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EMERGENCY MEDICINE PATHWAYS

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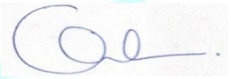
Approved By:	***Designation: MEDICAL DIRECTOR*** **Name :** Dr.Gowtham Krihsna **Signature:** 
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AMENDMENT SHEET

S.NO	Section and Page	Date	Amendment	Signature

NEWER GUIDELINES

S.No.	Section no & page no	Details of the amendment	Reasons
1	6.1 (Pg38)	C SPINE RULE	ATLS UPDATE
2	6.2 (Pg 48)	POLYTRAUMA	ATLS 2018 UPDATE
3	6.8 (Pg 69)	SEPSIS NEW DEFINITIONS	SEPSIS 2019
4	6.12 (Pg 101)	BURNS TREATMENT	ATLS 2018 UPDATE
5	8 (Pg 179)	ACLS ADULT,PAEDIATRIC, 2020	ACLS 2020 UPDATE
6	8 (Pg 182)	POST CARDIAC ARREST	ACLS 2020 UPDATE
7	8 (Pg 183)	CARDIAC ARREST IN PREGNANCY	ACLS 2020 UPDATE
8	8 (Pg 184)	PAEDIATRIC BRADYCARDIA	ACLS 2020 UPDATE
9	8 (Pg 185)	PAEDIATRIC TACHYCARDIA	ACLS 2020 UPDATE
10	8 (Pg 186)	PAEDIATRIC CARDIAC ARREST	ACLS 2020 UPDATE
11	208	PAEDIATRIC HEADINJURY	
12	209-2012	HEAD INJURY IN ADULT	

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CONTROL OF THE MANUAL

The holder of the copy of this manual is responsible for maintaining it in good and safe condition and in a readily identifiable and retrievable.

The holder of the copy of this Manual shall maintain it in current status by inserting latest amendments as and when the amended versions are received.

Accreditation coordinator is responsible for issuing the amended copies to the copyholders, the copyholder should acknowledge the same and he /she should return the obsolete copies to the Accreditation coordinator.

The amendment sheet, to be updated (as and when amendments received) and referred for details of amendments issued.

The manual is reviewed once a year and is updated as relevant to the hospital policies and procedures. Review and amendment can happen also as corrective actions to the non-conformities raised during the self-assessment or assessment audits by NABH.

The procedure manual with original signatures of the above on the title page is considered as 'Master Copy', and the photocopies of the master copy for the distribution are considered as 'Controlled Copy'.

Distribution List of the Manual:

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1	MEDICAL DIRECTOR
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SECTION 1: GENERAL INSTRUCTIONS

RESPONSIBILITY

i. The Emergency medical Officer is responsible to provide first aid, to carry out TRIAGE, for diagnosing the patient, planning treatment to the patient and arranging required specialist/consultant to examine the patient.

ii. Nursing In charge is responsible for maintaining basic inventory of drugs, disposables and instruments at appropriate level and condition and also responsible for supervising the activity of staff nurses and ensures adequate support to patient & doctors/consultants.

iii. The Staff Nurse is responsible to take care of the patients as per the Doctors Order.

iv. The Ward boy / Ayah assist the Staff Nurse so that they can discharge their responsibilities in time.

v. The Emergency Department functions for all the 24 hours of the day.

vi. The patients who are brought to the Emergency department are of two types

- Patients who are brought to the Hospital with some ailments in the non-OPD hours and needs relatively less intensive care.
- Patients who are brought to the Emergency needing immediate care.

vii. As soon as the patient is brought to the hospital the patient to be immediately moved to the Emergency Room using stretchers / wheel chairs with no undue delay

viii. The Emergency Medical Officer on duty attends the patient, carries out quick assessment (MEW'S) (TRIAGE), provide first aid (as appropriate), initiate for the necessary investigations, start the treatment and guide the patient's guardians to complete the formalities of registration.

ix. After examination by the Emergency Medical Officer, the Casualty / Emergency Medical Officer calls for the concerned Senior Resident / Specialist on duty to continue the treatment.

x. The Consultant examines the patient and raises investigation request to concerned departments and if required refers to other consultants.

xi. The Emergency Medical Officer judges the condition of the patient and if felt necessary the patient is moved to acute wards/other wards.

xii. All findings to be recorded in the patient's medical record

❖ **SECTION 2: ASSESSMENT OF PATIENT IN ER**

Policy:

- ER assessment form should be completed for every patient attends the ER.
- ER assessment shall be done immediately when the patient enters in the ER by the ER Nurse and EMO.

Procedure:

- Initial assessment at emergency shall be carried out by concerned doctor / staff nurse. Initial assessment at emergency shall be started as soon as possible if there are more than 3 patients at a time assessment it is done through triage method for triage refer to the triage policy
- The EMO assesses and evaluates each patient prior to making any referrals or decisions regarding disposition. The concerned consultant is informed immediately of all admissions or referrals or CPR or death. Any cross consultation required is discussed immediately with the consultant, and executed accordingly.
- Vitals assessment and general examination is carried out by the nursing staff, under the supervision of EMO on Duty.
- This assessment shall be documented in the emergency assessment form with sign, name, date and time duly endorsed by the person making the entry.

❖ **2.1.1 INITIATION OF ADMISSION**

- If patient requires Admission EMO shall update the treatment given in the consultant paper.
- Nurse/PRE shall direct the patient attendants to initiate admission, formalities (Refer to Admission policy)
- In case of MLC, nurse shall raise the MLC charges raised against the IP No in HIS and they shall be included in the IP bill.
- In case of IP admission through ER, if the patient requests nonpayment for ER related charges but seeks to include the same in IP bill, it shall be the responsibility of the concerned nurse to review the patient records, discuss with MOD/CEO and update the HIS / IP billing chart with reference to IP number of patients for all the procedures /investigation done for the patient for billing purposes.
- However, patient transfer shall not be delayed for this purpose. If patient has to be immediately transferred, the updation of entries shall be checked in coordination with the IPD, ICU staff where the patient has to be shifted.
- Nurse & ward boy shall accompany the patient while shifting to the wards or ICU from the ER. And hand over the patient file to concerned nurse by the ER nurse. The transaction shall be noted in nursing notes of both casualty IPD/ICU nurse. In case of critical cases EMO shall accompany the patient while transferring it to concerned department.

2. MEDICO LEGAL CASES

i. All unnatural cause(s) of suffering / death are treated as Medico Legal Cases.

ii. All cases handled by the emergency unit are recorded in the Admission Register or Out Patient register as appropriate.

iii. In all Medico Legal Cases, the Emergency Medical Officer enters the details in the MLC Register

iv. If the patient is brought dead on arrival, the Emergency Medical Officer enters the details of the deceased in the Brought Dead Register and Brought Dead Form is issued to patient attendant.

v. The Emergency Medical Officer intimates the details regarding the medico legal case to the Security Department, who in turn (Security Officer) informs to concerned police station.

vi. For Medico Legal Cases, dead body is handed over to the police for Autopsy.

LIST OF MLC CASES:

a. All injury cases, circumstances of which suggest commission of offence by someone.
b. All burn injuries due to any cause.
c. All vehicular, railway, aero plane, ship, boat, factory, construction site or other unnatural accidents where there is likelihood of death or grievous hurt.
d. Suspected or evident homicide, suicide including attempted.
e. Suspected or evident poisoning.
f. Suspected or evident sexual assaults.
g. Suspected or evident criminal abortion
h. Unconscious cases where the cause is not natural or not clear.
i. Cases brought dead with improper history creating suspicion of an offence.
j. Cases referred by courts or otherwise for age estimation.
k. Dead on arrival cases, or patients who die shortly after being brought to the casualty and before a definite diagnosis could be made.
l. Any other case not falling under the above mentioned category but has legal implications.
m. Unnatural death of a lady within 7 years of marriage.
n. Patients dying suddenly after parenteral administration of a drug or medication.
o. Patient falling down or any mishap in the Hospital, sustaining injury in the hospital.
p. Death on operation table.
q. Unexplained death after surgery or interventional procedure.
r. Unexplained ICU death.
s. Patient treated and then referred from a private hospital or other Government hospital with complications of surgery or delivery or bleeding, where the cause of death is unexplained.

t. Relatives of the patient assault the treating doctor or other staff of the hospital.

u. Relatives of the patient create a law and order problem in the hospital

MANAGEMENT OF MEDICO LEGAL CASES (MLC)

PROCEDURE: To outline the guidelines to be followed in dealing with cases that could potentially have Medico-Legal implications.

SCOPE: This policy is applicable for all the Medico legal cases admitted in the hospital.

RESPONSIBILITY: Staff of Emergency department, Patient Care Services, Security, Front Office & Management.

MEDICO LEGAL CASE : It is a case of injury/ ailment where an attending doctor, after taking the history and clinical examination of the patient, thinks that some investigations by law enforcement agencies are essential, so as to fix the responsibility regarding the case, in accordance with the law of the land.

POLICY :

The hospital receives and administers first aid or if required resuscitates patients with potential medico- legal implications only through the ER department.

Potential medico-legal cases include

- ✓ Cases of injuries and burns suspected to be an offence.
- ✓ All cases of suspected/evident poisoning/intoxication – Accidental, Suicidal, Homicidal
- ✓ Suspected/evident sexual assault.
- ✓ Suspected/evident criminal abortion.
- ✓ All vehicular, factory or unnatural accident cases.

- ✓ Cases brought dead with improper history creating suspicion of offence.
- ✓ Cases referred from court or otherwise for age estimation.

- ✓ All injuries like fire arm injuries, burn injuries & Blunt Injuries etc
- ✓ Any other case as defined legally as an MLC case, not included in above

- For All MLC cases MLC stamp has to be placed on all the documents including the investigation reports. RED MLC stamp to be placed on case sheet and MLC Forms are kept separate & confidential.
- The dead body of a MLC case shall not be handed over to the patient's relatives. It shall only be handed over to the police and for death cases the reason of death is not documented in the death summary for MLC cases.
- MLC should be reported by the first health care establishment in which the individual is received. In cases if MLC is not initiated it shall be documented in the transfer summary that MLC is not initiated.

PROCEDURE

- Once MLC is confirmed, EMO shall document the complete available particulars of the patient along with two identification marks. Particulars of the person accompanying the patient will also be noted in the MLC Form.
- For brought dead case, brought dead procedures shall be followed.
- Medico-legal register should be maintained in the emergency room and details of all medico-legal cases should be entered in this register by the PRE or Nurse and inform security.
- ER nurse shall enter the case details in MLC register and shall mark MLC stamp In Capital Letters) on case sheet. And take thumb impression of victim will be taken on the MLC form.
- Security officer shall visit the case and see if patient is accompanied by police or not, if

police is not accompanying the patient, then the security shall call the nearest police station and record the call in police intimation register an acknowledgement of receipt of such a message should be taken for future reference.

- 3 copies of Police intimation report/ MLC Form to be made original copy will be taken by the police and the duplicate copy is kept in the patient file & security on duplicate copies police signature to be obtained

MANAGEMENT OF BROUGHT DEAD CASE

PURPOSE: To establish a procedure for management of brought dead case.

PROCEDURE:

- If a patient is brought dead, the EMO & Nursing staff checks patient's vital signs and connects monitors take ECG and try to resuscitate the patient.
- Nurse shall update the ER register.
- EMO shall examine the patient and decide if an anesthetist is required. If not, then the EMO shall declare the patient as brought dead and update the consultant sheet.
- If the EMO decides an anesthetist is required, the on duty anesthetist shall be called.
- If the EMO /Anesthetist shall examine the patient and if he/she is still alive, then the critical care process shall be followed.
- If the EMO /Anesthetist declare the patient as dead ,ER team ensures the situation is under control and EMO/Anesthetist declares the death to nearby relatives.
- 2 copies of brought dead certificate shall be made. The original copy shall be handed to patient attendants; second copy shall be sent to Medical Records Department and file along with the ECG in Emergency Room.

LEAVING AGAINST MEDICAL ADVICE (LAMA)

- ✓ During the course of treatment, at any point of time if the patient/patient attendants prefer to leave against medical advice (LAMA), the same is arranged, after patient / patient attendant is explained about potential consequences by Casualty / Emergency Medical Officer.
- ✓ The Casualty / Emergency Medical Officer issues LAMA certificate for patients who Leaves Casualty room against medical advice.

❖ **LEAVING AGAINST MEDICAL ADVICE (LAMA) (AAC.13 C)**

PURPOSE: To Provide instructions & guidance for all the staff on how to manage patients leaving against medical advice in their department.

SCOPE: This policy is applicable for all Medical, Nursing and other staff at INODAYA Hospitals.

RESPONSIBILITY: All staff members involved in patient care: medical, nursing, paramedical, billing & medical record staff of INODAYA Hospitals

❖ LEAVING AGAINST MEDICAL ADVICE (LAMA) (AAC.13 C)

DEFINITION

LAMA: Is patient who insists upon leaving against the expressed advice of the treating team.

POLICY:

The Hospital respects the rights of adult patients to refuse medical treatment or to request a transfer to another facility and therefore will discharge such patients even against their physician's advice.

PROCEDURE:

- ✓ A patient who desires to leave the hospital without medical approval will not be forcibly detained.
- ✓ However, Duty Medical Officer / Treating Consultant shall counsel the patient family about the medical risk of patient, and try to convince them, if convinced the Patient Relative Executive (PREs) shall inform about the probable cost and treatment time.
- ✓ If the patient / patient's family are not convinced, the concerned nurse shall ask the patient/attendants to sign a LAMA form.
- ✓ Concerned nurse shall make the arrangements for requisite medicine replacement, billing & discharge (for further details refer Discharge procedure) & in log register LAMA shall be updated.
- ✓ In case of LAMA, treatment plan should not be handed over to the patient. LAMA discharge summary is prepared and handed over to the patient/relatives
- ✓ If any investigations were done, then the reports of the same must be handed over to the patient/ attendants and their acknowledgement shall be taken in the document handover register.

IN CASE OF DISCHARGE ON REQUEST (DOR)

- ✓ When patient feeling better and wants to take discharge on his/her own request.
- ✓ A patient who wishes to take his /her own discharge on request from hospital.

- Doctor shall inform the patient regarding of any specific risks or consequences of the risk involved in taking discharge on request and he / she will be recording in case sheet that discharge on request.
- Doctor / Concern Nurse shall take the discharge on request declaration from the Patient, preferably in the presence of a witness.
- The discharge on request form shall be filled in the patient's medical record.
- When a patient is unwilling to sign the declaration he /she should not be delayed in any way from taking his/her own discharge but the Consultant / duty medical officer who has explained to him/her should document the circumstances in the doctor's progress notes in the presence of a witness.

TRANSFER / REFERRAL OF PATIENTS (AAC.3 a-d)

PURPOSE: To provide guidelines and to ensure safe and appropriate transfer of the patient with minimal risk.

SCOPE: This policy is applicable for patients who need to be transferred from wards, departments, Emergency Room within the Hospital, to diagnostic facilities and to other hospital facilities.

RESPONSIBILITY: Treating Consultant, Duty Medical Officer, Emergency Medical Officer, Ward Nurse, Ward boy, and Ambulance Drivers

DEFINITIONS :

STABLE: Patients who have stable blood pressure and pulse, oral or intramuscular (IM) medications and be breathing on their own. They may have a normal or reduced level of consciousness, but should be stable at that level.

UNSTABLE: Patients who require an intensive care level of monitoring of their vital signs (pulse ,respiration, blood pressure) or require the bedside capacity to intervene in anticipation of a possible rapid decline in their condition are not considered stable. Patients with low, extremely high, or rapidly fluctuating blood pressure are not stable. Patients requiring continuous cardiac monitoring and/or the potential for cardiac resuscitation capability are not stable.

POLICY

- ✓ Clinical Staff of INODAYA hospitals shall be trained in BLS protocols and staff of ER & ICU are Trained

in ACLS protocols

- ✓ While transferring the patient within the hospital or to the other services patient's privacy & confidentiality to be taken care

INTRA HOSPITAL TRANSFER:

❖ **TRANSFER OF PATIENT FROM EMERGENCY ROOM TO OPERATION THEATRE (OT)**

- Patients who are critical and require immediate surgical intervention are transferred to OT from the emergency room.
- Patient shall be accompanied by the emergency nurse and emergency medical officer/ Intensivist. The patient is handed over to the OT Nurse along with their case file.
- Before shifting the patient from ER to OT, concerned nurse will be documenting the patient shifting information in the patient shifting information sheet / Nurses Notes.
- Staff accompanying in transfer of unstable patient shall be trained in ACLS.

❖ **EMERGENCY ROOM TO INTENSIVE CARE UNIT (ICU):**

- Patients who are critical and require immediate intensive care are transferred to ICU.
- ER nurse MUST confirm the availability of bed before transferring the patient.
- Patient shall be accompanied by the ER nurse and emergency medical officer, the patient is handed over to the ICU doctor/ ICU registered nurse along with their case file.
- Before shifting the patient from ER to ICUs, concerned nurse will be documenting the patient shifting information in the patient shifting information sheet / Nurses Notes.

❖ **WARD / ICUs to OT**

- Patients who are undergoing surgery will be shifted to OT. Before shifting the patient ward/ICU nurse MUST confirm the readiness of OT from the OT Nurse and information to be conveyed to the PRE of the concerned floor.

- The patient for surgery shall be shifted along with their case sheet and duly completed pre-operative checklist, relevant X-Rays, C.T. Scans and MRIs all other investigation reports by a registered nurse and accompanied by the relative of the patient.
- Before shifting the patient from Ward / ICU to OT, concerned nurse will be documenting the patient shifting information in the patient shifting information sheet.

