurosurgery for a period of 6 months in eminent institutions would be made available 24 *7. The centre should be equipped with emergency department, intensive care unit, blood bank rehabilitation services. The existing medical college

hospitals or hospitals with bed strength of 30 to 5 should be identified as level II trauma centre.

- Level III Trauma care Centre: Facility provides initial evaluation and stabilization (surgically if appropriate) to the trauma patient. Comprehensive medical and surgical inpatient services would be made available to those patients who can be maintained in a stable or improving condition without specialized care. Emergency doctors and nurses are available round the clock. Physicians, surgeons, Orthopedic surgeon and Anesthetist would be available round the clock to access, resuscitate, stabilize and initiate transfer as necessary to a higher – LEVEL Trauma care service. Such hospitals will have limited intensive care facility, diagnostic capacity, blood bank and other supportive services. The district / taluk hospitals with a bed capacity of 10 to 20 beds would be selected for level III care.
- Level IV Trauma care: This would be provided by appropriately equipped and manned mobile ambulance services. These shall be provided by 108 integrated. Emergency ambulance service 108 AS. NHAI ambulances in coordination with 108 AS MoRTH / NHAI / NRHM / State Govt., etc.,

- Concept of Emergency Stabilization centre (ESC): Golden hour is the first one hour after the trauma is called the "golden hour" if proper first aid is given, road accident casualties have greater chance of survival and a reduction in the severity of their injuries. ESC centers Stabilize critical trauma Patients and medical emergencies within the golden

hour, thereby providing a longer window for survival and reduces complications.

Level	1	2	3
Neurosurgeon	4	1	0
Radiologist	2	2	0
Plastic Surgeon	1	0	0
Anaesthesiologist	6	3	2
Orthopaedic Surgeon	4	3	2
General Surgeon	6	2	2
Casualty Medical Officer	30	8	6
Staff Nurse (including TNC)	100	40	25
Nursing Attendant	24	16	13
OT Technician	10	5	5
Radiographer	4	4	4
Lab Technician	4	2	2
MRI Technician	2	0	0
Multi Task Worker	40	15	12
Physiotherapist			
CT Technician			
EMO	10	4	2

		Level I	Level II	Level III
	Radiology			
1	C Arm - Image Intensifier - with CD ROM, Printer, 12" CCD, Double Monitor, Facilities for Electronic Transmission and Networking for Teleradiology with X Ray and DSA Facilities for OT	1	1	0
2	3D Ultrasonography - Trolley Based	1	1	0
3	Ultrasonography Trolly Based	0	0	1

4	800 mA Digital X Ray Machine with Processor	1	0	0
5	500 mA X Ray Machine with CR System and Camera	0	1	1
6	100 mA Portable X Ray machine	1	1	1
7	64 Slice CT Scan	1	0	0
8	16 or More Slice CT Scan	0	1	0
9	Portable Ultrasonogram	1	0	0
	100 mA Portable X-Ray machine			
	1000 mA digital X-Ray Machine			
	500 mA X-Ray Machine			
	3D Ultrasonography – Trolley based			
	Image Intensifier (C-Arm)-with CD ROM, Printer, 12" CCD, Double Monitor, Electronic Transmission and Networking for tele Radiology with X-Ray and DSA facility for OT			
	Angiography C-Arm based + Angiosuite			
	CT Scan more than 32 Slices			
	CT Scan 32 Slice			
	CT Scan			
	3 Tesla MRI			
	Portable USG			
	CR Reader wit Printer			
	CR Cassettes 17*14			
	CR cassettes 12* 10			
	Rehabilitation			
10	SW Diathermy	1	1	0
11	IFT Machine	1	1	0
12	Cervical Traction & Lumbar Traction	1	1	0
13	Physiotherapy Equipments	1	1	0
	Anaesthesiology			

14	OT Table - 4 Segments translucent Top with Orthopaedic Attachment	2	2	0
15	OT Table - 3 Segments translucent Top with Orthopaedic Attachment	0	0	2
16	Cautery Machine - Mono and BiPolar with Underwater Cutting	2	0	0
17	Cautery Machine - Mono and BiPolar	0	2	2
18	OT Ceiling Light - Shadow Less with inbuilt Camera and Monitor	2	0	0
19	OT Ceiling Light - Shadow Less	0	2	2
20	Central Suction and Central Pipe Line	1	1	0
21	High Vaccuum Suction Machine	2	2	0
22	Suction Machine	0	0	4
23	Anaesthesia Machine with Monitor 6 - 8 Channel (Parameters : Agent Monitoring, NIBP, SPO2, ETCO2, ECG, Temp, IBP)	4	2	0
24	Anaesthesia Machine with Monitor (Parameters : Agent Monitoring, NIBP, SPO2, ETCO2, ECG, Temp, IBP)	0	0	2
25	Transport Ventilator	1	1	1
26	Ventilator with High End Compressor	10	10	5
27	ABG Machine Hand Held Analyzer	0	0	1
28	Defibrillator with Monitor (Parameters, : NIBP, ECG, SPO2 with AED)	10	10	5
29	Monitor (Large Screen with ECG, SPO2, NIBP, ETCO2)	20	10	5
30	Operating Microscope	2	0	0
31	Operating Headlights	2	2	0
32	Manifold System in ICU	1	1	0
33	Patient Warming System	1	1	0

34	Syring Infusion Pump	5	3	1
	Orthopaedics			
35	Pneumatic Tourniquet	2	2	2
36	Power Drill and Power Saw	2	1	1
37	Splints and Traction Devices	2	2	0
38	General Orthopaedic Instrument Sets	2	2	1
	large fragment instrumentation set (4.5 system)			
	Small fragment instrumentation set (3.5 system)			
	Hemi arthroplasty instrumentation set			
	Interlocking nail set			
	external fixator set with instruments			
	OT			
39	General Surgical Instrument Sets	2	2	2
40	Thoracotomy Set	1	1	0
41	Spinal Surgery Set	1	1	0
42	Facio Maxillary Instrument Set	1	0	0
43	Craniotomy Instrument Set	2	2	1
44	Lab Automatic Blood Gas Analyser Set	1	1	0
45	Humidity Control Meter	1	1	1
	Patho			
	patho			
	Binocular self illuminating microscope			
	Automated hemato analyser-3 parts			
	Semi automatic coagulometer			
	Automated ESR analyser			
	automated urine analyser with strips			