❖ **TRANSFER OF PATIENT FROM OT TO POW / ICUS / WARDS**

- ✓ OT Nurse / OT technician shall inform POW / ICU nurse that patient is to be shifted from OT to POW/ ICU. Before shifting the patient from OT to ICUs / POW / Wards, concerned nurse will be documenting the patient shifting information in the patient shifting information sheet.
- ✓ For ICU patient's anaesthesia resident and technician shall accompany patient and hand over to concerned nurse / ICU doctor on duty.
- ✓ When the patient is fully conscious and follows the command, with the written order of the anaesthetist, patient is shifted to the concerned ward.

❖ **TRANSFER OF STABLE PATIENT FROM ER TO WARD, WARD TO DIAGNOSTIC SERVICES**

- ✓ Patients who are diagnosed with stable vital signs and does not require immediate intensive care shall be

admitted to ward these transfers shall be made only after receiving written orders from treating doctor.

- ✓ Before shifting the patient from ER to Wards, concerned nurse will be documenting the patient shifting information in the patient shifting information sheet.
- ✓ Patient once stabilized in the emergency shall be transferred along with their case file to the concerned ward accompanied by the staff nurse & ward boy.

INTER HOSPITAL / DIAGNOSTIC TRANSFER:

❖ **EMERGENCY ROOM OR WARDS TO DIAGNOSTIC CENTERS:**

- ✓ In case of some of the diagnostic facilities are not available within the hospitals, patients are transferred to such facilities for undergoing such diagnostic evaluations.
- ✓ The diagnostic centre- where the hospital has agreement (MOU) with Inodaya Hospitals labs, prior to the patient's transfer, the nurse or duty medical officer / PRE shall confirm the appointment and record all Information requested on the appropriate document. In addition, the transferring nurse shall review orders written 24 hours prior to transfer to ensure that all orders have been taken off.
- ✓ Before sending the patient, the emergency department or the ambulance control room is informed who makes the necessary arrangements for ambulance and staff.

- ✓ In case of critical patient, nurse and medical officer shall accompany the patient long with their case file / transfer summary

❖ **TRANSFER OF PATIENT TO OTHER HOSPITAL:**

- ✓ Patients who do not match organizational resources, both in emergency as well as non-emergency situations are transferred to other hospital after providing first aid to the patient.
- ✓ On duty medical officer / PRE inform the patient's relatives and makes necessary arrangements for ambulance and staff required for transferring the patients.
- ✓ Prior to the transfer of the patient the Medical Officer informs the other hospital regarding the shifting of the patient to their facility.
- ✓ Transfer summary containing information pertaining to the patient's complaints, diagnostic made and treatment given is prepared and given to the attendant accompanying the patient.
- ✓ Trained BLS &ACLS nurse accompanies the patients to the other hospital.
- ✓ In case of critical patients; a medical officer along with a nurse accompanies the patient.

REFERRAL

- ✓ Patients who do not match organizational resources, both in emergency as well as non-emergency situations in such cases the decision to refer a patient for consultation to other clinical specialty shall be taken by the primary treating consultant of the patient in Coordination with CEO.
- ✓ Concerned consultant shall be giving consultation referral slip containing details of the reasons for referring and the same is attached in the patient's case file.
- ✓ The consultant referring the patient to the identified external healthcare institution shall fill a referral slip indicating the diagnosis, treatment given, condition of the patient, investigations / procedures if any undertaken by the patient etc.

SECTION 3: RECORDS

S.N	REGISTER NAME	RECORD CODE	RESPONSIBILITY	INFORMATION RECORDED	RETENTION PERIOD
1	ADMISSION REGISTER	EMR – R – 01	SISTER INCHARGE	DETAILS OF IP PATIENT ADMISSION	2 YEARS
2	BROUGHT DEAD REGISTER	EMR – R – 05	SISTER INCHARGE	DETAILS OF BROUGHT DEAD PATIENT	2 YEARS

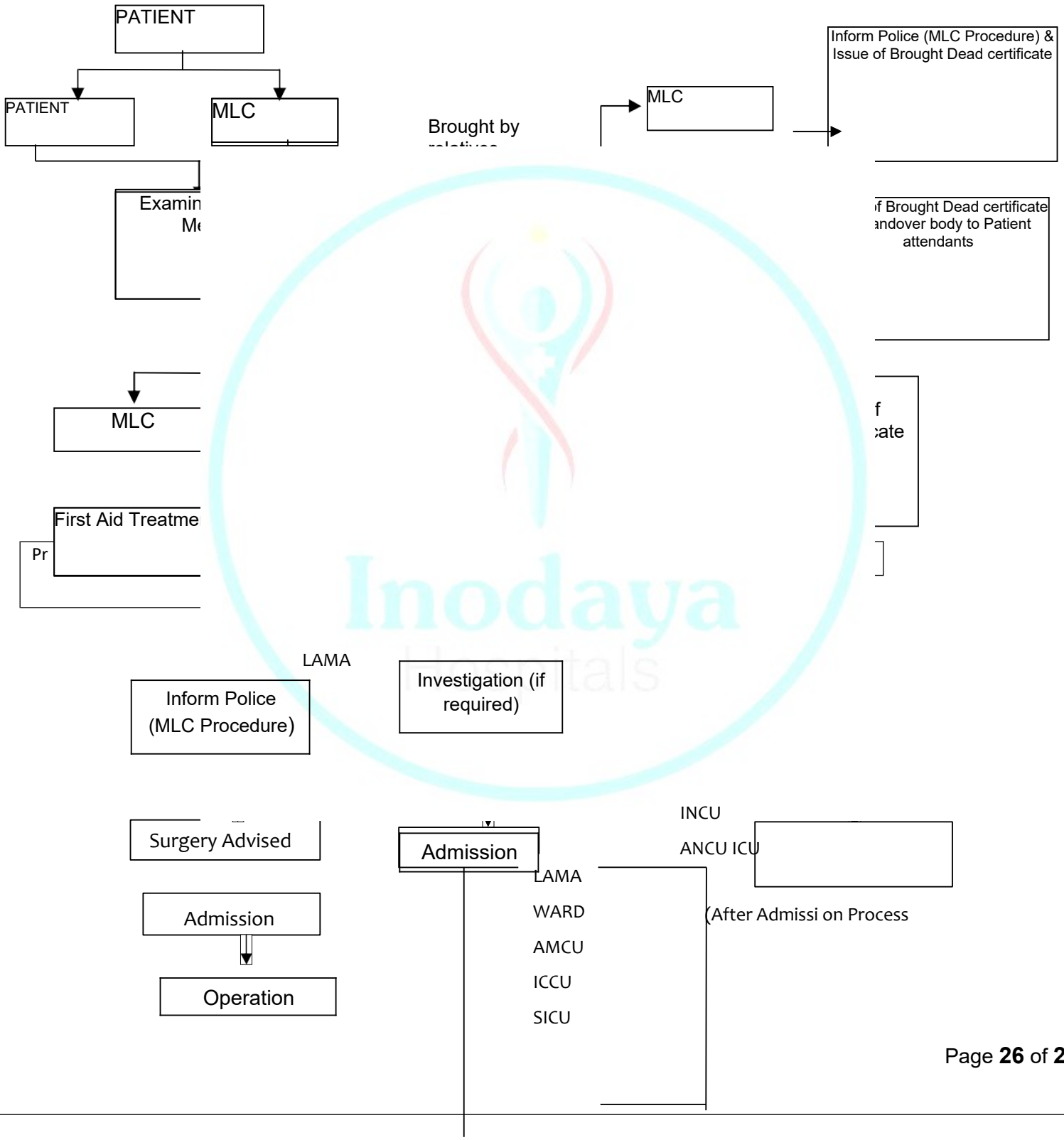
3	MLC REGISTER	EMR – R – 08	SISTER INCHARGE	DETAILS OF MLC CASES	2 YEARS
4	ORNAMENTS HANDOVER REGISTER	EMR – R – 09	SISTER INCHARGE	DETAILS OF ORNAMENT HAND OVER OF THE PATIENT	2 YEARS
5	STOCK HAND OVER	EMR – R – 11	SISTER	DETAILS OF HAND OVER	2 YEARS
6	STOCK REGISTER FOR EQUIPMENTS	EMR – R – 12	SISTER INCHARGE	DETAILS OF STOCK OF EQUIPMENT	2 YEARS
7	BIO MEDICAL EQUIPMENT	EMR – R – 13	SISTER INCHARGE	DETAILS OF BIOMEDICAL EQUIPMENT	2 YEARS
8	AMBULANCE REGISTER	EMR – R - 18	SISTER INCHAGRE	DETAILS OF AMBULANCE	2 YEARS
9	LAMA REGISTER	EMR – R - 19	SISTER INCHARGE	DETAILS OF SHIFTING OF HOSPITAL	2 YEARS
10	BIO MEDICAL CHECKLIST	EMR – R - 20	SISTER INCHARGE	DETAILS OF CHECKING THE WORKING CONDITION OF EQUIPMENT	2 YEARS

SECTION-4.1 EMERGENCY SERVICES

Flow of activities for emergency ward admission and transport to other ward / ICU

1. Procedures regarding functioning of EMD for all patients including medico-legal cases are laid by management (Refer Section)
2. The details of the emergency care provided to patients at EMD are maintained in records (forms, registers and medical records).
3. The Emergency Medical officer handles the procedures for emergency care delivery and medico-legal cases.
4. The Emergency Medical Officer co-ordinates all activities at EMD with other departments, ensuring that better care is provided to the patient requiring emergency care.
5. The Emergency Medical Officer / concerned Consultant is responsible to take decisions regarding admissions of patients, transfer of patient to ward / ICU / Operation theatre / Diagnostics.
6. The Emergency Medical Officer to discuss with the Registrar / Consultant whenever required and provides necessary care to the patient.
7. The staff at EMD (to be trained) to handle all types of cases and emergencies who assist the Emergency Medical Officer in providing care to patients.
8. The CMO arranges for admission / discharge of patient to ward / home / or transfer to another organization which is documented (OP prescription / IP – case sheet).
9. Regular training programs to be arranged to improve the efficiency of the team managing the emergency care by Emergency Medical officer/ Emergency Physician and Nursing Superintendent.

SECTION-4.2.FLOW CHART-EMERGENCY WARD ACTIVITIES



Inform Police (MLC Procedure)

Payments

Discharge

SECTION-05. ED TRIAGE & ACUITY SCALE

5.1 Triage is a process of prioritizing patients based on the severity of their condition. This facilitates the ability to treat as many patients as possible when resources are insufficient for all to be treated immediately.

The outcome may result in determining the order and priority of emergency treatment, the order and priority of emergency transport, or the transport destination for the patient, based upon the special needs of the patient or the balancing of patient distribution in Emergency Department.

5.2 TRIAGE IN THE EMERGENCY DEPARTMENT

General Principles

i. Aims:

a. To ensure that patients are treated in the order of their clinical urgency.
b. To ensure that treatment is appropriate and timely.
c. To allocate the patient to the most appropriate assessment and treatment area.
d. To gather information that facilitates the description of the departmental case mix.

ii. Background Information

Triage is an essential function in Emergency Departments (EDs), where many patients may present simultaneously. Urgency refers to the need for time-critical intervention - it is not synonymous with severity.

Patients triaged to lower acuity categories may be safe to wait longer for assessment and treatment but may still require hospital admission.

iii. Key points

a. The assessment/triage area must be immediately accessible and clearly sign-posted. Its design should allow for:

- ✓ patient examination
- ✓ means of communication between entrance and assessment area
- ✓ privacy

b. Strategies to protect staff will exist.

c. The same standards for triage categorization should apply to all Emergency Departments (ED) settings. It should be remembered however that a symptom reported by an adult may be less significant than the same symptom found in a child and may render a child's urgency greater.

d. Victims of trauma should be allocated a triage category according to their objective clinical urgency. As with other clinical situations, this will include consideration of high-risk history as well as brief physical assessment (general appearance +/- physiological observations).

e. Patients presenting with mental health or behavioral problems should be triaged according to their clinical and situational urgency, as with other ED patients. Where physical and behavioral problems coexist, the highest appropriate triage category should be applied based on the combined presentation.

iv. Equipment Requirements

a. Emergency equipment

b. Facilities for using standard precautions (hand-washing facilities, gloves)

c. Adequate communications devices (telephone and/or intercom etc)

d. Facilities for recording triage information.

v. The Triage Scale

Priority 1 - Immediate

Priority 2 - 10 minutes

Priority 3 - 30 minutes

Priority 4 - 45 minutes

Priority 5 - 60 minutes

- ✓ The **most urgent clinical feature** identified determines the TRIAGE priority.
- ✓ Once a high-risk feature is identified, a response equal to the urgency of that feature should be initiated.

5.3 Allocation of Triage Priority

PROCEDURE

a. On arrival, assess the patient.

- ✓ Balance the need for speed against the need to be thorough.
- ✓ All patients presenting to an Emergency Department should be triaged on arrival by a specifically trained and experienced registered nurse/doctor.
- ✓ The triage assessment should generally take no more than 2-5 minutes
- ✓ Measure vital signs at triage if required to estimate urgency, and if time permits.

b. Determine the clinical urgency of the patient

- ✓ Use a combination of the presenting problem, general appearance and possibly physiological observations to assess the patient's urgency.
- ✓ Notify doctor on call of patient's arrival and TRIAGE priority as required. Indicate urgency of doctor's attendance.

c. Allocate a Triage Scale

The Triage Scale is a scale for rating clinical urgency so that patients are seen in a timely manner, commensurate with their clinical urgency.

d. Shift to appropriate area

- ✓ Take any patient identified as TRIAGE Priority 1 or 2 into the appropriate assessment and treatment area immediately.
- ✓ A more complete nursing assessment should be done by the treatment nurse receiving the patient.

e. Meet any immediate care needs

Standing orders may apply

f. Initiate appropriate management

Initiate appropriate investigations (e.g. x-rays) or initiate management according to hospital protocol.

Waiting time is reduced and patient satisfaction is increase where nursing staff follow protocols and order tests and or management. (Level III-3

g. Documentation

Document details of the triage assessment include at least the following details:

a. Date and time of assessment
b. Name of triage nurse
c. Chief presenting problem(s)
d. Limited, relevant history
e. Relevant assessment findings
f. Initial triage priority allocated
g. Any diagnostic, first aid or treatment measures initiated.

h. Reassessment

- ✓ Ensure continuous reassessment of patients who remain waiting.

- ✓ Re-triage a patient if:
    1. his/her condition changes while they are waiting for treatment.
    2. additional relevant information becomes available that impacts on the patient's urgency
- ✓ Both the initial triage and any subsequent categorizations should be recorded, and the reason for the re-triage documented.

5.4 The Triage Scale: Descriptors for Categories

The clinical descriptors listed in each priority are based on available research data where possible, as well as expert consensus. However, the list is not intended to be exhaustive nor absolute and must be regarded as indicative only. Absolute physiological measurements should not be taken as the sole criterion for allocation to a TRIAGE priority. Senior clinicians should exercise their judgment and, where there is doubt, err on the side of caution.

Key points

- ✓ Most urgent clinical feature identified determines the TRIAGE priority.
- ✓ Once a high-risk feature is identified, a response commensurate with the urgency of that feature should be initiated.

5.5 TRIAGE

- **Priority 1 - Immediate simultaneous assessment and treatment Immediately Life-Threatening Condition**

  Conditions that are threats to life (or imminent risk of deterioration) and require immediate aggressive intervention.

Clinical Descriptors (indicative only)

a) Cardiac arrest
b) Respiratory arrest
c) Immediate risk to airway - impending arrest
d) Respiratory rate <10/min or spo2 < 90.
e) Extreme respiratory distress with agonal or gasping type respiration.

f) Critically informed patients who presents unresponsive.

g) Severe bradycardia / tachycardia with signs of Hypotension.

h) Hypotension with signs of Hypoperfusion.

i) Trauma patients who require immediate crystalloid and colloid resuscitation.

j) Chest pain, pale, diaphoretic, blood pressure 70 / palpable.

k) Weak and dizzy, HR-30.

l) Anaphylactic shock.

m) Baby that is flaccid.

n) Unresponsive patients with a strong odor of alcohol.

o) Hypoglycemia with change in mental status.

p) Intubated head bleed with unequal pupils.

q) Cerebrovascular accident / stroke.

r) Child that fall out of a true and is unresponsive to painful stimuli.

- **TRIAGE Priority 2 - Assessment and treatment within 10 minutes (often simultaneously)**

Imminently Life threatening

The patient's condition is serious enough or deteriorating so rapidly that there is the potential of threat to life, or organ system failure, if not treated within ten minutes of arrival.

- **Important time-critical treatment.**
  The potential for time-critical treatment (e.g. thrombolysis, antidote) to make a significant effect on clinical outcome depends on treatment commencing within a few minutes of the patient's arrival in the ED.

- **Very severe pain.**
  Practice mandates the relief of very severe pain or distress within 10 minutes

Clinical Descriptors Priority 2 (indicative only)

- ✓ Airway risk - severe stridor or drooling with distress
- ✓ Severe respiratory distress
- ✓ Circulatory compromise
- ✓ Clammy or mottled skin, poor perfusion
- ✓ HR<50 or >150 (adult)
- ✓ Hypotension with haemodynamic effects
- ✓ Severe blood loss
- ✓ Chest pain of likely cardiac nature
- ✓ Very severe pain - any cause
- ✓ Drowsy, decreased responsiveness any cause (GCS< 13)

- ✓ Acute hemiparesis/dysphasia
- ✓ Fever with signs of lethargy (any age.
- ✓ Acid or alkali splash to eye - requiring irrigation
- ✓ Major multi trauma (requiring rapid organized team response)

- ✓ Severe localized trauma - major fracture, amputation
- ✓ High-risk history:
- ✓ Significant sedative or other toxic ingestion
- ✓ Significant/dangerous envenomation
- ✓ Severe pain suggesting PE, AAA or ectopic pregnancy
- ✓ Behavioral / Psychiatric:
- ✓ violent or aggressive
- ✓ immediate threat to self or others
- ✓ requires or has required restrain.
- ✓ severe agitation or aggression\

- **TRIAGE priority 3 - Assessment and treatment start within 30**

mins

Potentially Life-Threatening

The patient's condition may progress to life or limb threatening, or may lead to significant morbidity, if assessment and treatment are not
commenced within thirty minutes of arrival.