	Biochem			
	Fully automated analyser with harmone assay			
	Centrifuge (16 buckets)			
	Electrolyte analyser			
	Refrigerator			
	Micropippetes			
	10 microlitre -fixed			
	5 microlitre- fixed			
	1000 microlitre - fixed			
	10-50- microlitre-variable			
46	Blood Bank and Microbiology	1	1	0
47	Electricity Back Up	1	1	1
48	Laminar Air Flow	1	1	0
49	ICU Beds	10	10	5
50	10 Bedded Step Down / Recovery Unit with 5 Monitors with 4 chennels	1	0	0
51	5 Bedded Step Down / Recovery Unit with 5 Monitors with 4 chennels	0	1	1
	Fowlers bed			
	Computer with LAN, Networking & BB facility,Printers, UPS			
	Telephone,Intercom& mobile phone			
	stethoscope			
	Sphigmomanometer			
	Gauze and Bandage			
	IV set			
	Urinary catheter			
	NG Tube			
	Thermometer			
	Weighing scale			
	Intra-osseous needle			

	Central Venous lines			
	Emergency drugs			
	Torch			
	Kidney tray			

Interventions planned under the Tamil Nadu Accident and Emergency Care Initiative (TAEI) :

Administrative Structure at State Level

- State Trauma Care Steering Committee (Constitution as per Annexure III)
- State Trauma Surveillance Centre which includes a Centre for Injury Survellience and Trauma Registry. (Constitution as per Annexure IV)
- Ex officio Commissioner for Trauma Care

Administrative Structure at District Level

District Program Unit

- District Collector will be the Chairman for Trauma care (TAEI)
- Joint Director of Health Services will be the District Trauma Care Nodal Officer (DTNO)

Structure at Hospital Level

- Hospital Trauma Care Nodal Officer (HTNO) will be designated
- Dedicated multidisciplinary Team with specialist and super specialist will be identified at the facility level with the Trauma Nurse Co-ordinator and Triage nurse for effectively managing care and co-ordination in the Emergency room and for definitive treatment.

The roles and responsibility of DTNO,HTNO,TNC are enclosed as annexure V

Branding

This initiative aims to establish and strengthen the Hub and spoke model of Trauma care under the name– Tamil Nadu Accident and Emergency Care Initiative (TAEI). It is proposed to brand all the centres with a logo and tagline "Saving Lives is Our Mission"

Color Coding

The Emergency Room will be Color coded as RED, YELLOW, GREEN based on the nature of the emergency. Color codes will be the first step in triage. It is proposed to set up Standard Emergency room, workflow mechanism in the Trauma care facility.

Standard Protocols and Emergency Manuals for Trauma Care Management:

The TAEI proposes to use the Advanced Trauma Life Support (ATLS) protocol which is an internationally accepted protocol in emergency care. Emergency Room Manual will be developed to ensure uniformity in care given in emergency rooms across the State.

Hospital Emergency Codes and Call Outs:

These have been dealt in detail already.

TAEI Number & Trauma Case Sheet:

Each Admission will be given an unique TAEI Number and there will be an eight Page Case Sheet. This Case Sheet will follow the patient from institution to institution. Entries will be made in this case sheet with a carbon copy in the hospital case sheet. This will serve as referral form and hence the time delay in preparing discharge summary will be avoided

Training:

Training and Capacity building of the Medical, paramedical and other support staff in the hospitals is proposed. The personnel will be trained in Advanced Trauma Life Support (ATLS) Training protocol uniformly across all Trauma care centers for doctors and Advanced Trauma Care for Nurses (ATCN).

Technical Support

The technical support and knowledge exchange is proposed between AIIMS which is the APEX Level I centre in the country and the Trauma care centers in our State. It is also proposed as part of the technical support to sign an MOU with AIIMS after finalizing the modalities.

MIS

It is proposed to develop an Management and Information System (MIS) in Emergency Room. It is also proposed to install Display Boards (electronic / Hand

Written) mentioning the status of the patient, treatment plan and the completion status of the recommended diagnostics and investigations to minimize apprehension among the patient relatives and thus enhance care and service delivery.

It is also proposed to generate unique ID by integrating the Emergency Room admission MIS with the CMCHIS software platform Remedinet.

e Registration of Medico Legal Cases

It is proposed to develop software in coordination with NIC for registering medico legal cases

Monitoring and Evaluation:

It is proposed to measure tangible outcomes of Trauma care services based on the data collected from all the centres. The Trauma care registry and the Injury Surveillance Centre will be responsible for collection, analysis and providing feed back to the Centres for necessary improvements. The Indicators are given in Annexure VI

Rehabilitation:

Is an integral part in trauma care as it is estimated that nearly 100% of the RTA casualties with severe injuries, 50% of those with moderate injuries and 10-20% of those with mild injuries carry disabilities of physical and psychological nature requiring long term rehabilitation

(Gururaj,2000) Hence good rehabilitative services need to ensured at all levels of care.

Under TAEI, comprehensive Medical and Psychological rehabilitation program will be developed

Trauma Quality of Care Analysis:

Under TAEI, Quality of Care will be analysed. The following procedure will be adopted.

- Verbal autopsy or community based Analysis
- Facility based Analysis
- Video Conference at state level including all healthcare professionals involved in patient care from EMT,Pilot in the ambulance to the doctors and nurses involved in treating the casualty.

Base line and Research studies

It is proposed to conduct base line study for the pilot project. Scope of work and TOR will be developed and suitable agencies will be engaged as per the procurement procedures.