Situational Urgency

There is potential for adverse outcome if time-critical treatment is not commenced within thirty minutes

Practice mandates the relief of severe discomfort or distress within thirty minutes

Clinical Descriptors (indicative only)

a. Severe hypertension
b. Moderately severe blood loss - any cause
c. Moderate shortness of breath
d. SAO2 90 - 95%
e. Seizure (now alert)
f. Any fever if immune suppressed eg oncology patient, steroid Rx
g. Persistent vomiting, Dehydration
h. Head injury with short LOC- now alert
i. Moderately severe pain - any cause - requiring analgesia
j. Chest pain likely non-cardiac and mod severity
k. Abdominal pain without high risk features - mod severe or patient age >65 year
l. Moderate limb injury - deformity, severe laceration, crush
m. Limb - altered sensation, acutely absent pulse
n. Trauma - high-risk history with no other high-risk features
o. Stable neonate
p. Child at risk
q. Behavioral/Psychiatric:
    - very distressed, risk of self-harm

- acutely psychotic or thought disordered
- situational crisis, deliberate self harm
- agitated / withdrawn / potentially aggressive

➢ **TRIAGE priority 4 - Assessment and treatment start within 45mins**

Potentially Life-Threatening

The patient's condition may progress to life or limb threatening, or may lead to significant morbidity, if assessment and treatment are not commenced within forty-five minutes of arrival. **or**

Situational Urgency

There is potential for adverse outcome if time-critical treatment is not commenced within forty-five minutes **or**

Practice mandates the relief of severe discomfort or distress within forty-five minutes

Clinical Descriptors (indicative only)

a. Mild haemorrhage
b. Foreign body aspiration, no respiratory distress
c. Chest injury without rib pain or respiratory distress
d. Difficulty swallowing, no respiratory distress
e. Minor head injury, no loss of consciousness
f. Moderate pain, some risk features
g. Vomiting or diarrhoea without dehydration
h. Eye inflammation or foreign body - normal vision
i. Minor limb trauma - sprained ankle, possible fracture, uncomplicated laceration requiring investigation or intervention - Normal vital signs, low/moderate pain
j. Tight cast, no neurovascular impairment
k. Swollen "hot" joint
l. Non-specific abdominal pain
m. Behavioral/Psychiatric:
    - Semi-urgent mental health problem

- Under observation and/or no immediate risk to self or other

➢ **TRAIGE Priority 5 - Assessment and treatment start within 60 mins**

Less Urgent

The patient's condition is chronic or minor enough that symptoms or clinical outcome will not be significantly affected if assessment and treatment are delayed up to two hours from arrival **or**

Clinico-administrative problems

Results review, medical certificates, prescriptions only

Clinical Descriptors (indicative only)

a. Minimal pain with no high risk features
b. Low-risk history and now asymptomatic
c. Minor symptoms of existing stable illness
d. Minor symptoms of low-risk conditions
e. Minor wounds - small abrasions, minor lacerations (not requiring sutures)
f. Scheduled revisit eg wound review, complex dressings
g. Immunization only
h. Behavioral/Psychiatric:
i. Known patient with chronic symptoms
j. Social crisis, clinically well patient

5.6 RECOGNITION OF CRITICALLY ILL CHILD

Background information

Serious illness in a child may not be recognized. This is because

Children.

- ✓ are poor historians
- ✓ may manifest nonspecific symptoms
- ✓ may be uncooperative during examination
- ✓ may not show significant indicators - but rather may present as subtle signs
- ✓ may be presumed to have age specific diseases

Markers of serious illness in infants under 6 months

- ➢ **High Risk Medium Risk Five point triage system**
  - ✓ **Feeding** < 1/2 normal 1/2- 2/3 normal Fluid intake < 1/2 normal
  - ✓ **Arousal (CNS)** Drowsy

    Decreased activity

    Convulsion

    Weak cry
  - ✓ **Breathing** Apnoea or cyanosis,

breathing difficulty Chest wall recession (in drawing)

- ✓ **Circulation** Skin pale and hot Skin pale

  Paleness (sudden onset, but persistent)
- ✓ **Fluid output** Green vomit > 5 vomits in 24 hr

  <4 wet nappies/ day less urine than usual
- ✓ **Faeces** Bloody stool

5.7 INITIAL VERSUS REASSESSMENT TRIAGE ACUITY LEVEL

- ✓ The triage assessment and triage acuity level assigned by the triage nurse at the first patient encounter is defined as the CTAS triage level.
- ✓ This initial triage level is based on the nurse's assessment of acuity and helps determine the urgency with which this patient requires care relative to the other patients waiting to be seen.
- ✓ It also determines the recommended frequency of reassessment while the patient is waiting. This initial score cannot be changed.
- ✓ The triage assessment is based on time-limited information. It is not a final diagnosis; the patient's condition may improve or deteriorate over time.

The goal of triage is to identify the patients who need to be seen first and those who can safely wait. ED waiting times have been increasing, and even those patients triaged as CTAS Level II are sometimes required to wait for long periods before being seen because ED beds are not available.

This reality is a major reason for the emphasis on patient reassessments in these revised guidelines. It is important that the patient or their caregiver be instructed to contact the triage nurse if the presenting condition worsens while the patient is in the waiting area. The safety of waiting is a shared responsibility between the patient and the triage nurse. The recommended reassessment time intervals are the same as those in the original guidelines:

- Level I patients should have continuous nursing care
- Level II every 15 minutes
- Level III every 30 minutes
- Level IV every 60 minutes
- Level V every 120 minutes.

- ✓ The extent of the reassessment depends on the presenting complaint, the initial triage level and any changes identified by the patient.
- ✓ Prolonged wait times and the need to warehouse admitted patients in the ED often lead to significant changes in patient acuity.
- ✓ The same acuity scale may be applied at the time of reassessment to establish a "reassessment acuity level," which should be recorded on the triage record (not altering the initial triage score) as well as any action taken.
- ✓ The patient's status may change because of changing modifiers associated with the presenting complaint or because the presenting complaint has actually changed. Should acuity increase upon reassessment, the order of priority of the patients waiting in the

ED may change.

- ✓ This demonstrates that the process of triage and acuity assignment is dynamic and should involve multiple reassessments and possible reassignments of a CTAS acuity level.

CLINICAL

SECTION 6

GUIDELINES

6.1 :HEAD INJURY GUIDELINES

- ✓ Assessment
- ✓ Level of Cons
- ✓ Management

Minor Head Injury

Moderate Head Injury

Severe Head Injury

Assessment

- Perform a **PRIMARY SURVEY** and ensure that the patient's airway, cervical spine, breathing and circulation are secure.
  - A - Alert
  - V - Responds to voice
  - P - Responds to pain
    - Purposefully,
    - Non-purposefully
      - Withdrawal / flexor response
      - Extensor response
  - U - Unresponsive

  Assess pupil size, equality and reaction and look for other focal neurological signs.

- Perform a **SECONDARY SURVEY** looking specifically at:
  - ✓ Neck and cervical spine-deformity, tenderness
  - ✓ Head-scalp bruising, lacerations, swelling, tenderness, bruising behind the ear (battles sign)
  - ✓ Eyes- pupil size, equality and reactivity, fundoscopy
  - ✓ Ears-blood behind the ear drum, CSF leak
  - ✓ Nose- deformity, swelling, bleeding, CSF leak
  - ✓ Mouth- dental trauma, soft tissue injuries
  - ✓ Facial fracture
  - ✓ Motor function
    - examine limbs for presence of reflexes and weakness
    - Perform a formal Glasgow Coma score
    - Consider the possibility of non-accidental injury during secondary survey especially in infants with head injury
    - Other injuries (see Adult Polytrauma Protocol).

Types of Head Injury

- Minor – GCS score 13-15
- Moderate – GCS score 9-12
- Severe – GCS score 3-8

Indications for CT scanning in (MTBI) Minor Brain Injury	
Head CT is required for patients with minor head injuries (i.e. witnessed loss of consciousness, definite amnesia, or witnessed disorientation in a patient with GCS score of 13 to 15) and any one of the following	
High risk for neurological intervention: •GCS score less than 15 at 2 hours after injury •Suspected open or depressed skull fracture •Any sign of basal skull fracture (eg, hemotympanum, raccoon eyes, CSF otorrhea or rhinorrhea, battle sign) •Vomiting (**>2** episodes) •Age greater than 65 years	**Moderate risk of brain injury on CT:** •Amnesia before impact (more than 30 minutes) •Dangerous mechanism (eg. Pedestrian struck by motor vehicle, fall from height more than 3 feet or five stairs)

Which patients with Mild Head Injury require a CT scan?

Patients with 'High Risk' Mild Head Injury requiring CT scan

The following risk factors identify patients with Mild Head Injury (initial GCS 14-15) at increased risk of clinically significant lesions requiring acute neurosurgical intervention or prolonged observation in hospital.

These patients should have early CT scanning if available, if they have any of the following features:

- **Any of Initial assessment**

  Persistent GCS <15 at two hours post injury.

  Focal neurological deficit.

  Clinical suspicion of skull fracture.

  Prolonged loss of consciousness (>5min).

  Prolonged anterograde or retrograde amnesia (>30min).

  Post traumatic seizure.

  Repeated vomiting (>2 occasions).

  Persistent severe headache.

  Known coagulopathy.

  Age >65 years (clinical judgment appropriate if no other risk factors present).

- **After a period of observation (four hours post injury)**

  Any deterioration in GCS.

  Persistent abnormal mental status (abnormal behavior or cognition).

  Any patient who fails to clinically improve.

- **Clinical judgment required if:**

  Age >65 years

  Drug or alcohol ingestion

  Dangerous mechanism

  Multi-system trauma

  Known neurosurgery / neurological impairment

Delayed presentation or representation.

HISTORY

- **AMPLE**
- **Time and mechanism of injury**

- **Level of Consciousness**
  - **Immediately post injury**
  - **Subsequent evaluations**
- **Amnesia (Retrograde and antegrade)**
- **Headache**
- **Seizures**

APPROACHING CASE:

- ✓ Supportive care ABCDE's.
- ✓ Prevent secondary injury.
- ✓ Early CT Scan.
- ✓ General physical examination to exclude systemic injuries.
- ✓ Limited neurologic examination
- ✓ Blood alcohol level and urine toxicology screening
- ✓ Intubation if required to ensure adequate oxygenation and ventilation or to safely perform CT scan.
- ✓ Early neurosurgical consult if not clinically improving or abnormal CT scan.
- ✓ Admission in ICU set up.
- ✓ In ICU or similar set up capable of close nursing observation.
- ✓ Frequent neurologic check.
- ✓ Follow-up CT Head 12 to 24 hrs after initial CT (if abnormal) Condition deteriorates or Before discharge.
- ✓ **If patient improves**

  Discharge when appropriate. Follow

up in clinic

- ✓ **If patient deteriorates:** Repeat CT scan and manage as severe head injury

MANAGEMENT OF SEVERE HEAD INJURY

Initial GCS 8 or less on arrival PRIMARY SURVEY

Airway with RESTRICTION OF CERVICAL SPINE MOTION	✓ Open with jaw thrust. ✓ Apply a hard cervical collar. ✓ Consider early endotracheal intubation.
Breathing: and ventilation	✓ Ventilation with 100% O2 ✓ ABG ✓ SpO2 >98% ✓ Cautious hyperventilation.. PCO2 ~ 35mm Hg
Circulation and Hemorrhage control	✓ Fluid resuscitation to maintain normovolemia**.** ✓ Do not use hypotonic / dextrose containing fluids.(use only in documented hypoglycaemia) ✓ If hypotension persists**,**do not shift the patient for CT scan **.** ✓ Consider associated spinal cord injury/ cardiac contusion or tamponade / tension pneumothorax / pelvic fracture / other systemic injuries. ✓ Supportive care aims to prevent secondary brain injury: PaO2 >60 SaO2 >90 PaCO2 35-40 ✓ Systolic BP >90 Head up 30° Correct Acidosis
DISABILITY **/Neurologic examination**	✓ GCS ✓ Pupillary light response ✓ Do not attempt dolls eye unless c-spine injury has been ruled out. ✓ Sedation and analgesia after neurologic examination

SECONDARY SURVEY:

As per ATLS protocols

- ✓ Serial neurologic examinations
- ✓ Oro gastric tube
- ✓ Foleys catheterization

Diagnostic tests

- ✓ CT scan:

Obtained after hemodynamic normalization.

- Repeat whenever there is change in patients neurologic status or after 12 – 24 hours
- Look for Scalp swellings / hematomas at the region of impact.
- Skull fractures
- Intracranial hematomas
- Contusions
- Midline shift.

- ✓ C-Spine x-ray.
- ✓ Chest x-ray
- ✓ Pelvis x-ray

Medical therapies

- IV fluids
- Hyperventilation (pco2 25 – 35)
- Mannitol : 1gm/kg iv bolus over 20-30 mins
- Dilated pupil
- Loss of consciousness while patient is being observed
- Hemiparesis
- Frusemide : 0.3 – 0.5 mg/kg
- Steroids are not recommended
- Barbiturates are not indicated in acute resuscitative phase
- Anticonvulsants

Phenytoin or Fosphenytoin: 15-20mg/kg iv at 50 mg /min

Midazolam in addition to phenytoin until seizure stops

Glasgow Coma Scale		
Response	Scale	Score
Eye Opening Response	Eyes open spontaneously	4 Points
	Eyes open to verbal command, speech, or shout	3 Points
	Eyes open to pain (not applied to face)	2 Points
	No eye opening	1 Point
Verbal Response	Oriented	5 Points
	Confused conversation, but able to answer questions	4 Points
	Inappropriate responses, words discernible	3 Points
	Incomprehensible sounds or speech	2 Points
	No verbal response	1 Point
Motor Response	Obeys commands for movement	6 Points
	Purposeful movement to painful stimulus	5 Points
	Withdraws from pain	4 Points
	Abnormal (spastic) flexion, decorticate posture	3 Points
	Extensor (rigid) response, decerebrate posture	2 Points
	No motor response	1 Point
Minor Brain Injury = 13-15 points; **Moderate Brain Injury** = 9-12 points; **Severe Brain Injury** = 3-8 points		

GLASSGOW COMA SCALE

➢ **SYSTOLIC BLOOD PRESSURE MANAGEMENT**

- **Maintain SBP at ≥ 100 mmHg for patients 50-69 years or**

  at ≥ 110 mmHg for patients 15-49 years or older than 70 years;

- **this may decrease mortality and improve outcomes (III).**

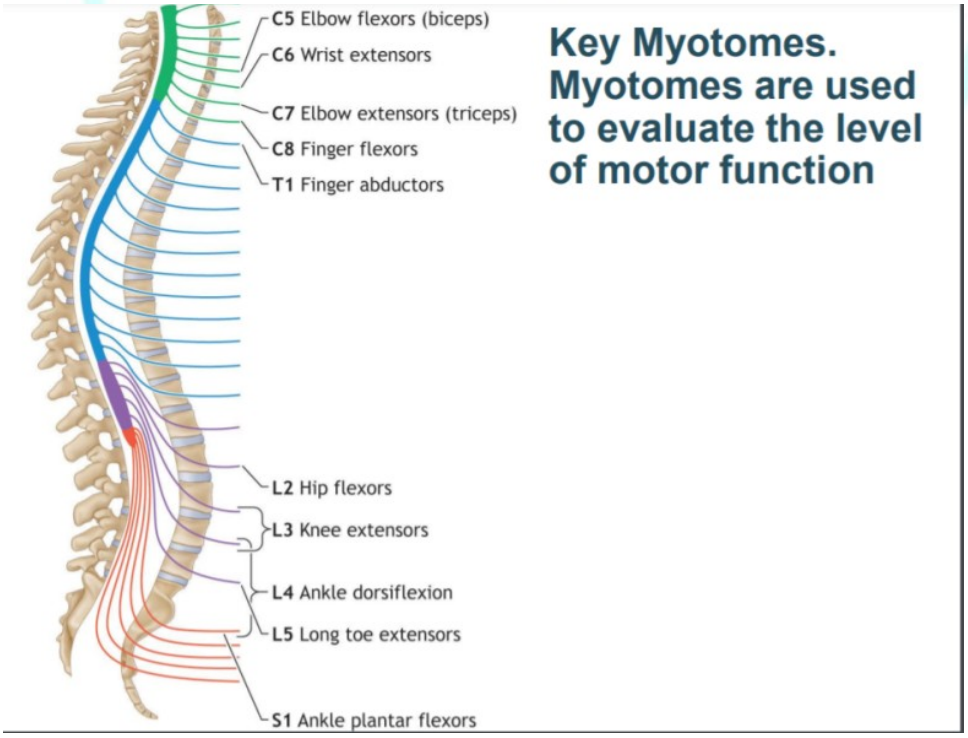
Goals of treatment of brain injury

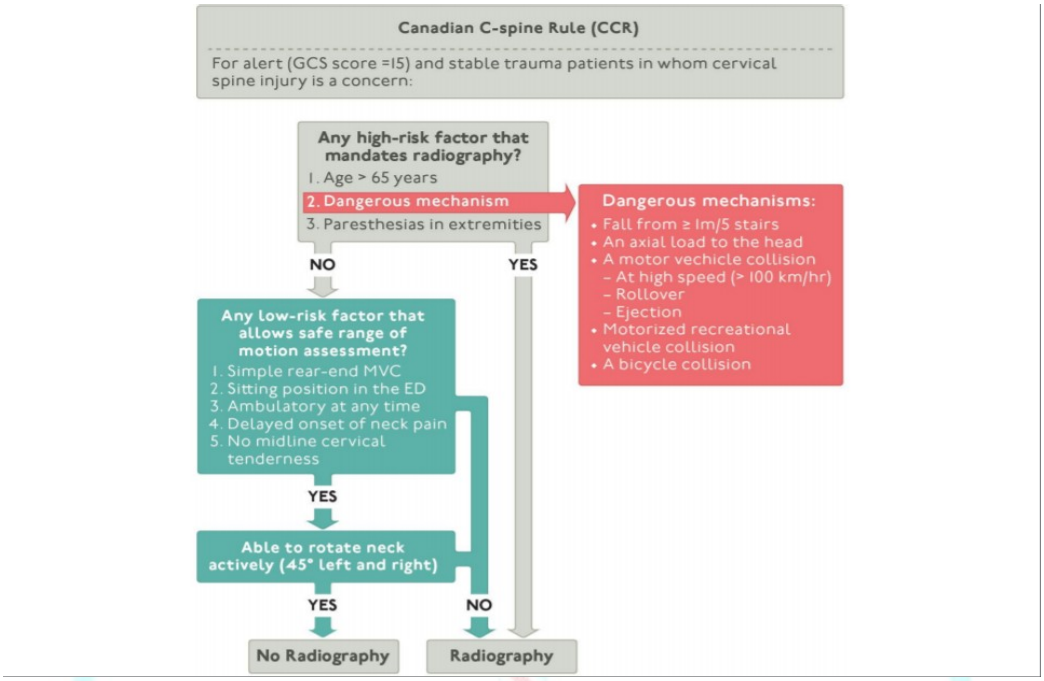
Clinical Parameters
- Systolic BP ≥ 100 mmHg
- Temperature 36–38°C