Pilot Projects

It is proposed to conduct pilots in following 4 hospitals during the year 2017-18

Sl No.	Name of the Hospital	Level
1.	Rajiv Gandhi Government General Hospital, Chennai	Level I (New)
2.	Government Medical College Hospital, Villupuram	Level II (Upgrading from III)
3.	District Head Quarters Hospital, Cuddalore	Level II (Upgrading from III)
4	District Head Quarters Hospital, Perambalur	Level III (Strengthening existing)
5	GH Tambaram	Level III (Strengthening existing)

Expansion Plan

The year-wise expansion plan based on the RTA/Trauma load to implement the Hub and spoke model (TAEI) is as follows:

Level	Present Centres – 2017	Expansion in six years	Total Centres – 2023
Level I	0	7	7
Level II	6	13	19
Level III	15	24	39
ECC	03	47	50

The details of the Centres to be newly established, upgraded from lower level to higher level, strengthening at existing level is given in Annexure VIII.

Tangible results:

Once the Hub and spoke model of Trauma Care (TAEI) is established it is expected to have the following tangible results.

- Emergency Room uniformly standardized in each facility of the state
- Standardised Treatment Protocol and guidelines
- Color Codes for Triage
- Assured service like CEmONC, NICU
- Improved Quality of Care
- Reduction in Mortality
- Reduction in Morbidity

Standards:

STANDARD I – ADMINISTRATIVE

The Emergency department is guided by professionally trained personal in the field of emergency medicine.

1. The emphasis is on providing a competent emergency care based on trained physicians, nurses and paramedics specialized in the field of emergency care.
2. The care provided is assessed by Emergency acre indicators and documented appropriately. (Triage time, Time taken from patient arrival to care initiation, standard precautions in A& E , Unplanned re attendance of the patient to A & E)
3. Independent budget is mandatory to ensure availability of essential resources.
4. Weekly monthly reports and appraisal of the care is mandatory.
5. Administrative Requirements -- The trauma medical director shall ensure that:
    - The following physicians participating on the trauma service meet and maintain the qualifications, certifications, and trauma-related continuing medical education (CME)
        - Pediatric and general trauma surgeons.
        - Emergency physicians.

6. The trauma service maintains morbidity and mortality information.
7. Nursing personnel have completed their trauma-related continuing education requirement.
8. Medical and Patient Care Requirements -- The trauma medical director shall maintain oversight responsibility for the development, implementation, and ongoing compliance of hospital policies and clinical protocols for trauma care.
9. The trauma medical director shall ensure that patient care protocols exist for a minimum of the following departments:
    a. Trauma Resuscitation Area.
    b. Intensive Care Unit and Pediatric Intensive Care Unit.
    c. Operating Room and Post-Anesthesia Recovery/Post-Anesthesia Care Unit.
    d. Medical Surgical Unit.
    e. The trauma medical director shall ensure that policies and protocols are developed for a minimum of the following:
    f. Priority admission status for trauma patients.
    g. Patient transfers into and out of the hospital.
    h. The trauma medical director shall approve all trauma-related patient care protocols before implementation.
    i. The trauma medical director, in coordination with the trauma program manager, shall monitor compliance with trauma-related protocols through the trauma quality management process.

STANDARD II -- TRAUMA SERVICE

Trauma and Non Trauma Care is guided by set Policy, Protocol and Standard Operating Procedures, which is the base on which the staff are trained.

- Emergency care is of 24 x 365 days service including Mass casualty Management
- Need to have On Call Physician, Nurse for emergency response to the A & E Department.
- The Emergency care is based on the needs of urban and rural regions in Tamil Nadu, developing standards defining the organizational arrangements and resources required for optimal care of the injured patient in Tamil Nadu and develop guidelines for assessing hospital facilities, and how they integrate with Pre Hospital care and relate to patient outcomes.
- Develop procedures for inspection of hospital facilities; the assessment of outcome of trauma systems; establishment of the requirements for surveyors and the development of a panel of surveyors; establishment of methods of preparing reports; and establishment of methods of reporting to hospitals and State and Territory authorities.

- A designated medical director to direct and oversee the operation of the trauma service. The medical director position for the trauma service documented by a written job description and organizational chart.
- A trauma registrar for the trauma service. The trauma registrar position for the trauma service shall be paid by the hospital and documented by a written job description and organizational chart.

- At least one qualified trauma surgeon to be in-hospital and on primary trauma call at all times to provide trauma service care.
    - At least one qualified trauma surgeon to be on backup trauma call at all times to provide trauma service care.
    - At least one qualified pediatric trauma surgeon for the trauma service.
- Triage is the process of sorting patients according to the severity of their injuries. When attempting to match patient requirements and system resources such a process is essential.
    - The ideal triage tool would be applied quickly and easily under field conditions.
    - The goal is to get the patient to the right hospital at the right time.
    - Three tier Triage system can be followed

Recommended minimum resource requirements for delivery of trauma care at different levels of trauma service provision (adult)

Advanced Trauma Service ATS

District Trauma Service DTS

Rural Trauma Service RTS

Basic Trauma Service BTS

TRAUMA SERVICE ORGANISATION (Need to have the following)

- Triage guidelines
- Medical director of the trauma service
- A trauma committee
- Organization chart
- Written procedural guidelines
- Written patient management guidelines
- Surveillance data systems, Registry
- Injury management data systems
- Trauma education & research
- Emergency preparedness
- Quality Improvement and Performance Assurance

STAFFING

- Doctors present in the hospital 24 hours
- Doctors on call 24 hours

- Doctors with EMTC Training
- Nursing staff with trauma training (EMTC Early Management of Trauma Course)
- Specialists available for resuscitation and early management
    - Emergency medicine
    - Surgery
    - Anesthetics
    - Intensive care

- **EMERGENCY DEPARTMENT**
- General criteria as established in Guidelines:
    - Emergency Medical Services22 ED open 24 hours
    - Ambulance access
- Triage on arrival
- Documented policies and protocols
- Research and education programs
- Designated medical director
- Specialist doctor in house or on call 24 hours
- Trained trauma nurse in charge of nursing resources for trauma
- Trained nurses and aides
- Radiology in proximity
- Equipment including but not limited to: Resuscitation
    - blood warmer
    - portable ventilator

- airways and endotracheal laryngoscope
- oxygen supply
- IV fluids and drip sets portable monitor/
- defibrillator
- Cricothyroidotomy set