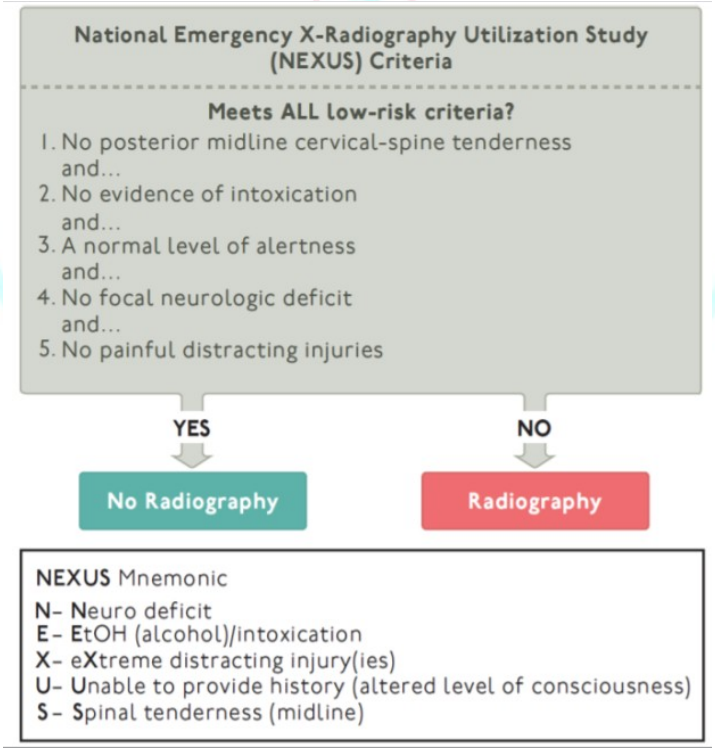
Monitoring Parameters
- CPP ≥ 60 mm Hg*
- ICP 5–15 mm Hg*
- $PbtO_2$ ≥ 15 mm Hg*
- Pulse oximetry ≥ 95%

Laboratory Parameters
- Glucose 80–180 mg/dL
- Hemoglobin ≥ 7 g/dl
- INR ≤ 1.4
- Na 135–145 meq/dL
- PaO_2 ≥ 100 mmHg
- $PaCO_2$ 35–45 mmHg
- pH 7.35–7.45
- Platelets ≥ 75 $X10^3/mm^3$

*Unlikely to be available in the ED or in low-resource settings
Data from ACS TQIP Best Practices in the Management of Traumatic Brain Injury. ACS Committee on Trauma, January 2015.




Canadian C-spine Rule (CCR)
For alert (GCS score =15) and stable trauma patients in whom cervical spine injury is a concern:
Any high-risk factor that mandates radiography?
1. Age > 65 years
2. Dangerous mechanism
3. Paresthesias in extremities
Dangerous mechanisms:
• Fall from ≥ 1m/5 stairs
• An axial load to the head
• A motor vechicle collision
– At high speed (> 100 km/hr)
– Rollover
– Ejection
• Motorized recreational vehicle collision
• A bicycle collision
NO
YES
Any low-risk factor that allows safe range of motion assessment?
1. Simple rear-end MVC
2. Sitting position in the ED
3. Ambulatory at any time
4. Delayed onset of neck pain
5. No midline cervical tenderness
YES
Able to rotate neck actively (45° left and right)
YES
NO
No Radiography
Radiography

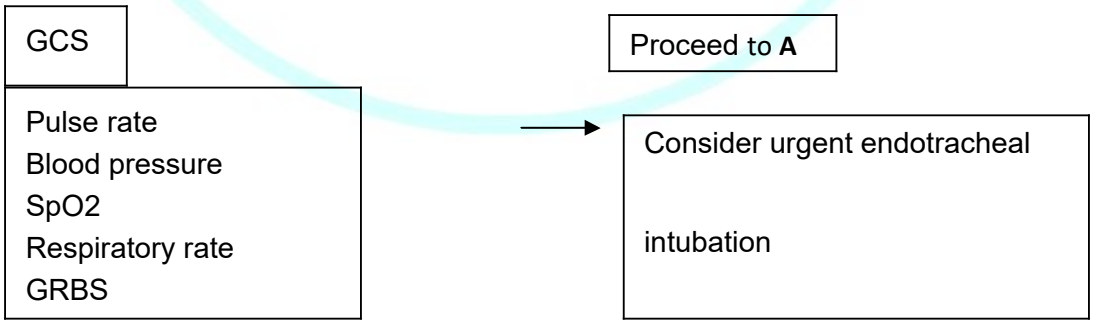

National Emergency X-Radiography Utilization Study (NEXUS) Criteria
Meets ALL low-risk criteria?
1. No posterior midline cervical-spine tenderness
and...
2. No evidence of intoxication
and...
3. A normal level of alertness
and...
4. No focal neurologic deficit
and...
5. No painful distracting injuries
YES
NO
No Radiography
Radiography
NEXUS Mnemonic
N– Neuro deficit
E– EtOH (alcohol)/intoxication
X– eXtreme distracting injury(ies)
U– Unable to provide history (altered level of consciousness)
S– Spinal tenderness (midline)

SECTION-6.2 POLYTRAUMA PROTOCOL

1. Brief history:

Mechanism of injury

Time of injury and injuries sustained
Symptoms at site including history of LOC, Vomiting,
Seizures,
ENT bleed
Prehospital treatment received
Check vitals –



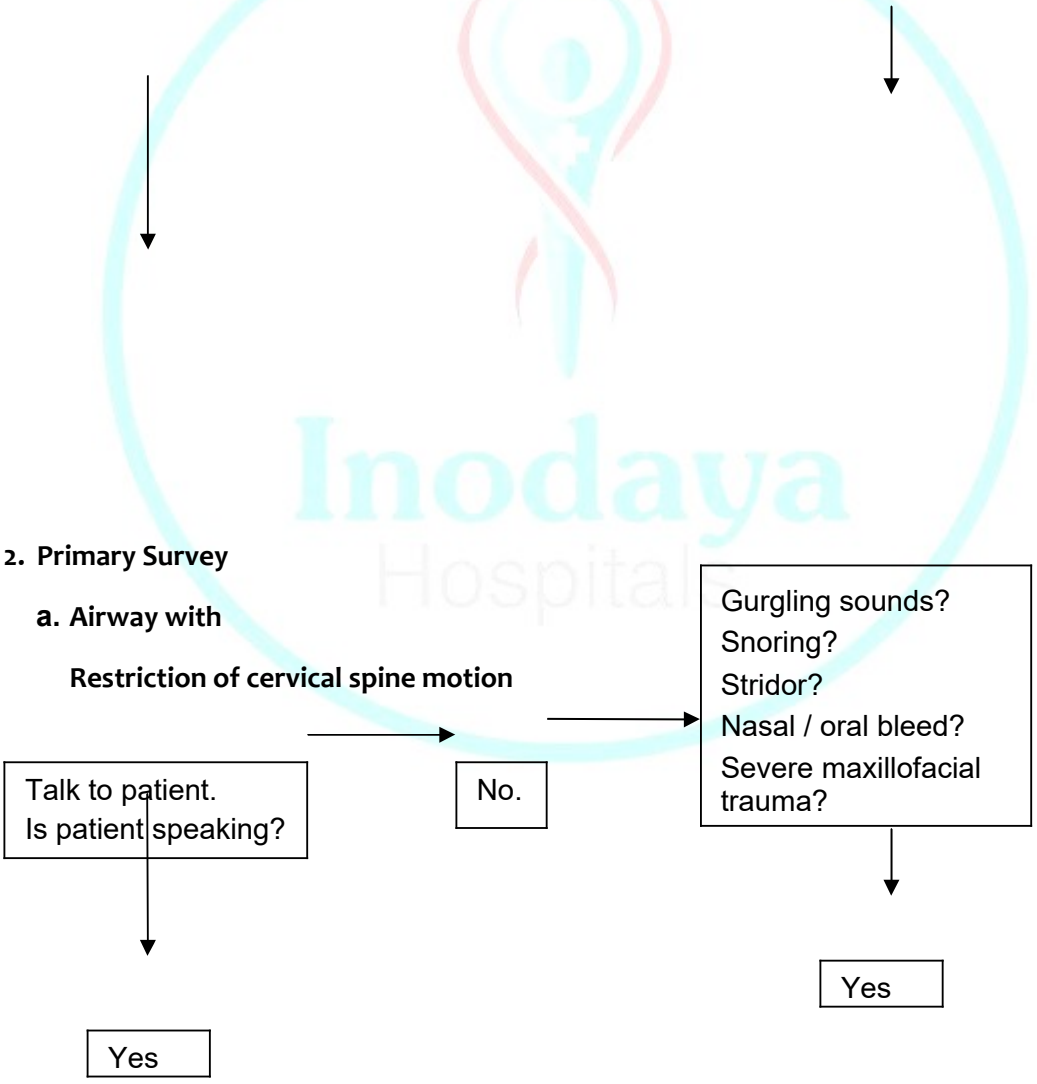
PRIMARY SURVEY

- **Airway maintenance with restriction of cervical spine motion**
- **Breathing and ventilation**
- **Circulation with hemorrhage control**
- **Disability(assessment of neurologic status)**
- **Exposure/Environmental control**

2. Primary Survey

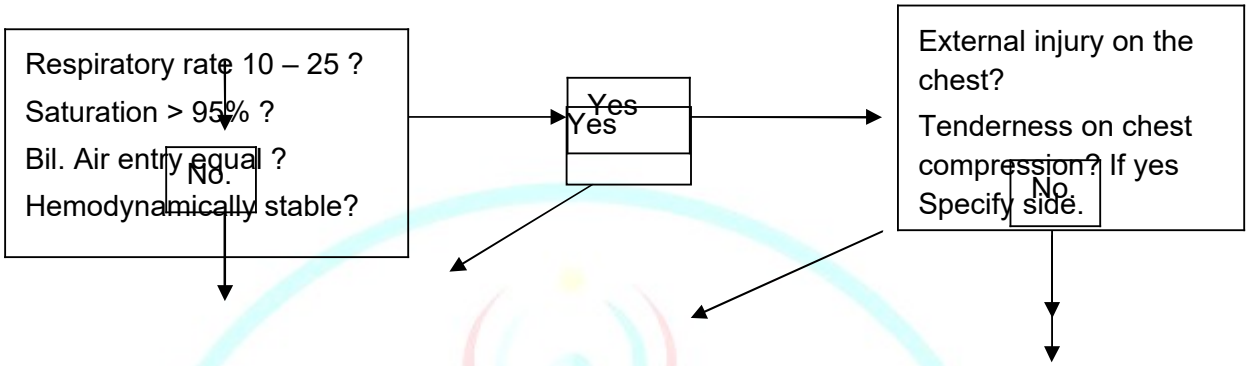
a. Airway with

Restriction of cervical spine motion



Apply hard cervical collar Proceed to **B**	Open airway with jaw thrust Look for secretions / blood / vomitus Do oral suctioning Consider endotracheal intubation. Apply hard cervical collar Proceed to **B**

b. Breathing with 100% oxygenation and ventilation.



Get urgent bedside chest x-ray.
Send ABG
Look for signs of
- Tension pneumothorax*
- Hemothorax
- Open pneumothorax
- Flail chest.

Urgent gen. surgery consultation

Apply O2 via high concentration mask at 15 ltrs/ min.
Proceed to **C**

Consider ICD insertion.
Plan Endotracheal intubation.
Administer 100% oxygen.
Provide positive pressure ventilations if required.
Proceed to **C**

*Urgent needle thoracostomy for Tension Pneumothorax. Do not wait for chest x ray.Keep needle in 5 th IC space, mid axillary line /2nd ICS for child • Flail chest out • Tracheobronchial injury in Tension pneumothorax • • 28-32 Fr chest drain for hemothorax (not 36-40 Fr) • Algorithm for circulatory arrest approach • Aortic rupture management with Beta Blocker

c. Circulation with haemorrhage control

Hemodynamically unstable?

Yes

Tenderness / guarding / external injuries / distention of abdomen?
Tenderness on pelvic compression / distraction?
Scrotal hematoma / Blood in urethral meatus?
Evidence of long bone fracture?
Active external hemorrhage?

No.

site of incident?
eal hemorrhage
othorax Cardiac

injury (if patient

d resuscitation

Fluid resuscitation

Insert 2 large bore IV catheters (16,18 G)

Urgent blood grouping and cross matching, major surgical profile, ABG.

Administer 2 litres crystalloids (RL)

Apply firm pressure on any external active bleeding site.

Urgent bedside e-FAST / DPL

Urgent bedside x-ray pelvis

Apply pelvic binder in patients with evidence of pelvic fracture

Urgent Gen. Surgery / orthopaedic / urology consultation for relevant injuries

Foleys catheterization

Reassess Vitals.

Rapid responder

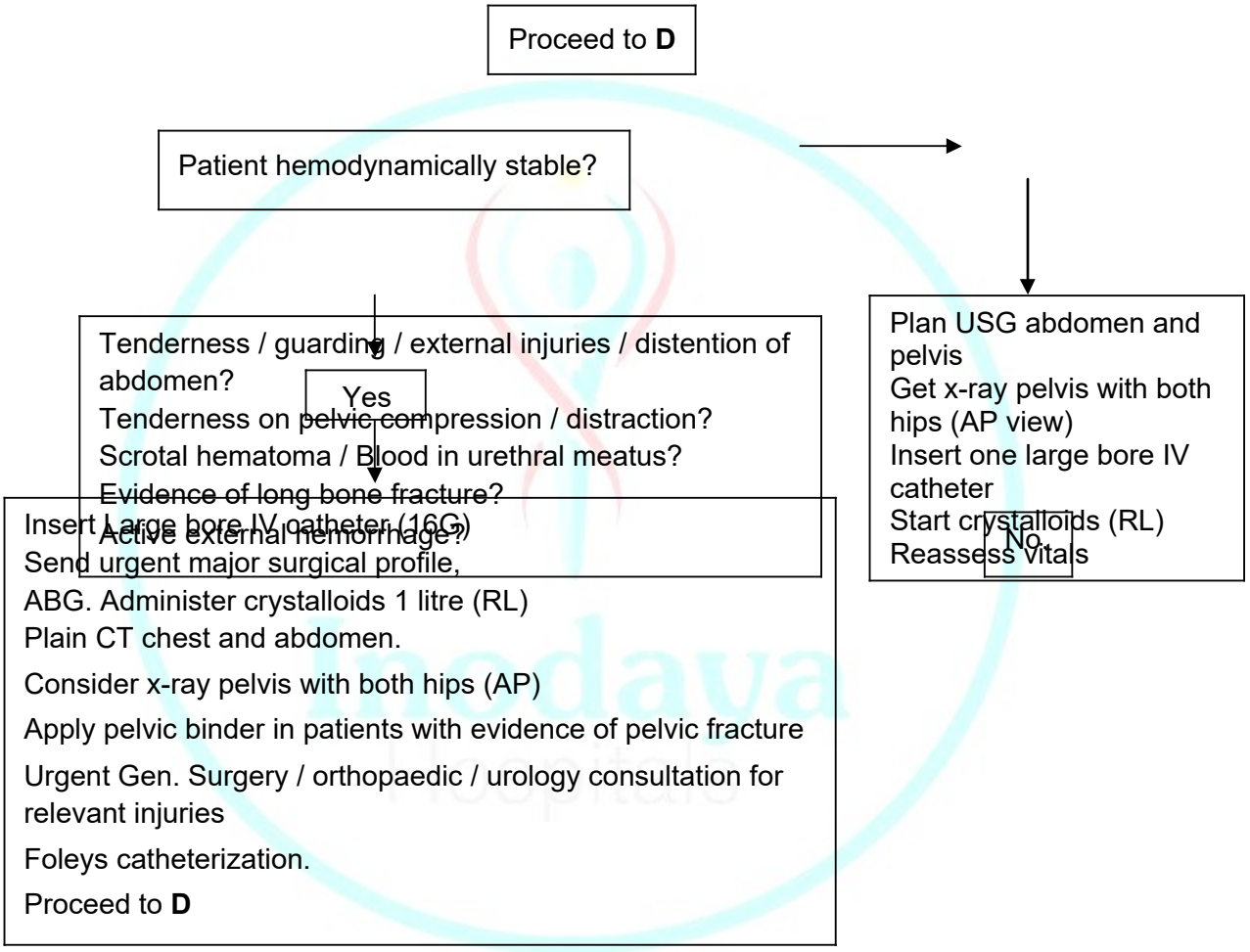
- Consider crystalloid infusion
- Reassess BP every 5 – 10 mins
- Consider cross matched packed cell transfusion
- Plan CECT chest and abdomen
- CECT pelvis if indicated

Transient responder

- Consider crystalloids and colloids
- Reassess BP every 5 mins
- Consider group specific uncrossmatched packed cell transfusion
- Plan Urgent CECT chest and abdomen

Non responder

- Aggressive volume resuscitation with crystalloids and colloids
- Continous BP monitoring
- Urgent Emergency blood (O – ve)transfusion.
- **Do not shift to Radiology until hemodynamically stable**
- Plan Endotracheal intubation in view of hemodynamic


Proceed to D
Patient hemodynamically stable?
Tenderness / guarding / external injuries / distention of abdomen?
Tenderness on pelvic compression / distraction?
Scrotal hematoma / Blood in urethral meatus?
Evidence of long bone fracture?
Active external hemorrhage?
Yes
Insert Large bore IV catheter (16G)
Send urgent major surgical profile,
ABG. Administer crystalloids 1 litre (RL)
Plain CT chest and abdomen.
Consider x-ray pelvis with both hips (AP)
Apply pelvic binder in patients with evidence of pelvic fracture
Urgent Gen. Surgery / orthopaedic / urology consultation for relevant injuries
Foleys catheterization.
Proceed to D
Plan USG abdomen and pelvis
Get x-ray pelvis with both hips (AP view)
Insert one large bore IV catheter
Start crystalloids (RL)
Reassess vitals
No

d.Disability with brief neurological examination.