- Intercostal tubes and drains
  - intraosseus needles intraosseus drills
    Diagnostic/monitoring
  - capnography
  - Focused Abdominal Sonography in Trauma
  - Noninvasive BP
  - mobile x-ray
  - portable pulse oximeter
  - portable non-invasive BP monitor
  - 12-lead ECG
  - auroscope
  - ophthalmoscope
  - cardiac monitor
  - Miscellaneous
    - Blood refrigerator, infusion pump, humidifier full range of splints, protective clothing, photocopier and fax, internet access, minor operations set, nebulizer

STANDARD III -- SURGICAL SERVICES --

STAFFING AND ORGANIZATION

INTRODUCTION: Trauma Surgeon is critical to the need of kife saving in trauma care services. The surgeons involved in the provision of trauma patient care should reflect an interest in and a commitment to trauma. Formal trauma fellowships, training in surgery with an active trauma service, constitute examples of such interest. Each trauma surgeon participating on the trauma service should also maintain his or her skills and expertise through continuing trauma-related education.

A. General or Pediatric Surgery

a. Primary trauma call

- To be physically present in-hospital to meet all trauma alert patients in the trauma resuscitation area at the time of the trauma alert patient's arrival.
- To perform no elective surgery or procedures, during the on-call period, that would render the trauma surgeon unavailable to arrive promptly to a trauma alert patient.

- To refrain from taking general surgery emergency calls or trauma calls at any other facility while on trauma call at the primary facility.
- Backup trauma call
- To refrain from any activity that would delay or prohibit the trauma surgeon from becoming the primary trauma surgeon when notified.
- Current Trauma Care training certification

STANDARD IV -- NON-SURGICAL SERVICES --

STAFFING AND ORGANIZATION

The Accident & Emergency department should use a coordinated team approach for the optimal care of trauma patients because the complex problems of trauma patients can require the involvement of several specialty areas. However, trauma surgeons should not relinquish the overall responsibility for the trauma patient.

A. Anesthesia -- An anesthesiologist shall be in-hospital and promptly available for trauma patient care 24 hours a day.

B. The following non-surgical specialties shall be available 24 hours a day to arrive promptly at the trauma center when summoned: (Adult & Paediatric)

1. Cardiology

2. Gastroenterology

3. Hematology

4. Infectious disease

5. Internal medicine

6. Nephrology

7. Pathology

8. Pediatrics

9. Psychiatry

10. Pulmonary medicine

11. Radiology

STANDARD V -- EMERGENCY DEPARTMENT

INTRODUCTION: Resuscitation is a vital component of trauma care that requires appropriate organization, personnel, and resources to ensure an effective multidisciplinary approach. It is desirable that the emergency department medical director and other emergency physicians obtain at least half of their trauma-related continuing education outside the hospital. It is also desirable that emergency nurses assigned to the trauma resuscitation obtain their initial trauma education through a comprehensive trauma core course. The resuscitation, if well planned and organized, should optimize the patient's chances of survival, minimize morbidity, and ensure both efficiency and proficiency of the trauma team. Once organized, resuscitations should undergo constant study, constructive evaluation, and continuous quality improvement.

A. Emergency Department Facility Requirements

1. There shall be an easily accessible and identifiable resuscitation area designated for trauma alert patients. This area shall be large enough to allow assembly of the full trauma team.

2. There shall be resources, staff, and equipment necessary to treat the pediatric trauma patient.
3. The trauma resuscitation area shall be of adequate size and contain adequate trauma care equipment and supplies to simultaneously perform at least two multi-system trauma alert patient resuscitations.
4. There shall be evidence of security measures in place in the resuscitation area designed to protect the life and well being of assigned trauma center staff, patients, and families (for example, a silent or overt alarm system or an assigned security guard).

B. Physician Requirements

1. Emergency Department Medical Director -- Evidence shall be on file indicating that the trauma center has designated a medical director for the emergency department.

2. Presence of emergency physicians who care for only pediatric trauma patients,

(1) Providing appropriate assessment and responses to emergent changes in patient condition.

(2) Instituting initial diagnostic procedures.

(3) Providing definitive emergent care.

C. Resuscitation Area Nursing and Support Personnel Staffing Requirements

1. Resuscitation area nursing staff
   a. At a minimum, two nurses (R.N.s) per shift shall be in-hospital and taking primary assignment for the resuscitation area.
   b. All resuscitation area nurses shall fulfill all initial and recurring training requirements
2. Other nursing and technical support staff

   a. The number of nursing personnel and technical staff members assigned to provide patient care in the resuscitation area shall be established by each trauma center and shall ensure adequate care of the trauma patient.
   b. The trauma center shall have a designated and trained staff member to record pertinent patient information on a trauma flow sheet during each trauma alert

D. Resuscitation Area Documentation Requirements

1. The trauma team shall use a trauma flow sheet of one or more pages to document patient care in the resuscitation area.
2. At a minimum, the design of the flow sheet shall be in such a fashion as to provide a sequential account of the following:
    a. The time ambulance (108) called trauma alert.
    b. The time of the trauma alert patient's arrival in the resuscitation area.
    c. The time of arrival for each trauma team member and physician consultant.
    d. Serial physiological measurements and neurological status.
    e. All invasive procedures performed and results.
    f. Laboratory tests.
    g. Radiological procedures.
    h. The time of disposition and the patient's destination from the resuscitation area.
    i. Complete nursing assessment.
    j. Weight for pediatric trauma patients.
    k. Immobilization measures.

l. Total burn surface area and fluid resuscitation calculations for burn patients.

E. Emergency Department Responsibilities

1. The emergency department shall activate the trauma team when the facility is notified of a trauma alert en route that meets state/regional trauma alert criteria.

F. The trauma team, physician consultants, and other support personnel shall arrive promptly when notified of a trauma alert. The trauma team, physician consultants, and other support personnel shall ensure that their response times are documented in each patient's record on the trauma flow sheet.

G. The trauma team shall include, at a minimum, the following:

1. A trauma surgeon (as team leader).
2. An emergency physician.
3. At least two trauma resuscitation area registered nurses.