Assess GCS
Check pupil size and reaction
Neurological deficit?

GCS < 9/15 **(severe head injury)**
Anisocoria? / non reacting pupils?

Consider early endotracheal intubation.
Ventilation with 100% O2
Send ABG
Keep SpO2 >98%
Cautious hyperventilation. PCO2 ~ 35mm Hg
Do not use hypotonic/ dextrose containing fluids. Consider phenytoin loading dose 15 – 20 mg /kg
Consider Mannitol 1gm / Kg if anisocoria present.
Get urgent plain CT scan brain.
X – Ray C – Spine (lateral view)
Urgent neurosurgery consult.

GCS 9 – 14 (mild or mod head injury) Pupils equal and reacting to light?
Positive history, signs and symptoms of head injury?

Provide 100% O2
Keep SpO2 >98%
Send ABG
Do not use hypotonic/ dextrose containing fluids.
Consider phenytoin loading dose 15 – 20 mg /kg
Get plain CT scan brain.
X – Ray C – Spine (lateral view)
Urgent neurosurgery consult.
Proceed to **E.**

Consider CT brain for patients with any of the following

- Persistent GCS <15 at two hours post injury.
- Focal neurological deficit.
- Clinical suspicion of skull fracture
- CSF otorrhoea or rhinorrhoea, ENT bleed, racoons eyes, battle sign.
- Prolonged loss of consciousness (>5min).
- Prolonged anterograde or retrograde amnesia (>30min).
- Post traumatic seizure.
- Repeated vomiting (>2 occasions).
- Persistent severe headache.
- Known coagulopathy.
- Age >65 years
- Drug or alcohol ingestion
- Dangerous mechanism
- Multi-system trauma
- Known neurosurgery / neurological impairment

e. Exposure

Undress the patient completely
Look for obvious deformities and other injuries
Logroll patient to examine the back.
Look for tenderness/ deformity / crepitus over spine
Perform a PR examination

Examination findings normal?

Plan for primary investigations.
Xray C-Spine (lat), Xray Chest and Xray pelvis if not done earlier.
USG abdomen and pelvis.

Examination findings abnormal?

Maintain spinal immobilization
Urgent neurosurgery and orthopedic consultation.
Look for bulbocavernous reflex
Neurological examination to assess the level of spinal injury.
Consider methyl prednisolone 30mg / kg over 15 mins after expert consultation.
Wait 45 mins.
Start methyl prednisolone infusion at 5.4mg/kg/hr
Insert Foleys catheter
Consider MRI spine after expert consultation.

Abnormal?
Review primary survey
Proceed to secondary survey only if patient haemodynamically stable

AMPLE history
Allergies
Medications
Past medical history / pregnancy
Last meal
Event / Environmental factors

Proceed to secondary survey

Secondary Survey

Quick review of primary survey
AMPLE history
Complete head to toe examination
Ryles tube and Foleys catheterization
Treatment of minor injuries
Relevant consultations

ATLS classification of hypovolemic shock

TABLE 3-1 SIGNS AND SYMPTOMS OF HEMORRHAGE BY CLASS

PARAMETER	CLASS I	CLASS II (MILD)	CLASS III (MODERATE)	CLASS IV (SEVERE)
Approximate blood loss	<15%	15–30%	31–40%	>40%
Heart rate	↔	↔/↑	↑	↑/↑↑
Blood pressure	↔	↔	↔/↓	↓
Pulse pressure	↔	↓	↓	↓
Respiratory rate	↔	↔	↔/↑	↑
Urine output	↔	↔	↓	↓↓
Glasgow Coma Scale score	↔	↔	↓	↓
Base deficit*	0 to –2 mEq/L	–2 to –6 mEq/L	–6 to –10 mEq/L	–10 mEq/L or less
Need for blood products	Monitor	Possible	Yes	Massive Transfusion

- **EARLY USE OF BLOOD AND BLOOD PRODUCTS**
  - ✓ Early resuscitation with blood and blood products must be considered in patients with evidence of class III and IV hemorrhage.
  - ✓ Early administration of blood products at a low ratio of packed red blood cells to plasma and platelets can prevent the development of coagulopathy and thrombocytopenia.

- **TRANEXAMIC ACID (TXA)**
  - ✓ European and American military studies demonstrate improved survival when TXA is administered over 10 minutes within 3 hours of injury.
  - ✓ When bolused in the field, follow up infusion TAX 1 gram over 8 hours in the hospital.

- **TENSION PNEUMOTHORAX**
  - ✓ When ultrasound is available, tension pneumothorax can be diagnosed using an extended FAST (eFAST): seashore, bar code, or stratosphere sign in M mode.
  - ✓ Needle decompression:

    Recent evidence supports placing the large, over-the-needle catheter at the fifth interspace, slightly anterior to the midaxillary line •
  - ✓ 28-32 Fr chest tube for hemothorax (not 36- 40Fr)

- **AORTIC RUPTURE** management with beta blocker ,if no contraindications exist,
  - ✓ Heart rate control with a short-acting beta blocker (esmolol) to a goal heart rate < 80 bpm and
  - ✓ Blood pressure control with a goal MAP 60-70 mmHg is recommended.
- **HIGHLIGHTING RISK FACTOR OF BILATERAL FEMUR FRACTURES**
  - ✓ Compared with patients with unilateral femur fractures, patients with bilateral femur fractures are at higher risk for significant blood loss, severe associated injuries, pulmonary complications, multiple organ failure, and death.
- **PEDIATRIC MASS TRANSFUSION PROTOCOL**
  - ✓ Initial 20 mL/kg bolus of isotonic crystalloid
  - ✓ followed by weight-based blood product resuscitation with 10-20 mL/kg of RBC and
  - ✓ 10-20 mL/kg of FFP and platelets.

TABLE 8-2 INTRAVENOUS ANTIBIOTIC WEIGHT-BASED DOSING GUIDELINES

OPEN FRACTURES	FIRST-GENERATION CEPHALOSPORINS (GRAM-POSITIVE COVERAGE) CEFAZOLIN	IF ANAPHYLACTIC PENICILLIN ALLERGY (INSTEAD OF FIRST-GENERATION CEPHALOSPORIN) CLINDAMYCIN	AMINOGLYCOCIDE (GRAM-NEGATIVE COVERAGE) GENTAMICIN	PIPERACILLIN/ TAZOBACTAM (BROAD-SPECTRUM GRAM-POSITIVE AND NEGATIVE COVERAGE)
Wound <1 cm; minimal contamination or soft tissue damage	<50 kg: 1 gm Q 8 hr 50–100 kg: 2 gm Q 8 hr >100 kg: 3 gm Q 8 hr	<80 kg: 600 mg Q 8 hr >80 kg: 900 mg Q 8 hr		
Wound 1–10 cm; moderate soft tissue damage; comminution of fracture	<50 kg: 1 gm Q 8 hr 50–100 kg: 2 gm Q 8 hr >100 kg: 3 gm Q 8 hr	<80 kg: 600 mg Q 8 hr >80 kg: 900 mg Q 8 hr		
Severe soft-tissue damage and substantial contamination with associated vascular injury	<50 kg: 1 gm Q 8 hr 50–100 kg: 2 gm Q 8 hr >100 kg: 3 gm Q 8 hr	<80 kg: 600 mg Q 8 hr >80 kg: 900 mg Q 8 hr	Loading dose in ER: 2.5 mg/kg for child (or <50 kg) 5 mg/kg for adult (i.e., 150-lb pt = 340 mg)	
Farmyard, soil or standing water, irrespective of wound size or severity				3.375 gm Q 6 hr (<100 kg) 4.5 gm Q 6 hr (>100 kg) **If anaphylactic penicillin allergy consult Infectious Disease Department or Pharmacy

ATLS 2018 AHA GUIDELINES

INODAYA HOSPITALS, KAKINADA

DEPARTMENT OF EMERGENCY MEDICINE

CHEST PAIN –ACS PATHWAY

Name			Age	Sex	M / F
Address			Contact Number:		
Arrival Date		Arrival Time:		OP No. :	
Arrival Mode: Ambulance / Public Transport		Previous Admission: Yes (IP No:)/ No			
Possibility of Pregnancy: Yes / No		Informed by :			
TRIAGE	**I II III IV**	Known **Allergies** if any:			
TRIAGE done by :		Triage Time:			
Outside ECG findings : Date & Time : Treatment given outside:					
Chief Complaints: CHEST PAIN		**ASSOCIATED SYMPTOMS**			
Site :		**Nausea / vomiting**			
Onset		**Shortness of Breath**			
Character		**Coughing Blood**	**Palpitations**		
Duration		**Sweating**	**Leg swelling**		
Radiation		**Syncope**	**Fever**		
Occupation :		**Trauma**	**Orthopnea**		
Travelling History:		**Decreased Urine O/P**	**Bleeding manifestations**		

Other Complaints

	CIRCULATION	AIRWAY	BREATHING
Assessment	Adequate/inadequate		
Management	IV access:		

ECG FINDINGS:

Vitals taken at		Pulse :	BP :
Pain score		Resp.Rate:	Spo2:
GRBS		Temp. :	GCS :
Weight :		Height :	BMI :

RISK FACTORS / COMORBIDITIES		
DM-II	PREVIOUS MI	
HYPERTENSION	ASTHMA	
DYSLIPIDEMIA	PEPTIC ULCER	
STROKE	SMOKING	
CAD	ALCOHOL & other drugs	
RENAL DISEASE	STDs/Contraception	
H/O DVT :	Family History	
RECENT SURGERIES:		

Note: BMI : WEIGHT(in Kg)/(HEIGHT in meters) ^{2}

SECTION-6.3 ACUTE CHEST PAIN

1. A careful history is essential, in general:

EXAMINATION DETAILS						
General	P	I	Cl	Cy	L	E
Heart Sounds	S1 S2 S3 S4		Carotid Bruit		Murmurs	
Pulse Rate	Rhythm		Volume		Character	
Vascular System	All Peripheral Pulses :					
Lungs	Trachea :					
	Left	Right	Wheeze	Crepts		
Abdomen	Soft / Tender		Organomegaly			
Bowel sounds	Present / Absent					
CNS						
SKIN OVER RADIAL & FEMORAL SITES :						
Hands	Janeway lesions	Osler's nodes	Tremors	Quinkes sign		

ECHO SCREENING REPORT
PROVISIONAL DIAGNOSIS

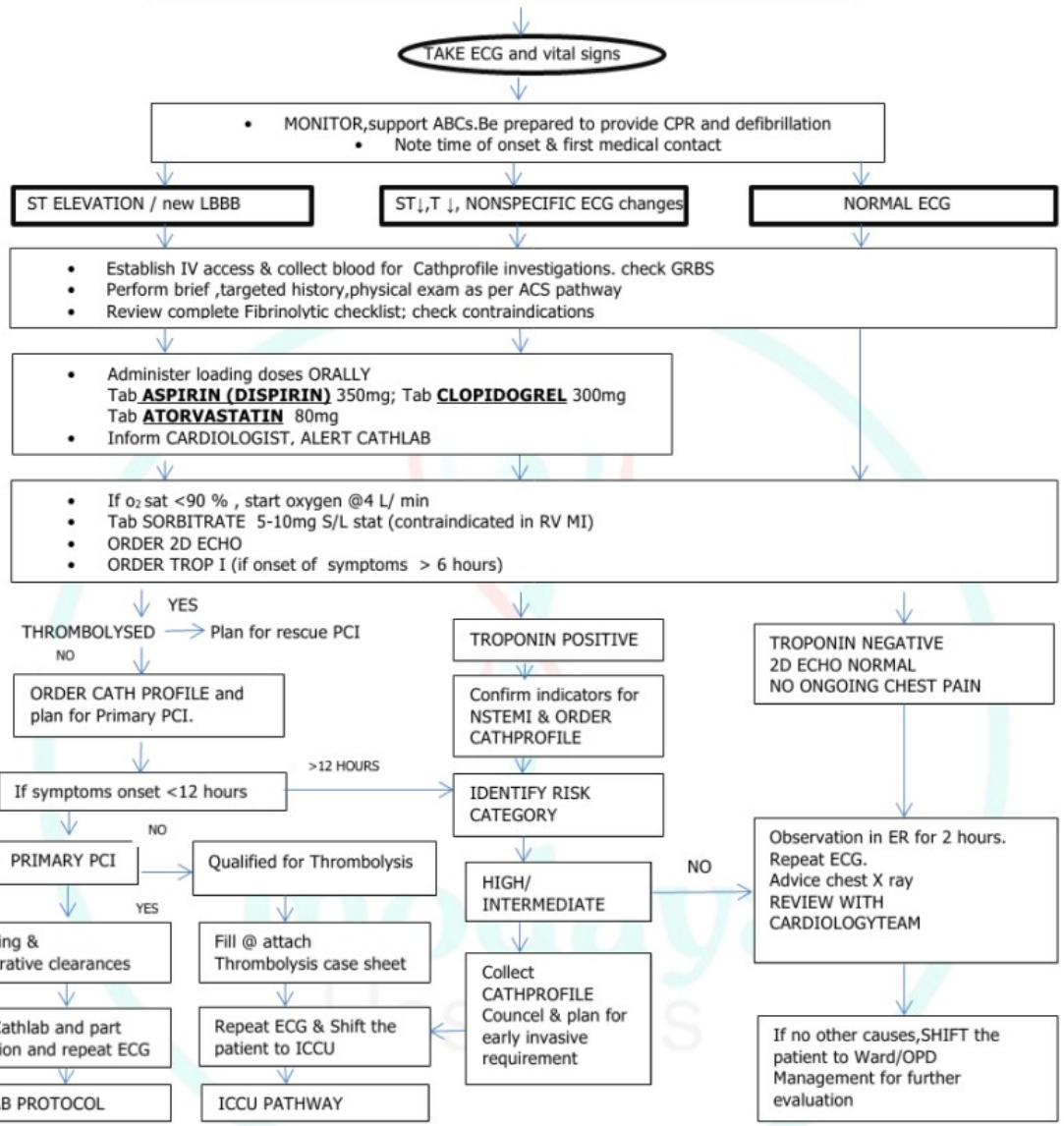
CONSULTANT REFERRALS	INFORMED TO	INFORMED TIME	REVIEWED TIME
CATION CHART			

OXYGEN @	IV ACCESS		CARDIAC MONITOR		
DRUG	DOSE	ROUTE	DOCTOR	NURSE	TIME
Tab ASPIRIN(DISPIRIN)					
TAB CLOPIDOGREL					
Tab ATORVASTATIN					
Tab TICAGRELOR					
Tab PRASUGREL					
Tab SORBITRATE					
Inj PANTOPRAZOLE					
Inj ONDANSETRON					
Inj HEPARIN*					

ER PHYSICIAN		ER MEDICAL OFFICER	

Note : *------to be given only in consultation with Cardiologist;
JANEWAY LESIONS :nontender,small hemorrhagic macular,popular or nodular lesions on palms;
OSLER'S NODES :painful,raised lesions on fingers and/or toes. ; *QUINKES SIGN* : systolic pulsations seen upon light compression of nailbed

CHEST PAIN OR SYMPTOMS OF MYOCARDIAL ISCHEAMIA



ECG LOCALISATION	LEADS AFFECTED	VESSELS INVOLVED	ECG CHANGES
SEPTAL WALL	V1-V2	LAD	R wave disappears,ST elevation, T inversion
ANTERIOR WALL	V2-V4	LAD (DIAGONAL)	ST elevation,T inversion
LATERAL WALL	I,aVL ,V5,V6	LCx	ST elevation,
INFERIOR WALL	II ,III, aVF	RCA	ST elevation,T inversion
POSTERIOR WALL	V1,V2 V7-V9	LCx , RCA	V1-2: Tall R waves ,ST depression, upright T waves V7-9 ST elevation
RIGHT VENTRICLE MI	V1,V4R	RCA	ST elevation V4 in RIGHT SIDE ECG
ATRIAL MI	PTa in I,V5,V6	RCA	PTa Elevation >0.5 mm in I,V5-6 with Depression in II,III,V1-2
LBBB	V1,V5-V6		V1 – rS or QS complex in V1 R waves in Lateral leads – M shaped/notched/monophasic/RS complex

	Ischeamic stroke >3 months ago/dementia
	Pregnancy or within 1 week postpartum

THROMBOLYSIS AGENTS			
AGENT	**INDICATIONS**	**IV DOSING**	**COMMENTS**
ALTEPLASE (rt-PA)	**STEMI**	>67 kg : 100mg IV (TOTAL) 15mg bolus over 1-2 min 50mg over 30 min 35mg over 60 min	ICH 0.4%-0.9%
		<67kg : 100mg IV (TOTAL) 15mg bolus over 1-2 min 0.75 mg/kg over 30 min (max 50 mg) 0.5 mg/kg over 60 min (max 35 mg)	
	ACUTE PE	100 mg infusion over 2 hours	
	AIS	0.1 mg/kg bolus, then 0.8 mg/kg infusion over 60 min	
TENECTEPLASE	**STEMI**	<60kg - 30mg (6ml) ≥60kg to <70 kg- 35 mg (7ml) ≥70kg to <80kg – 40 mg (8ml) ≥80kg to <90kg – 45 mg (9 ml) ≥90kg - 50 mg (10 ml)	IV push over 5 seconds ICH : 0.9%
STREPTOKINASE	**STEMI**	1.5 million units over 60 min	Anaphylaxis
	Acute PE / DVT	250,000 IU OVER 30 min, then 100,000 IU/hr for 24 hr(PE) or 72 hr(DVT)	
RETEPLASE	**STEMI**	10units IV push over 2 min Repeat in 30 min	Anaphylaxis ICH

Door to ICU / Thrombolysis time = 30 min.