The trauma medical director may also require other disciplines to participate on this team.

STANDARD VI -- OPERATING ROOM AND POST-ANESTHESIA RECOVERY AREA

INTRODUCTION: Another key component in the provision of definitive trauma care is the timely availability of surgical facilities. Availability also means that operating rooms and post-anesthesia recovery areas are appropriately staffed with trained nurses and technicians.

A. Operating Room

1. The trauma center shall have at least one adequately staffed operating room immediately available for adult and pediatric trauma patients 24 hours a day. This standard does not require a separate operating room for adult and pediatric patients.
2. The trauma center shall have a second adequately staffed operating room available within 30 minutes after the primary operating room is occupied with an adult or pediatric trauma patient.
3. The operating team shall consist minimally of the following:
    a. One scrub nurse or technician.

b. One circulating registered nurse.

c. One anesthesiologist immediately available.

4. All nursing staff members involved in trauma patient care shall satisfy all initial and recurring training requirements

B. Post-Anesthesia Recovery (PAR)

1. The trauma center shall have a PAR area (the surgical intensive care unit is acceptable) adequately staffed with registered nurses and other essential personnel 24 hours a day.

2. A physician credentialed by the hospital to provide care in the ICU or emergency department shall be in-hospital and available to respond immediately to the PAR for care of adult and pediatric trauma patients 24 hours a day.

3. All nursing staff members involved in trauma patient care shall satisfy all initial and recurring training

STANDARD VII -- INTENSIVE CARE UNIT (ICU) AND

PEDIATRIC INTENSIVE CARE UNIT (PICU)

The critically ill trauma patient requires continuous and intensive multidisciplinary assessment and intervention to restore stability, prevent complications, and achieve and maintain optimal outcomes. The trauma service that assumes initial responsibility for the care of an injured patient should maintain that responsibility as long as the patient remains critically ill.

A. The adult ICU must be separate and distinct from the PICU.

B. Adult ICU

1. Physician Requirements

a. The trauma medical director or trauma surgeon designee is responsible for adult trauma patient care in the ICU.

b. An attending trauma surgeon may transfer primary responsibility for a stable adult patient with a single-system injury (for example, neurological) from the trauma service if it is mutually acceptable to the attending trauma

surgeon and the surgical specialist of the accepting service.

2. Nursing Requirements
   a. The ratio of nurses to trauma patients in the ICU shall be a minimum of 1:1.
   b. The ICU nursing staff shall satisfy all initial and recurring training requirements,

C. Pediatric ICU
   1. Physician Requirements
      a. The trauma medical director or trauma surgeon designee is responsible for pediatric trauma patient care in the PICU.
      b. The trauma center shall track by way of the trauma registry all pediatric trauma patients, whether under the primary responsibility of the trauma service or of another surgical or non-surgical service, through the quality management process to evaluate the care provided by all health care disciplines.
   2. Nursing Requirements
      a. The ratio of nurses to trauma patients in the PICU shall be a minimum of 1:1.

b. The PICU nursing staff shall satisfy all initial and recurring training requirements, as listed in Standard VIII, in the time frames provided.

D. Nursing documentation in the ICU and PICU shall be on a 24-hour patient flow sheet.

E. There shall be immediate access to clinical laboratory services.

STANDARD VIII -- TRAINING AND CONTINUING

EDUCATION PROGRAMS

All healthcare professionals providing trauma patient care should have mandatory training in Early Management of Trauma and selected Non Trauma care. Educational offerings attended by staff, both external to the institution and those developed and presented in-hospital, should include Practice\Simulated training. All participants in trauma patient care should acquire and maintain an adequate level of clinical competency and an understanding of the theories supporting a trauma philosophy. The trauma service and the individual department involved, for example, nursing, surgery, intensive care, should mutually manage the educational sessions..
Evidence shall be available indicating the completion of trauma-related continuing education in the hours and time frames provided for the personnel listed below. Time frames begin the effective date the hospital earns provisional trauma center status, or the employee's subsequent date of assignment to the indicated trauma care area.

A. Registered nurses assigned to following departments shall obtain the specified number of trauma-related contact hours:

1. ED/trauma resuscitation area
2. Operating room and post-anesthesia recovery
3. Intensive care unit and pediatric intensive care unit
4. Medical surgical/step down unit for both adult and pediatric
5. Rehabilitation unit
6. Burn unit

B. Paramedics assigned to the above departments shall complete four contact hours of trauma-related continuing education every two years.

C. The nurse or paramedic should be trained to provide both adult and pediatric

STANDARD IX -- EQUIPMENT

The rapid resuscitation, emergency management, and subsequent care of trauma patients require specialized equipment and supplies. This equipment may be expensive and unique to the care of trauma patients, so personnel should have appropriate training and orientation in the use, care, and maintenance of this equipment.

Medical supplies and equipment requirements for the care of adult and pediatric trauma patients in the treatment areas indicated below shall be readily available and shall include at a minimum the following:

A. Trauma Resuscitation Area

1. Airway control and ventilation equipment, including various sizes of laryngoscopes and endotracheal tubes, bag valve mask resuscitator, mechanical ventilator oxygen masks and cannulae, and oxygen.
2. Cardiopulmonary resuscitation cart, including emergency drugs and equipment.
3. Doppler monitoring capability.
4. Electrocardiograph/oscilloscope/defibrillator.
5. Monitoring equipment for blood pressure and pulse and an electrocardiogram (ECG).
6. Pacing capability.

7. Pulse oximetry.
8. Skeletal traction devices.
9. Standard devices and fluids for intravenous (IV) administration.
10. Sterile surgical sets for airway, chest, vascular access, diagnostic peritoneal lavage, and burr hole capability.
11. Suction devices and nasogastric tubes.
12. Telephone and paging equipment for priority contact of trauma team personnel.
13. Thermal control devices for patients, IV fluids, and environment.