For primary PCI : Door to Balloon time < 90 mins Window period > 3 hours consider IV GP IIb IIIa blockers

SECTION-6.4 COMA MANAGEMENT

Airway Protected or Patent?

Yes No

Check for Pulse → No → Resuscitation check RBS → hypoglycemia → Yes

If coma persists <----------% glucose IV

Consider and treat cause of coma:

a. General examination
b. Appropriate laboratory investigation

Ex: S. Electrolytes, Poisons, ABG

c. CT Scan brain

1. Common Causes of Coma

a. Cerebral hemisphere dysfunction
   - Post ictal stupor
   - CVA
   - Closed head injury

b. Damaged or depressed reticular activating system

- Compression by tumor
- Compression by hemorrhage
- Tentotrial herniation

c. Metabolic encephalopathy

d. Post – anoxic encephalopathy

e. Meningoencephalitis

f. Poisoning.

2. Monitoring of Coma

a. The Glasgow coma scale is a common technique for monitoring the progress of coma producing a score from 15 (normal) to 3 (deep coma)

b. Prognosis can be judged from the patient's posture (Decerebrate posturing and rigidity), papillary reflexes and oculovestibular reflexes and CT scan brain.

3. Management

Immediate investigation:

RBS
CBP,BUN,Sr. Electrolytes,Sr. Calcium
ABG,ECG,CXR
Toxicological screen
X-Ray – cervical spine, skull,
CT scan brain
Lumbar puncture

4. Emergency Treatment

a. Airway, oxygenation (high flow)

b. Endotracheal intubation to protect from aspiration

c. PCO_2 should be lowered to approximate 35 mm hg if raised ICT suspected

d. Control of bleeding

e. IV access, Record and monitor vital signs continuously

f. Quick blood glucose analysis and correct hypoglycemia if present with 25% dextrose.

g. Empirically administer thiamine 100mg IV, Naloxene 2-4 mg IV

h. If Benzodiazepine overdose is suspected, give Flumazenil 0.2mg over IV 15 seconds this

may be repeated every 60 sec, to a total dose of 1.0mg

i. Antibiotics for suspected CNS Infection
j. If raised intracerebral pressure – give Mannitol 1grm/kg Iv
k. Plan for immediate surgery for operable cases – If CT scan reveals subtotal, epidural or other hematoma. With shift of midline structures.
l. Metabolic cause present, correct the underlying cause.

6.5 PERFORATION OF VISCUS

Main causes of perforation of viscus are peptic ulcer, gall bladder disease, infections or tumors of small intestine and diseases of large intestine

(Diverticulitis, carcinoma, colitis or foreign body)

Clinical features

a. Abdominal pain
b. Vomiting – bile in vomitus / coffee ground vomitus / faeculant vomitus
c. Signs of ileus or bowel obstruction – abdominal distension, inability to pass flatus constipation.
d. Signs of peritonitis – rigidity / guarding, Absent bowel sounds.
e. Signs of sepsis and hypovolemia.
    - Fever
    - Tachycardia
    - Decrease in pulse pressure
    - Tachypnoea
    - Oliguria

Diagnosis

a. Elevated WBC
b. Increased serum amylase levels

c. ABG may show metabolic acidosis
d. X-ray abdomen in erect posture may show subdiaphragmatic gas shodow
e. Pneumoperitoneum -pathognomonic for perforated viscous
f. Air fluid levels in step lader pattern indicates the presence of mechanical obstruction
g. Ultrasound study of abdomen for presence of cystic/common duct stone, free peripheral fluid etc.
h. Abdominal CT – if necessary.

Treatment

b. Inform surgeon immediately and assess for surgery
c. Nil by mouth
d. Nasogastric tube aspiration – optional
e. IV Fluids
f. IV Antibiotics
g. Analgesics – if severe pain
h. Pre- Laboratory tests and pre-anesthetic check up if planned for surgery

SECTION-6.6 ACUTE RENAL FAILURE

1. Acute renal failure may be oliguric (urine output less than 500ml in 24 hrs) or non oliguric (urine output more than 500ml / 24 hrs).

i. Suggestive features

a. Uremia – uremic symptoms include drowsiness, nausea, hiccough and twitching. Raised BUN level.

b. Raised serum creatinine.

c. Hyperkalemia.

d. Hyponatremia.

e. Metabolic acidosis.

The approach to patients with ARF is simplified by classifying it as pre – renal, intrinsic or post – obstructive.

ii. Pre - renal azotemia

Pre – renal azotemia is a clinical result of renal hypo perfusion due to a decrease in effective arterial blood volume.

Causes - Dehydration

Hypo tension

Low cardiac output states

iii. Intrinsic Renal Failure

Results from variety of injuries to the renal blood vessels, glomeruli, tubules or interstitium.

iv. Causes

a. Acute tubular necrosis

b. Arteriolar Injury

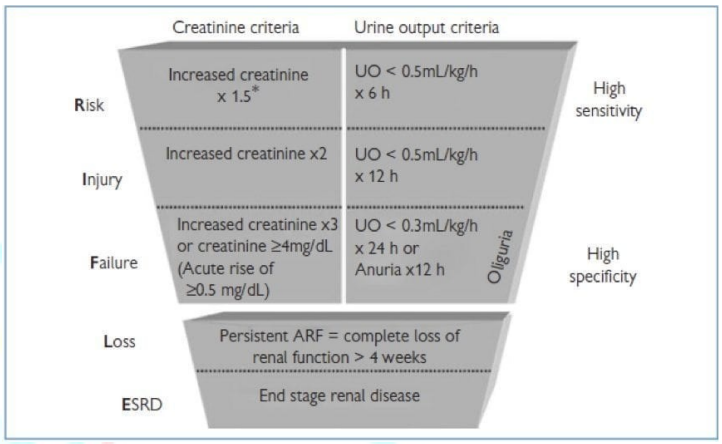
c. Glomerulonephritis

d. Interstitial Nephritis

v. **Post Obstructive Failure** -- Due to obstruction in the upper or lower urinary tract

Causes --- ureteral obstruction (clot, calculus, tumor etc.) Bladder outlet

obstruction(neurogenic bladder, prostrate hypertrophy, carcinoma, calculus, ureteral stricture)



vi. Immediate Investigations

a. Urine analysis
b. Blood urea nitrogen
c. Serum Electrolytes.
d. Urinary sodium and creatinine.
e. Urinary osmolarity
f. Fractional excretion of Na %
g. Renal failure Index
h. RBS
i. ECG
j. ABG
k. CXR

vii. Specific Investigations

a. Quick history and physical examination.

b. If oliguria present (< 500ml/24hrs)

RIFLE CRITERIA

Lab investigations will help in classifying ARF.

Diagnosis	u/p cr.	U Na	Fe Na%	U. Osmolality
Pre renal	> 40	< 20	< 1	> 500
Oliguric ATN	< 20	> 40	> 1	< 350
Post renal	> 40	> 40	> 1	< 350

U = urine, P = plasma, Re Na = Fractional excretion of Na, ATN = acute tubular necrosis.

viii. If Pre Renal

a. Intra venous fluids – N. saline / Ringer's lactate 500 – 1000ml of N. Saline can be infused over 30-60 mts provided patient is not volume overloaded. (Frequent cardio – pulmonary examination to be done).
b. If oliguria persists > 2 hrs – Furesomide 5 – 10 bolus IV, consider increasing dose at 30 min internal to 250 mg.
c. If oliguria persists – DOPAMINE INFUSION 2.5 – 5 mcg / kg / min.

d. If oliguria persists, suggestive features of ARF become significant, and pt. Symptomatic – consider DIALYSIS
e. Inform Nephrologist.

ix. If Renal cause of ARF

a. Inform Nephrologist.

b. Consider urinary sediment / renal biopsy / steroids / immuno suppressives / DIALYSIS/ DIURETICS / LOW DOSE DOPAMINE / FLUID RESTRICTION (500ml + Insensitive loss)

x. If Post – Renal ARF –

a. Renal ultra sound.
b. Obstruction confirmed on U/S. – inform urologist.
c. Catheterize bladder or ensure catheter patent.
d. If no obstruction, consider possible renal vascular lesion.
e. Renal isotopes scan to confirm vascular lesion. If confirmed inform vascular surgeon / urologist.
f. If patient symptomatic, oliguria persists and renal abnormal function present, consider DIALYSIS.

xi. Indication for initiation of RRT include

a. volume overload
b. hyperkalemia (K+ >6.5 or rising)
c. acid-base imbalance
d. "symptomatic uremia"
   - pericarditis
   - encephalopathy
   - bleeding dyscrasia
   - nausea
   - vomiting, or
   - pruritus),
e. uremia (BUN >100),

f. dialyzable intoxications
   - methanol,
   - ethylene glycol,
   - theophylline,
   - aspirin,
   - lithium

SECTION-6.7 UPPER AIRWAY OBSTRUCTION

1. In the conscious patient manifestation of airway obstruction:
   a. Strider / Tachypnoea / Dyspnea / cyanosis / snoring.
   b. Impaired or absent phonation.
   c. Sternal or suprasternal retraction.
   d. Display of the universal choking sign.
   e. Respiratory distress – LOW SPO2.
   f. Look for urticaria, angio edema, fever or trauma.
   g. In an unconscious patient look for labored breathing or apnea
   h. Care should be exercised when moving the neck if a history of trauma is given.
   i. Inspiratory stridor in an ominous sign.
   j. Snoring is an indication of partial obstruction. Therapy is directed to rapid relief of obstruction to prevent cardio-pulmonary event and anoxic brain damage.

2. Management

   a. If patient has stridor / Tachypnoea / Dyspnea / cyanosis or snoring, give maximum FiO2.
   b. Check if patient is arousable. If patient not arousable, tilt forehead back and jaw forward. If patient has relief of obstruction or improvement in signs, symptoms the patient to coma position and treat the cause, If patient is arousable and has symptom / signs or airway obstruction inform ENT specialist or Anesthetist as early as possible.
   c. If the conditions are severe, urgently consider endotracheal intubation / Tracheostomy / Cricothyroidotomy whichever is appropriate.
   d. If upper AWO is due to foreign body inhalations consider removing from pharynx if visible, use Heimlich maneuver (Sub-diaphramatic abdominal thrust) or consider bronchoscopy.

a. Unless extreme emergency, only attempt endo-tracheal intubation when facilitate to expertise available for tracheotomy / Cricothyroidotomy.

SECTION-6.8 SEPSIS and SEPTIC SHOCK

1. The American College of Chest Physicians (ACCP)/Society of Critical Care Medicine (SCCM) consensus conference definitions of sepsis, severe sepsis, and septic shock are outlined below.

a. **Systemic inflammatory response syndrome (SIRS):** The systemic inflammatory response to a wide variety of severe clinical insults manifests by 2 or more of the following conditions:

i. Temperature greater than 38°C or less than 36°C
ii. Heart rate greater than 90 beats per minute (bpm)
iii. Respiratory rate greater than 20 breaths per minute or $PaCO_2$ less than 32 mm Hg
iv. White blood cell count greater than 12,000/□L, less than 4000/□L, or 10% immature (band) forms

2. **Sepsis:** This is a systemic inflammatory response to a documented infection. The manifestations of sepsis are the same as those previously defined for SIRS. The clinical features include 2 or more of the following conditions as a result of a documented infection:

- Rectal temperature greater than 38°C or less than 36°C
- Tachycardia (>90 bpm)
- Tachypnea (>20 breaths per min)

With sepsis, at least 1 of the following manifestations of inadequate organ function/perfusion also must be included:

- Alteration in mental state

- Hypoxemia (PaO_2<72 mm Hg at FiO_2 [fraction of inspired oxygen] 0.21; overt pulmonary disease not the direct cause of hypoxemia)
- Elevated plasma lactate level
- Oliguria (urine output <30 mL or 0.5 mL/kg for at least 1 h)

3. **Severe sepsis:** This is sepsis and SIRS associated with organ dysfunction, Hypo perfusion, or hypotension. Hypo perfusion and perfusion abnormalities may include, but are not limited to, lactic acidosis, oliguria, or an acute alteration in mental status. The systemic response to infection is manifested by 2 or more of the following conditions:

a. Temperature greater than 38°C or less than 36°C
b. Heart rate greater than 90 bpm
c. Respiratory rate greater than 20 breaths per minute or $PaCO_2$ less than 32 mm Hg
d. White blood cell count greater than 12,000/□L, less than 4000/□L, or 10% immature (band) forms

4. **Sepsis-induced hypotension** (ie, systolic blood pressure <90 mm Hg or a reduction of >40 mm Hg from baseline): This may develop despite adequate fluid resuscitation, along with the presence of perfusion abnormalities that may include lactic acidosis, oliguria, or an acute alteration in mental state.

5. **Septic shock:** A subset of people with severe sepsis develop hypotension despite adequate fluid resuscitation, along with the presence of perfusion abnormalities that may include lactic acidosis, oliguria, or an acute alteration in mental status. Patients receiving inotropic or vasopressor agents may not be hypotensive by the time that they manifest hypoperfusion abnormalities or organ dysfunction.

6. **Multiple organ dysfunction syndrome (MODS):** This is the presence of altered organ function in a patient who is acutely ill and in whom homeostasis cannot be maintained without intervention.

The following points should be considered for early diagnosis of sepsis:

a. Patients with sepsis may present in a myriad of ways and high clinical suspicion is necessary to identify subtle presentations.
b. Septic patients should be screened for evidence of tissue hypo-perfusion.
c. Cool or clammy skin, mottling, and elevated shock index (heart rate/systolic blood pressure > 0.9) may be signs of tissue hypo-perfusion.
d. Lactic acid level greater than 4 mmol/dL has been used as an entry criteria for EGDT and indicator of severe tissue hypo-perfusion.

e. CBC count with differential

i. An adequate hemoglobin concentration is necessary to ensure adequate oxygen delivery in patients with shock. Ensure that the hemoglobin is maintained at a level of 8 g/dL.
ii. Platelets, an acute phase reactant, usually increase at the onset of any serious stress. However, the platelet count will fall with persistent sepsis, and DIC may develop.
iii. The WBC count and the white cell differential count may predict the existence of a bacterial infection. In adults who are febrile, a WBC count of greater than 15,000/□L or a neutrophil band count of greater than 1500/□L is associated with a high likelihood of bacterial infection.
iv. WBC counts of greater than 50,000/□L or less than 300/□L are associated with significantly decreased rates of survival.
v. At regular intervals, obtain metabolic assessment with serum electrolytes, including magnesium, calcium, phosphate, and glucose.
vi. Assess renal and hepatic function with the following:
    - Serum creatinine
    - BUN
    - Bilirubin

- Alkaline phosphate
- Alanine aminotransferase (ALT)
- Aspartate aminotransferase (AST)
- Albumin

- ABG: Measure serum lactate to provide an assessment of tissue hypoperfusion. Elevated serum lactate indicates that significant tissue hypoperfusion exists with the shift from aerobic to anaerobic metabolism. The higher the serum lactate, the worse the degree of shock and the higher the mortality rate.
- Assess the coagulation status with prothrombin time (PT) and aPTT.
- Patients with clinical evidence of a coagulopathy require additional tests to detect the presence of DIC.
- Blood cultures: The blood culture is the primary means for the diagnosis for intravascular infections (eg, endocarditis) and infections of indwelling intravascular devices. The individuals at high risk for endocarditis are intravenous (IV) drug abusers and patients with prosthetic heart valves.
- The patients at risk for bacteremia include adults who are febrile with anelevated WBC count or neutrophil band count, elderly patients who are febrile, and patients who are febrile with neutropenia. These populations have a 20-30% incidence of bacteremia.
- The incidence of bacteremia increases to at least 50% in patients withsepsis and evidence of end-organ dysfunction.
- Perform a urinalysis and urine culture for every patient who is septic.
- Urinary infection is a common source for sepsis, especially in elderly individuals. Adults who are febrile without localizing symptoms or signs have a 10-15% incidence of occult urinary tract infection.
- Obtain secretions or tissue for Gram stain and culture from the sites of potential infection. The Gram stain is the only immediately available test that can document the presence of bacterial infection and guide the choice of initial antibiotic therapy.