B. Operating Room

1. Airway control and ventilation equipment, including various sizes of laryngoscopes and endotracheal tubes, bag valve mask resuscitator, mechanical ventilator suction devices, oxygen masks and cannulae, and oxygen.
2. Anesthesia monitoring equipment.
3. Autotransfusion.
4. Cardiopulmonary bypass capability.
5. Cardiopulmonary resuscitation cart, including emergency drugs and equipment.

6. Craniotomy/burr hole and intracranial monitoring capabilities.

7. Endoscopes.

8. Invasive hemodynamic monitoring and monitoring equipment for blood pressure, pulse, and ECG.

9. Operating microscope.

10. Orthopedic equipment for fixation of pelvic, longbone, and spinal fractures and fracture table.

11. Pacing capability.

12. Standard devices and fluids for IV administration.

13. Thermal control devices for patients, IV fluids, and environment.

14. X-ray capability.

C. Post-Anesthesia Recovery

1. Airway control and ventilation equipment, including various sizes of laryngoscopes and endotracheal tubes, bag valve mask resuscitator, mechanical ventilator suction devices, oxygen masks and cannulae, and oxygen.

2. Autotransfusion.

3. Cardiopulmonary resuscitation cart, including emergency drugs and equipment.

4. Intracranial pressure monitoring.

5. Invasive hemodynamic monitoring and monitoring equipment for blood pressure, pulse, and ECG.

6. Pacing capability.

7. Pulse oximetry.

8. Standard devices and fluids for IV administration.

9. Sterile surgical sets for airway and chest.

10. Thermal control devices for patients and IV fluids.

D. Intensive Care Unit and Pediatric Intensive Care Unit

1. Airway control and ventilation equipment, including various sizes of laryngoscopes and endotracheal tubes, bag valve mask resuscitator, mechanical ventilator suction devices, oxygen masks and cannulae, and oxygen.

2. Auto transfusion.

3. Cardiopulmonary resuscitation cart, including emergency drugs and equipment.

4. Compartment pressure-monitoring devices.

5. Intracranial pressure monitoring capabilities.

6. Invasive hemodynamic monitoring.

7. Orthopedic equipment for the management of pelvic, longbone, and spinal fractures.

8. Pacing capabilities.

9. Pulse oximetry.

10. Scales.

11. Standard devices and fluids for IV administration.

12. Sterile surgical sets for airway and chest.

13. Thermal control devices for patients, IV fluids, and environment.

E. Medical Surgical Unit

1. Airway control and ventilation equipment, including laryngoscopes, endotracheal tubes of all sizes, bag-mask resuscitator, and sources of oxygen.

2. Cardiopulmonary resuscitation cart, including emergency drugs and equipment.

3. Standard devices and fluids for IV administration.

4. Suction devices.

STANDARD X -- LABORATORY SERVICES

A. Service Capabilities -- The trauma center shall have the following laboratory capabilities for adult and pediatric trauma alert patients available in-hospital 24 hours per day:

1. Services for the prompt analysis of the following:

   a. Blood, urine, and other body fluids.

   b. Blood gases and pH determination within five minutes 90 percent of the time.

   c. Coagulation studies.

   d. Drug and alcohol screening.

   e. Microbiology.

   f. Serum and urine osmolality.

2. An appropriately staffed blood bank. The blood bank shall, at a minimum, be capable of providing the following:

   a. Blood typing, screening, and cross matching.

   b. Platelets and fresh frozen plasma.

3. Needed units of type "O" blood.

4. The trauma center shall have written protocols available ensuring that trauma patients receive priority over routine laboratory tests.

B. Staffing Requirements -- A laboratory technician shall be available in-hospital 24 hours per day to conduct laboratory studies for trauma alert patients.

STANDARD XI -- ACUTE HEMODIALYSIS CAPABILITY

Acute hemodialysis capability shall be available for trauma patients 24 hours a day.

STANDARD XII -- RADIOLOGICAL SERVICES

A. Service Capabilities -- The following radiological service capabilities for trauma alert patients shall be available in-hospital 24 hours per day:

1. Angiography (of all types) with a maximum response time until the start of the procedure of 60 minutes.
2. Computerized tomography (CT).
3. Routine radiological studies.

B. Staffing Requirements -- Radiological staff needed to perform radiological services for trauma alert patients shall be available 24 hours a day. At a minimum, this includes the following:

1. A radiologist, A chief radiology resident may fill the in-hospital requirement only if the trauma medical director ensures the following:
    a. A staff radiologist is on trauma call and available to arrive promptly at the trauma center when summoned.
    b. The trauma medical director and the Chief of Radiology attest in writing that each

participating resident is capable of the following:

(1) Authorizing any radiological studies required for adult and pediatric trauma alert patients.

(2) Providing appropriate evaluation of adult and pediatric trauma alert patient radiological studies.

2. A CT technician shall be in-hospital 24 hours a day.

3. A radiological technician shall be available in-hospital 24 hours per day.

C. CT Scanner Requirements

1. At least one CT scanner shall be available for trauma alert patients, and be located in the same building as the resuscitation area. CT scanners located in remote areas of the hospital campus (that requires moving the patient from one building to another), in mobile vans, or in other institutions do not meet this requirement.

2. If the trauma center has only one CT scanner, a written plan shall be in place describing the steps to be taken if the apparatus is in use or becomes temporarily

inoperable. The plan must include trauma patient transfer agreements.

STANDARD XIII -- ORGANIZED BURN CARE

Most burn injuries are relatively minor and patients are discharged following outpatient treatment at the facility where they are first seen. Some burns, however, are serious enough to require hospitalization, either through direct admission or by referral to hospitals with special burn treatment capabilities.

The trauma center shall have written policies and procedures for triage, assessment, stabilization, emergency treatment, and transfer (either into or out of the facility) of burn patients. Policies and procedures shall also be written regarding in-hospital management, including rehabilitation, of burn patients.

A. The trauma center is capable of providing specialized care, dedicated beds, and supplies or equipment appropriate for the care of a patient with major or significant

B. If the trauma center is not capable of providing specialized care, dedicated beds, and supplies or equipment appropriate for the care of a patient with major or significant burns, the facility shall have a written transfer agreement with such a facility. The trauma center shall also have written medical

transfer policies and protocols to ensure the timely and safe transfer of the burn patient.