7. Imaging Studies:

a. Several imaging modalities are used to detect a clinically suspected focal infection, the presence of a clinically occult focal infection, and a complication of sepsis and septic shock.
b. Since most patients that present with sepsis have pneumonia, one should obtain a chest radiograph because the clinical examination is unreliable for the detection of pneumonia; especially in elderly patients. Occult infiltrates can be detected by the routine use of chest radiography in adults who are febrile without localizing symptoms or signs and in patients who are febrile with neutropenia and without pulmonary symptoms.

c. The chest radiograph results may be normal in early ARDS. The typical findings of noncardiogenic pulmonary edema are bilateral, hazy, symmetric
homogenous opacities, which may demonstrate air bronchograms. The margins of pulmonary vessels become indistinct and obscured with disease progression. The usual findings of metastatic pulmonary edema, such as Kerley A or B lines, are not

usually observed; a perihilar distribution of opacities is also absent. Furthermore, other findings of cardiogenic pulmonary edema, such as cardiomegaly, vascular redistribution and pleural effusions, also are not present.
d. With disease progression, the ground glass opacities change into heterogeneous, linear or reticular infiltrates. Days to weeks later, either persistent chronic fibrosis may develop or the chest radiograph appearance becomes more normal. Periodic chest radiographs during the management of ARDS are particularly important to diagnose barotrauma, adequate postioning of an endotracheal tube and intravascular catheters, and occurrence of nosocomial pneumonia.
e. Acquire supine and upright or lateral decubitus abdominal films because they may be useful when an intra-abdominal source of sepsis is suspected.
f. Ultrasound is the imaging modality of choice when a biliary tract source is thought to

be the source of sepsis.

g. Obesity or the presence of excessive intestinal gas markedly interferes with abdominal imaging by ultrasonography; therefore, the CT scans are preferred.

h. The CT scan is the imaging modality of choice for excluding an intra-abdominal abscess or the retroperitoneal source of infection.

i. When clinical evidence exists of a deep soft tissue infection, such as crepitus, bullae, hemorrhage, or foul smelling exudate, obtain a plain radiograph. The presence of soft tissue gas often dictates surgical exploration.

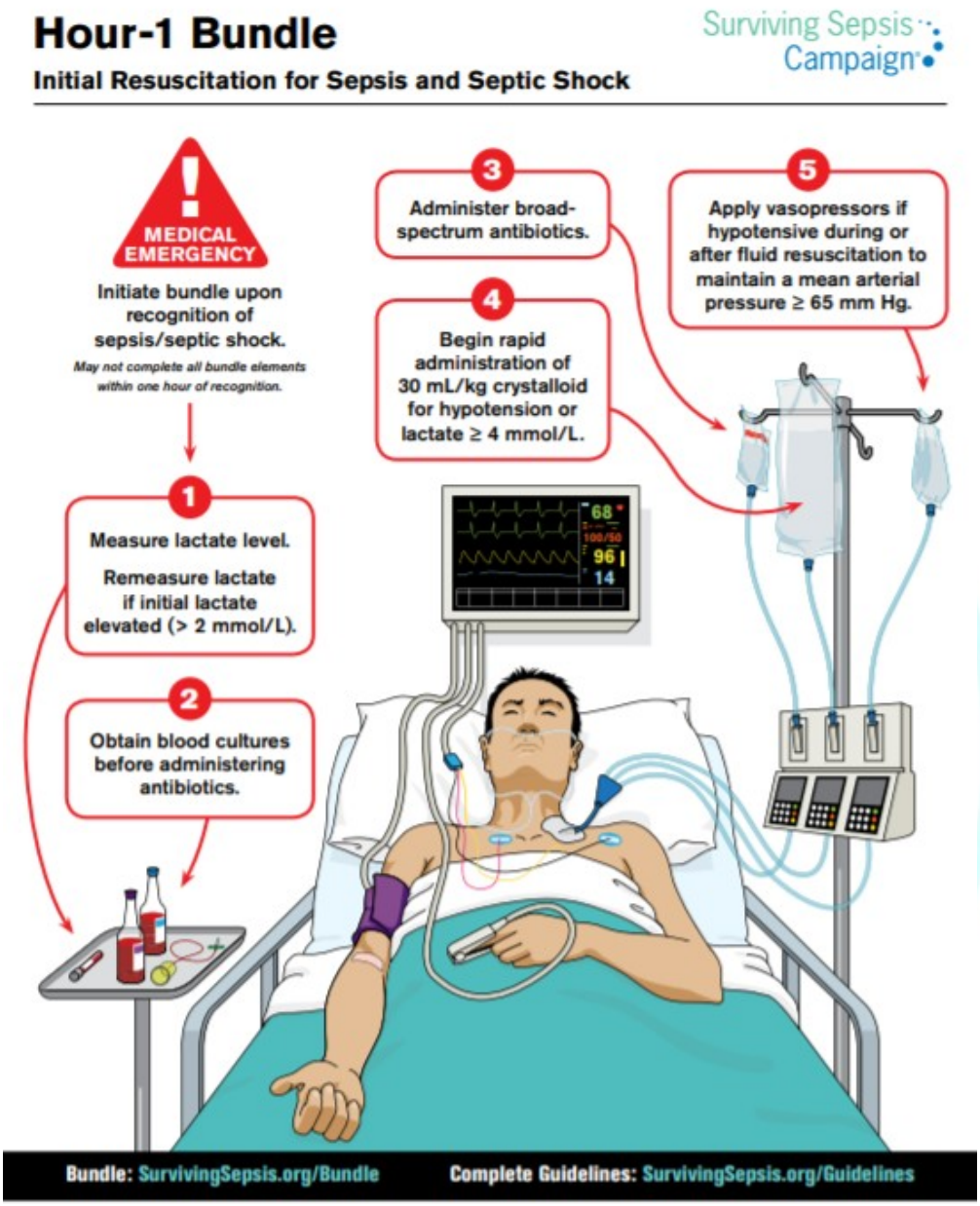
j. Obtain a head CT scan in patients with evidence of increased intracranial pressure (papilledema) and in patients thought to have focal mass lesions (eg, focal defects, previous sinusitis or otitis, recent intracranial surgery).

k. If bacterial meningitis is strongly suspected, then a lumbar puncture (LP) should be performed without the delay of obtaining a CT scan. If the opening pressure is elevated, then only enough cerebrospinal fluid (CSF) for culture should be obtained.

8. MANAGEMENT

The principles in the management of septic shock, based on current literature, include the following components:

2019 guidelines surviving sepsis campaign


Hour-1 Bundle
Initial Resuscitation for Sepsis and Septic Shock
Surviving Sepsis Campaign
MEDICAL EMERGENCY
Initiate bundle upon recognition of sepsis/septic shock.
May not complete all bundle elements within one hour of recognition.
1
Measure lactate level.
Remeasure lactate if initial lactate elevated (> 2 mmol/L).
2
Obtain blood cultures before administering antibiotics.
3
Administer broad-spectrum antibiotics.
4
Begin rapid administration of 30 mL/kg crystalloid for hypotension or lactate ≥ 4 mmol/L.
5
Apply vasopressors if hypotensive during or after fluid resuscitation to maintain a mean arterial pressure ≥ 65 mm Hg.
Bundle: SurvivingSepsis.org/Bundle
Complete Guidelines: SurvivingSepsis.org/Guidelines

a. Early recognition
b. Early and adequate antibiotic therapy
c. Source control
d. Early hemodynamic resuscitation and continued support
e. Corticosteroids (refractory vasopressor-dependent shock)
f. Drotrecogin alpha (Severely ill if APACHE II > 25)
g. Tight glycemic control
h. Proper ventilator management with low tidal volume in patients with ARDS

General supportive care: Initial treatment includes support of respiratory and circulatory function, supplemental oxygen, mechanical ventilation, and volume infusion. Treatment beyond these supportive measures includes antimicrobial therapy targeting the most likely pathogen, removal or drainage of the infected foci, treatment of complications, and interventions to prevent and treat effects of harmful host responses. Source control is essential for the following reasons:

a. Identifying and obtaining source control is an essential component of sepsis management.
b. In general, the source of sepsis needs to be removed, drained, or otherwise eradicated.
c. Administer supplemental oxygen to any patients with sepsis who also have hypoxemia or are in respiratory distress.
d. If the patient's airway is not secure, the gas exchange or acid-base balance is severely deranged, and if evidence of respiratory muscle fatigue exists or if the patient appears markedly distressed, perform an endotracheal intubation.
e. Patients in septic shock generally require intubation and assisted ventilation because respiratory failure either is present at the onset or may develop during the course of the illness.
f. Correction of shock state and abnormal tissue perfusion is the next step in the

treatment of patients with septic shock.

Hemodynamic support of septic shock

a. The goals of hemodynamic therapy are restoration and maintenance of adequate tissue perfusion to prevent multiple organ dysfunction.
b. Careful clinical and invasive monitoring is required for assessment of global and regional perfusion. A mean arterial pressure (MAP) of less than 60 mm Hg or a decrease in MAP of 40 mm Hg from baseline defines shock at the bedside.
c. Elevation of the blood lactate level on serial measurements of lactate can indicate inadequate tissue perfusion.
d. Mixed venous oxyhemoglobin saturation serves as an indicator of the balance between oxygen delivery and consumption. An MVO2 of less than 65% generally indicates decreased tissue perfusion.
e. The hemodynamic support in septic shock is provided by restoring the adequate circulating blood volume, and, if needed, optimizing the perfusion pressure and cardiac function with vasoactive and inotropic support to improve tissue oxygenation.

Intravascular volume resuscitation

i. Hypovolemia is an important factor contributing to shock and tissue hypoxia; therefore, all patients with sepsis require supplemental fluids. The amount and rate of infusion areguided by an assessment of the patient's volume and cardiovascular status. Monitor patients for signs of volume overload, such as dyspnea, elevated jugular venous pressure, crackles on auscultation, and pulmonary edema on the chest radiograph. Improvement in the patient's mental status, heart rate, MAP, capillary refill, and urine output indicate adequate volume resuscitation.
ii. Large volumes of fluid infusions are required as initial therapy in patients with septic shock.

Administer fluid therapy with predetermined boluses (500 mL or 10 mL/kg) titrated to the clinical end points of heart rate, urine output, and blood pressure. Continue fluid resuscitation until the clinical end points are reached or the pulmonary capillary wedge pressure exceeds 18 mm Hg. The volume resuscitation can be achieved by either crystalloid or colloid solutions.

Vasopressin supportive therapy

i. If the patient does not respond to several liters of volume infusion with isotonic crystalloid solution (usually 4 L or more) or evidence of volume overload is present, the depressed cardiovascular system can be stimulated by inotropic and vasoconstrictive agents. When proper fluid resuscitation fails to restore hemodynamic stability and tissue perfusion, initiate therapy with vasopressor agents. These agents are dopamine, nor epinephrine, epinephrine, and phenyl ephrine. These agents are vaso constricting drugs that maintain adequate blood pressure during life-threatening hypotension and preserve perfusion pressure for optimizing flow in various organs.

ii. The mean blood pressure required for adequate splanchnic and renal perfusion(MAP of 60 or 65 mm Hg) is based on clinical indices of organ function. Dopamine is the most commonly used agent for this purpose. Treatment usually begins at a rate of 5-10 mcg/kg/min IV, and the infusion is adjusted according to the blood pressure and other hemodynamic parameters. Often, patients may require high doses of dopamine (as much as 20mcg/kg/min). Presently, norepinephrine is the preferred drug because dopamine is known to cause unfavorable flow distribution.

iii. If the patient remains hypotensive despite volume infusion and moderate doses of dopamine, a direct vasoconstrictor (eg, norepinephrine) should be started at a dose of 0.5 mcg/kg/min and titrated to maintain a MAP of 60 mm Hg. While potent vasoconstrictors (eg, norepinephrine) traditionally have been avoided because of their adverse effects on cardiac output and renal perfusion, data from animal and human

studies reveal that norepinephrine can reverse septic shock in patients unresponsive to volume and dopamine. These patients require invasive hemodynamic monitoring with arterial lines and pulmonary artery catheters. Vasopressors may cause more harm than good if administered to patients whose inadequate intravascular volume is not restored (ie, a patient "whose tank is not filled").

Empirical antimicrobial therapy

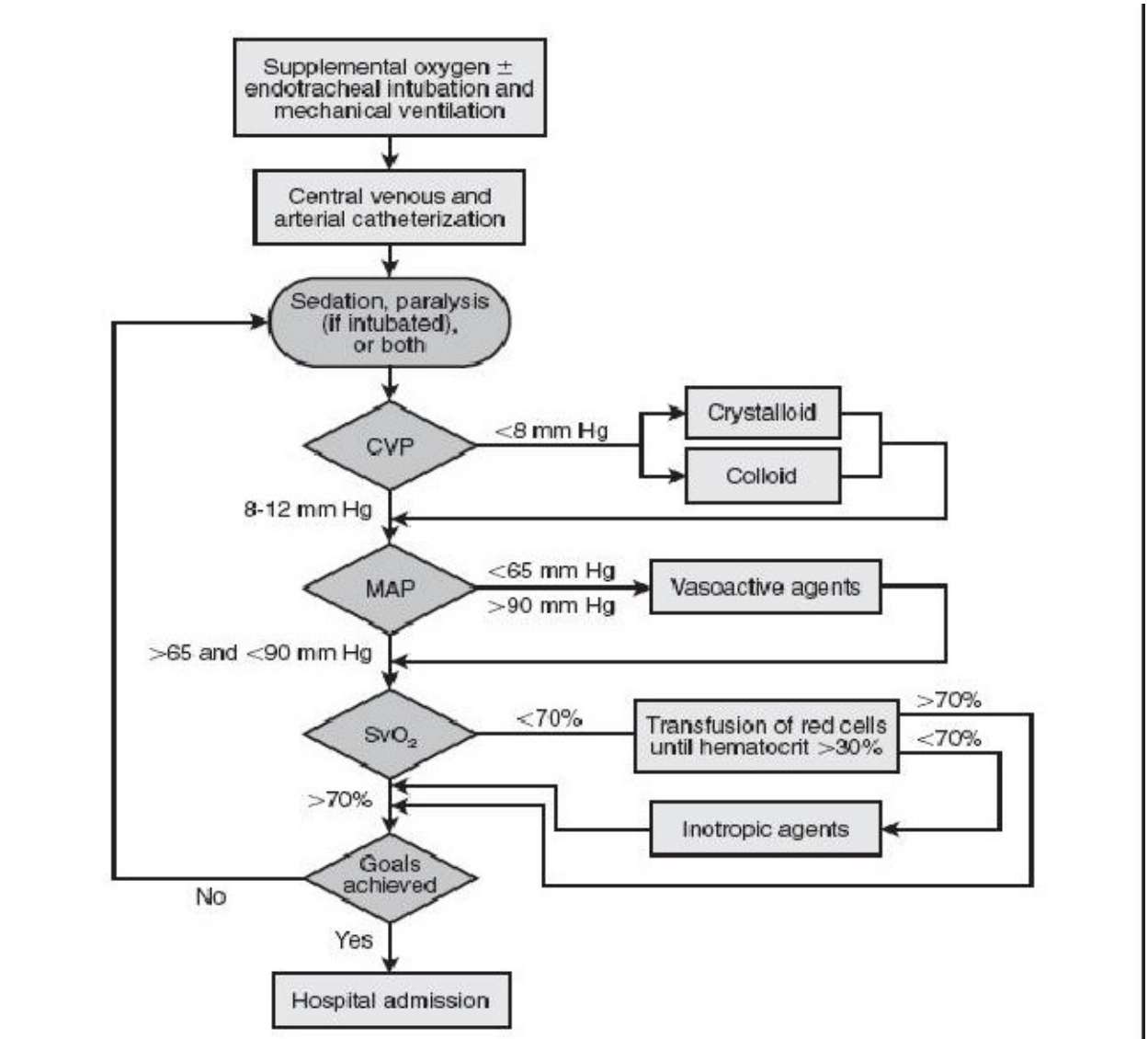
i. Initiate this therapy early in patients experiencing septic shock. The selection of appropriate agents is based on the patient's underlying host defenses, the potential sources of infection, and the most likely culprit organisms. Antibiotics

ii. must be broad-spectrum agents and must cover gram-positive, gram-negative, and anaerobic bacteria because the different classes of these organisms produce an identical clinical picture of distributive shock.

iii. Administer the antibiotics parenterally, in doses adequate to achieve bactericidal serum levels

iv. Include coverage directed against anaerobes in patients with intra-abdominal orperineal infections. Antipseudomonal coverage is indicated in patients with neutropenia or burns or in patients who acquired sepsis while hospitalized. Patients who are immunocompetent usually can be treated with a single drug with broad- spectrum coverage, such as a third-generation cephalosporin. Patients who are immunocompromised typically require dual broad-spectrum antibiotics with overlapping coverage. Within these general guidelines, no single combination of antibiotics is clearly superior to others

9. Flowchart



It is recommended that a resuscitation bundle incorporating early goal-directed therapy be started immediately and completed within 6 hours of recognition of severe sepsis/septic shock.

a. . Serum lactate measured.
b. . Blood cultures obtained before antibiotic administration.
c. From the time of presentation, broad-spectrum antibiotics administered within 3 hours

for ED admission.

d. In the event of hypotension:
   I. Crystalloid (or colloid equivalent) delivered at a minimum of 20 mL/kg.
   II. For hypotension not responding to volume resuscitation, vasopressors used tomaintain mean arterial pressure >65 mm Hg.

e. In the event of persistent arterial hypotension refractory to volume resuscitation (septic shock) or initial lactate >4 mmol/L (36 mg/dL):
   i. Central venous pressure >8 mm Hg achieved.
   ii. Central venous oxygen saturation 70% achieved.