STANDARD XIV -- ACUTE SPINAL CORD AND

BRAIN INJURY MANAGEMENT CAPABILITY

A. The trauma center shall have written policies and procedures for triage, assessment, stabilization, emergency treatment, and transfer (either into or out of the facility) for brain or spinal cord injured patients. Policies and procedures shall also be written regarding in-hospital management, including rehabilitation, and the implementation of the preventive ulcer program, for brain or spinal cord injured patients.

STANDARD XV -- ACUTE REHABILITATIVE SERVICES

A trauma service should provide for the rehabilitation of its patients, with the goal of returning to society an individual who functions at the highest possible level consistent with his or her injuries. Early rehabilitation minimizes the risk of secondary complications that may interfere with or limit functional recovery. Members of the trauma service should also work with colleagues to prepare the patient and family physically, psychosocially, and emotionally for the transition to rehabilitation and ultimately for return to the community.

A. The trauma medical director shall establish injury categories to identify trauma patients as candidates for rehabilitative services. At a minimum, the injury categories shall include trauma patients with musculoskeletal, cognitive, and other neurological impairments.

B. The trauma medical director or trauma program manager shall ensure that trauma patients meeting the criteria established above have an evaluation by any or all of the following (as appropriate to the patient's injury) within 7 days of inpatient admission:

1. Attending trauma surgeon, neurosurgeon, neurologist, or orthopedic surgeon.
2. Neuropyschologist.
3. Nursing personnel may include the following:
    a. Trauma program manager or designee.
    b. Clinical nurse specialist.
    c. Rehabilitation nurse.
4. Occupational therapist.
5. Physiatrist or medical director of the rehabilitation services department.
6. Physical therapist.
7. Speech therapist.

C. The consultant shall document this evaluation in the patient's medical record. Documentation shall include any short- or long-term rehabilitation goals and plan.

D. The physician with primary responsibility for the patient shall review the assessment and recommendations within 48 hours and document the review in the patient's medical record.

E. The trauma center shall have one of the following for long-term rehabilitative services:
    1. A designated rehabilitation unit

2. A rehabilitation unit designated by the Department of Health.
3. A written transfer agreement in place with one of the above stated facility types, and written medical transfer policies and protocols for when to initiate a transfer to ensure the timely and safe transfer of the trauma patient.

STANDARD XVI -- PSYCHOSOCIAL SUPPORT SYSTEMS

Post Traumatic Stress Disorder is a common feature of Trauma. The trauma center should assure that qualified personnel are available to assess and support the patient and the patient's family or significant others. This should include crisis intervention, acceptance and adaptation to the repercussions of the injury, and facilitation of the transition from the hospital.

A. The trauma center shall have written policies and protocols to provide mental health services, child protective services, and emotional support to trauma patients or their families. At a minimum, the policies and protocols shall include qualified personnel to provide the services and require that the personnel shall arrive promptly at the trauma center when summoned.

B. Qualified personnel may include, but are not be limited to, the following:

   1. Nurses (in addition to resuscitation area personnel).
   2. Spiritual care representatives.
   3. Patient advocates or representatives.
   4. Physician consultants.

5. Psychologists or psychiatrists.
6. Social service workers.

C. Drug and alcohol counseling and referral services shall be available for patients and their families.

D. The personnel listed in B.1-6 shall document these interventions in the patient's medical record.

STANDARD XVII -- OUTREACH PROGRAMS

Although the trauma center is a key component of acute care for the critically injured trauma patient, an effective trauma system encompasses all phases of care, from prehospital to reintegration into society. By providing multidisciplinary educational opportunities and becoming actively involved in the formulation of community approaches to trauma care, the trauma center will aid in attaining the goal of optimal care for all injured patients. It is desirable that the trauma center coordinate their outreach activities with the local or regional trauma agency, if one exists. Finally, the trauma center should consider developing these programs in response to identified, targeted local problems. Use of national injury prevention programs are recommended to avoid replication and eliminate the need to spend resources to develop a quality program when one has already been developed and tested.

A. The trauma service shall have written evidence documenting active involvement in at least two public education programs (one general and one pediatric) and two public trauma prevention programs (one general and one pediatric) per calendar year.

1. Injury prevention programs shall be chosen based upon the epidemiologic needs of the community served by the trauma center.
2. Hospital-specific evaluation methods shall be implemented to determine the effectiveness of the injury prevention programs.

B. The trauma service shall provide 24-hour availability of telephone consultation with members of the hospital's trauma team and physicians of the community and outlying areas. Scheduled on-site consultations with members of the hospital's trauma team shall be available with physicians of the community and outlying areas. Evidence of these consultations shall be documented.

C. Evidence of contact with referring physicians regarding patient transfers shall be documented in all cases.

D. There shall be evidence of a minimum of 10 multidisciplinary conferences conducted per year to provide trauma case review for the purpose of case management, education,and correction of system issues for both prehospital and in-hospital. The case review must include at least one adult and one pediatric trauma patient when appropriate.

STANDARD XVIII -- QUALITY MANAGEMENT

The goals of a trauma quality improvement program are to monitor the process and outcome of patient care, to ensure the quality and timely provision of such care, to improve the knowledge and skills of the trauma care providers, and to provide institutional structure and organization to promote quality improvement. The plan should contain these essential elements for successful implementation: authority and accountability for the program,
a well-defined organizational structure for the committee composition and member responsibilities, defined standards to determine quality of care, and explicit definitions for outcomes required by the facility's prescribed standards.

The trauma center shall demonstrate a clearly defined performance improvement program for the trauma population that is integrated into the hospital-wide program. The trauma program's monitoring and evaluation process must show identification of process/outcome issues, corrective actions taken, and loop closure, when applicable, for evaluations of the desired effects.
The trauma service shall have written evidence on file indicating an active and effective trauma quality improvement program. This

evidence shall include procedures and mechanisms for at least the following:

Population of cases for review -- The trauma medical director and trauma program manager shall review all trauma patient records from the following categories:

- All trauma alert cases admitted to the hospital
- Critical or intensive care unit admissions for traumatic injury.
- All operating room admissions for traumatic injury (excluding same day discharges or isolated, non-life threatening orthopedic injuries).
- Any critical trauma transfer into or out of the hospital.
- All in-hospital traumatic deaths, including deaths in the trauma resuscitation area.

a. Process/outcome indicators -- The facility shall monitor at least ten indicators relevant to process or outcome measures.

b. The facility must monitor four state-required indicators relevant to process and outcome. The initial four indicators shall be as follows:

(1) All deaths.

(2) Any trauma patient with an unplanned re-admittance to the hospital within thirty days of discharge.

(3) Any trauma patient readmitted to ICU, or an unplanned admission to the ICU from a medical/surgical unit.

(4) Percentage of all traumatic C1, C2 and/or C3 spinal cord injury patients permanently dependent on mechanical ventilator support who were admitted or transferred to the ICU during the quarter or who remained in the ICU from the previous quarter; who received the diaphragm pacer surgery and were discharged to a less restrictive facility, home or home-health.

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- The facility must identify and monitor six indicators relevant to its respective facility for a period of six months and submit these indicators to the Department of Health.

- The identification of indicators shall be based on defined criteria (expectations) that can be determined from consensus institutional guidelines and nationally derived evidence-based guidelines.
- As process and outcome issues are resolved through evidence of the implementation of an action plan, evaluation, and closure when applicable, new indicators shall be introduced and monitored for a minimum of at least six months. New indicators must be submitted to the Department of Health.
- Evaluation of cases -- The trauma medical director or trauma program manager shall evaluate each case identified by one of the indicators
- Committee discussion and action -- The members of the TQM committee shall review and discuss each case referred by the trauma medical director or trauma program manager.
- Resolution and follow-up -- The TQM committee shall evaluate and document the effectiveness of action taken to ensure problem resolution, improvements in patient care, or improved patient outcomes.

C. The trauma quality management committee shall be composed of at least the following persons:

1. Trauma medical director (as chairperson).
2. Trauma program manager.

3. Medical director of emergency department or emergency physician designee.
4. Trauma surgeon, other than the trauma medical director.
5. Surgical specialist other than trauma surgeon, such as neurosurgeon, orthopedic surgeon, and pediatric surgeon.
6. Representative from administration.
7. Operating room nursing director or designee.
8. Emergency department nursing director or designee.
9. Intensive care unit nursing director or designee.
10. Trauma Nurse Coordinator

STANDARD XIX -- TRAUMA RESEARCH

One of the major responsibilities of a Level I trauma center is to continually expand the body of knowledge in the field of trauma through clinical and basic research programs. It is incumbent on the full-time staff of the trauma center to apply this newly acquired knowledge to the treatment of the injured patient and to disseminate the knowledge throughout the medical community.

A. The trauma service shall conduct ongoing clinical and research programs in trauma patient care and a Level I trauma center program must have:

   a. Peer-reviewed funding for trauma research. There should be demonstrated evidence of funding of the center from a recognized government or private agency or organization.

   b. Evidence of dissemination of knowledge to include review articles, book chapters, technical documents, Web-based publications, editorial comments, training manuals, and trauma-related course material.

c. Display of scholarly application of knowledge as evidenced by case reports or reports of clinical series in journals included in MEDLINE.

d. Participation as a visiting professor or invited lecturer at national or regional trauma conferences.

e. Support of resident participation in institution-focused scholarly activity, including laboratory experiences, clinical trials, or resident trauma paper competitions at the state, regional, or national level.

f. Mentorship of residents and fellows, as evidenced by the development of a trauma fellowship program or successful matriculation of graduating residents into trauma fellowship programs.

B. The institution will have a designated trauma research director and demonstrate current involvement in and commitment to research in adult and pediatric trauma care.

STANDARD XX – DISASTER PLANNING AND MANAGEMENT

- The trauma center shall meet the disaster related requirements
- As per the guidelines of National Disaster Management Authority (NDMA) the principles of MCM need to be followed such as
- Notification, Verification, Activation, Response and Deactivation.
- They are time bound and provided by trained Health Care personnel as cited above.

Trauma Registry

The Trauma Registry will have data captured at each stage of the Patient Management

Data Captured for Registry
2. Name 3. Age 4. Gender 5. In Case of RTA 6. In case of Chest Pain 7. In Case of Stroke 8. In Case of Poison 9.

Data captured for Trauma Registry at Post Mortem

1. Age
2. Gender
    a. Male / Female
3. Mode of Injury
    a. RTA / TTA / Assault / Fault / Industrial Accident
4. Is there a Head Injury
    a. Yes / No
        i. If Yes, Choose all that apply
            1. Fracture
            2. EDH
            3. SDH
            4. SAH
            5. Contusion
            6. IVH
5. Is there as Chest Injury

a. Yes / No
    i. If Yes, Choose all that apply
        1. Lung Injury
        2. Heart Injury
        3. Great Vessel Injury

6. Is there a Abdominal Injury
    a. Yes / No
        i. If Yes, Choose All that apply
            1. Liver Injury
            2. Spleen Injury
            3. Great Vessel Injury
            4. Others
7. Is there a Long Bone or Pelvic Injury
    a. Yes / No
        i. If Yes, Choose All that Apply
            1. Femur
            2. Tibia
            3. Pelvis
8. Was there any surgical intervention
    a. Yes / No
        i. If Yes, Choose All that Apply
            1. Intercostal Drainage
            2. Laparotomy
            3. External Fixation
            4. Burr Hole / Craniotomy

OP Load

Number of visits: 130.4 million
Number of injury-related visits: 37.2 million
Number of visits per 100 persons: 41.9
Number of emergency department visits resulting in hospital admission: 12.2 million

Number of emergency department visits resulting in admission to critical care unit: 1.5 million
Percent of visits with patient seen in fewer than 15 minutes: 29.8%
Percent of visits resulting in hospital admission: 9.3%
Percent of visits resulting in transfer to a different (psychiatric or other) hospital: 2.2%
https://www.cdc.gov/nchs/fastats/emergency-department.htm

Appendices :