SEPSIS 3 new DEFINITIONS 2016

- **SEPSIS** is life-threatening organ dysfunction due to a dysregulated host response to infection

  - ✓ Sepsis clinical criteria: organ dysfunction is defined as an increase of 2 points or more in the Sequential Organ Failure Assessment (SOFA) score
  - ✓ for patients with infections, an increase of 2 SOFA points gives an overall mortality rate of 10%
  - ✓ Patients with suspected infection who are likely to have a prolonged ICU stay or to die in the hospital can be promptly identified at the bedside with qSOFA ("HAT"); i.e. 2 or more of:

    - **H**ypotension: SBP less than or equal to 100 mmHg
    - **A**ltered mental status (any GCS less than 15)
    - **T**achypnoea: RR greater than or equal to 22

- **SEPTIC SHOCK** is a subset of sepsis in which underlying circulatory and cellular/metabolic abnormalities are profound enough to substantially increase mortality.

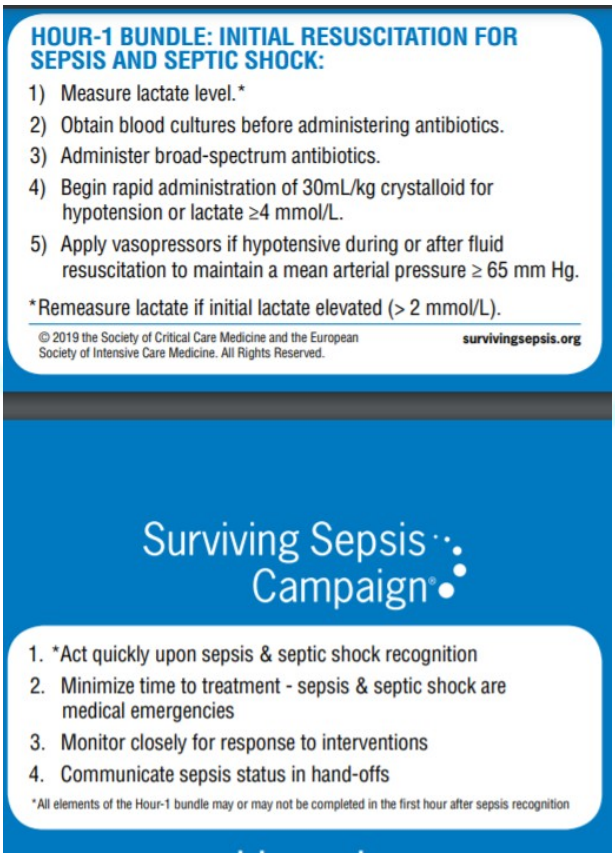
Septic shock clinical criteria:

- ✓ Sepsis and (despite adequate volume resuscitation) both of:
  - ✓ Persistent hypotension requiring vasopressors to maintain

    MAP greater than or equal to 65 mm Hg, and
  - ✓ Lactate greater than or equal to 2 mmol/L

- With these criteria, hospital mortality is in excess of 40%

Note that the term "severe sepsis" is no longer in use.



SECTION 6.9 MANAGEMENT OF ACUTE POISONING

1. Introduction

The management of a patient with acute poisoning consists of :

a) Emergency management
b) Clinical evaluation
c) History
d) Physical examination
e) Investigations
f) Treatment
g) Decontamination
h) Antidotes
i) Enhanced elimination of absorbed drugs
j) Supportive therapy
k) Observation
l) Follow – up

Emergency Management

Resuscitation and stabilization

On first contact with the patient, assessment of the level of consciousness is important. For an unconscious patient, careful evaluation of the Airway, Breathing and Circulation (ABC) should be followed by active measures to not only secure these, but also to reverse the unconscious state, if possible. It would also be pertinent to look for obvious associated trauma.

A - Airway

A patent airway is critical in the further management of the patient. One or more of the following may maintain patency, if the patient is unconscious:

- The head-tilt, chin-lift technique or the classical jaw thrust would be the initial method of choice. However, in the event that neck trauma is suspected, the head tilt should not be employed. The modified jaw thrust is an alternative technique that may be employed in

traumatized patients.

- Insertion of oro-pharyngeal or naso-pharyngeal airway with regular suctioning. Prior to this the oral cavity should be inspected and any obvious foreign bodies such as or broken dentures should be removed.

- Turning the patient to the recovery (there- quarters prone) position. This allows oral secretions and vomitus in the oro-pharynx to drain out of the mouth.
- Endotracheal or nasotracheal intubation. If performed, this should only be with a cuffed tube.
- Surgical cricothyrotomy

Examination of the airway is not complete without evaluating for the presence or absence of the gag reflex. Especially in the unconscious patient, the absence of the gag reflex mandates definitive measures to protect the airway, such as with a cuffed endotracheal tube before any procedures for gastrointestinal decontamination are instituted.

B - Breathing

Assessment of breathing should include not just whether the patient is breathing, but also if the breathing is slow or fast. Any patient with abnormal breathing should be provided with 100% oxygen and assisted ventilation, if required either via a bag-valve mask or positive pressure ventilation, may be instituted.

C – Circulation

Assessment of circulation should include heart rate, blood pressure, peripheral circulation and hydration status of the patient. To maintain the circulation: -

- Dopamine and dobutamine may be needed to maintain the BP
- IV fluid (crystalloids, colloids) may be necessary
- CVP monitoring may be necessary
- The patient may require ECG monitoring
- If in shock, the patient should be maintained in the head –down position

Other Problems

The patient may also have other problems e.g. altered mental status, seizures, etc.

Clinical Evaluation History

The primary aims of taking the history are to:

- Confirm that poisoning has occurred
- Identify the substance or substances involved

Note : this can be taken when the patient's condition is stable

Suspected Cases of Poisoning. Symptoms of unknown Toxic Exposure Physical Examination

A full physical examination should be carried out for all patients. In a toxicological patient, particular attention may should be paid to the following:-

Consciousness level

- Odour of breath on the patient
- Pupil size

Rate and depth of respiration

- Heart rate and blood pressure
- Dryness of oral mucosa and skin
- Oral ulcers
- Evidence of drug abuse e.g. needle marks
- Evidence of suicidal intent, e.g. cuts on the wrists

Gastrointestinal Tract (GIT)

- Nausea and vomiting
- Abdominal pain
- Pain and ulceration
- Increased salivation

- Dry mouth
- Diarrhea
- Constipation
- Jaundice

Respiratory System

- Cough and breathlessness
- Wheezes and crackles
- Cyanosis
- Hyperventilation
- Hypoventilation

Cardiovascular System (CVS)

- Tachycardia
- Bradycardia
- Arrhythmias
- Hypotension
- Hypertension

Central Nervous system (CNS)

- Ataxia
- Coma or drowsiness
- Hypotonia and hyper-reflexia
- Convulsions or fasciculations
- Dystonic reactions
- Delirium and hallucinations

Eyes

- Loss of Vision
- Pupils
- Small or pinpoint pupils are usually present in poisoning by:
    - Cholinesterase inhibitors
    - Opioid analgesics

- Dilated pupils are usually present in poisoning by:
    - Amphetamines
    - Anticholinergic drugs
    - Antihistamines
- Nystagmus
- Papilloedema

Skin

- Reddish skin
- Moist skin
- Dry skin
- Blisters and / or bullae
- Needle tracks
- Tinnitus and deafness
- Hypothermia
- Hyperthermia
- Clinical Toxidromes
- Anticholinergics

The characteristics of Anticholinergic poisoning are best remembered by way of the following well-known mnemonic:

- Hot as a hare (hyper pyrexia)
- Red as a beet (cutaneous vasodilation)
- Dry as a bone (decreased salivation)
- Blind as a bat (cycloplegia and mydriasis)
- Mad as a hatter (delirium and hallucinations)
- Decreased GI motility

- Tachycardia
- Urinary retention

Caustic substance ingestion

- Dysphagia
- Acute abdomen
- Chest pain
- Respiratory distress

CHOLINERGICS

CNS signs and symptoms

- Agitation
- Coma
- Confusion

- Muscle fasciculations
- Seizures
- Weakness

GIT signs and symptoms

- Defecation
- Emesis
- Gastric cramping
- Salivation
- Lacrimation
- Odor of garlic
- Profuse sweating
- Urination

CYCLIC ANTIDEPRESSANTS

- CNS stimulation with delirium
- Coma
- Hypotension
- Seizures

Opioids

- Coma
- Pinpoint pupils
- Respiratory depression

ORGANOPHOSPHATE

Muscarinic effects

- abdominal cramping
- bradycardia
- bronchoconstrictions
- bronochorrhoea

- defecation
- heart block
- Lacrimation

- nausea and vomiting
- salivation
- sweating

Nicotinic effects

- breathlessness
- fasciculations
- muscular fatigue
- pallor
- paralysis
- Tachycardia
- tremor
- twitching
- weakness

CNS effects

- anxiety
- ataxia
- coma
- confusion
- convulsions
- headache
- slurred speech

Phenothiazines

- Coma
- Convulsions
- Extra pyramidal reactions

- Hypothermia
- Lethargy
- Miosis
- Postural hypotension

Salicylates

- Fever

- Lethargy
- Tachypnoea
- Tinnitus
- Vomiting
- Coma (rarely)

Sedatives /Hypnotics

- Coma
- Confusion
- Hypotension
- Hypothermia
- Respiratory depression
- variable pupilary changes
- vesicles or bullae

Sympathomimetics

- Anxiety or delirium
- Hyper pyrexia
- Hypertension
- Mydriasis
- Tachycardia

Theophylline

- CNS signs and symptoms
- agitation

- anxiety
- seizures
- tremor
- CVS signs and symptoms
- diarrhea
- nausea and vomiting

Investigations / Identification of agent

One or more of the following samples may be sent for toxicology:

- Blood
- Urine
- Gastric aspirate

Other test for initial management (as required)

- Serum digoxine level
- serum paracetamol level
- Serum phenytoin level
- Serum salicylate level
- Serum Theophylline level

They should therefore be ordered without hesitation if indicated.

Effects of agent

A number of different investigations may be necessary for evaluating the effects of a poison.

- Full blood count (FBC)
- Urea and electrolytes (U/E)
- Liver function test (LFT)
- e.g. Hepatotoxic drugs
- Prothrombin time / partial thromboplastin time (PT/ PTT)
- Group and cross – match (GXM) for fresh frozen plasma (FFP)
- Arterial blood gas (ABG)
- Urine full examination and microscopic examination (UFEME)
- Electrocardiogram (ECG)
- Chest X- ray (CXR)
- Paraquat poisoning
- Blood urea nitrogen (BUN)
- Creatine phosphokinase (CPK)
- Magnesium, calcium and phosphate levels
- Methaemoglobin

- Serum cholinesterase levels
- Electroencephalography (EEG)
- Serum osmolality for toxic alcohols

Treatment

The principles of managing a case of poisoning are as follows:

- Emergency management
- Decontamination
- Antidotes
- Enhanced elimination

Treatment generally consists of:

- Supportive therapy
- keeping the patient under observation

Nursing Care

- Complete rest in bed (CRIB)
- Rest in bed (RIB) if patient is relatively well
- Conscious level chart
- Hourly parameters
- Input / output (I/O) chart
- Suicide precautions

Other Considerations

Any poisoning is made a medico – legal case

BENZODIAZEPINE OVER DOSE

1. Benzodiazepines are commonly involved in drug overdose.
2. When taken alone , they rarely cause death
3. They potentiate the effects of the CNS depressants including ethanol
4. Their inclusion in an overdose may be beneficial when the co-ingestant causes convulsions. (e.g . tricyclic anti - depressants)
5. **Clinical Features**
   a. Drowsiness
   b. Dysarthria
   c. Ataxia
   d. Confusion
   e. Coma, hypotension and respiratory depression are less common and recovery is usually rapid.
6. **Treatment**
   - Gastric lavage
   - Activated charcoal administration
   - Administration of cathartic
   - General supportive measures
   - Respiratory depression if present -may require intubation.
   - Flumazenil – benzodiazepine antagonist reverses toxicity.

- Administer 0.2 mg (2ml) IV over 30 seconds, followed by 0.3 mg at 1-minute intervals to a total dose of 3 mg . If a partial response has occurred, give additional 0.5 mg increments to a total of 5mg.
- If mixed overdose with cyclic- antidepressants is suspected or the patient has a known seizure disorder, flumazenil should not be used.

Note

- Blood level of the drug estimated.
- ABG to check for Resp depression (High PCO_2)

BARBITURATE OVER DOSE

1. Toxic manifestation of barbiturates vary with the amount of ingestion, type of drug and length of time since ingestion
2. Lower doses of short acting barbiturates (e.g. Amobarbiral, butabarbital, serobarbitaland pentobarbital) than long acting barbiturates (e.g. Pheno barbiturate, barbital and primidone) generally causestoxicity, but fatalities are more common with the latter.
3. **Clinical Manifestation**
   a. Depression of mental status, response only to painful stimuli.
   b. Decreased deep tendon reflexes.
   c. Loss of all reflexes (except the papillary light reflex) in severe intoxication.
   d. Plantar reflexes are extensor.
   e. Coma develops rapidity in severe cases
   f. Respiratory depression – slow respiration.
   g. Barb burn – characteristic bullae seen over pressure points and on the dorsum of the fingers
   h. Hypothermia
   i. Hypotension

j. In severe cases, no electrical activity on an EEG.

4. Management

a. Maintain airway and adequate ventilation

b. Gastric lavage and (multi dose activated charcoal -1 gm/kg per gastric tube - 4 Hrly markedly decreases the half life of phenobarbital). Pill concentration may require repeated lavage. Cathartic can also be administered.

c. Forced alkaline diuresis : - effective for long acting barbiturates

d. Hemoperfusion – effective for both

e. Treat hypo tension with IV fluid administration. If this fails, administer norepinephrine or dopamine.

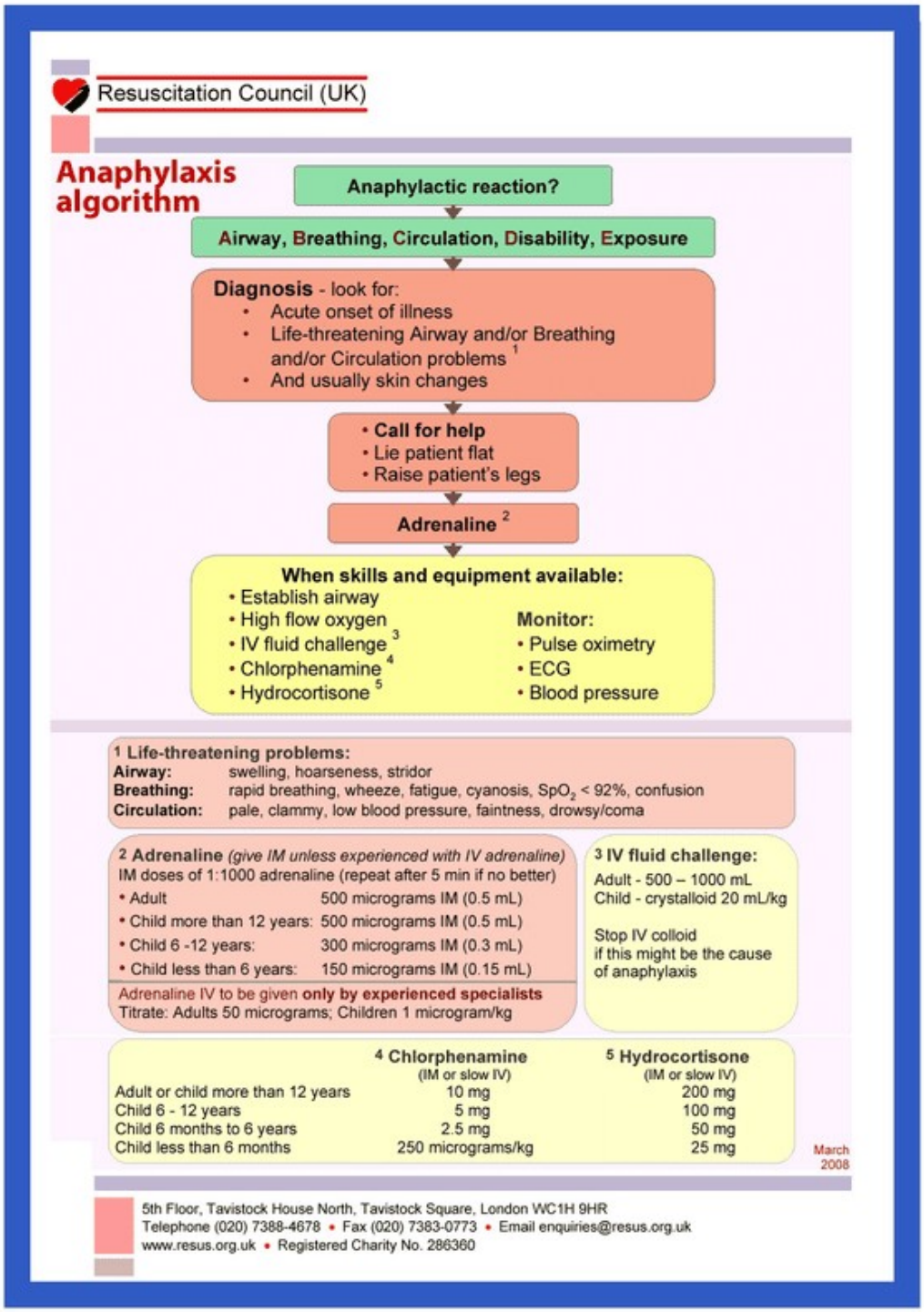
f. General supportive measures.

Note

a. Blood Levels of the drug must be estimated.

↓

SECTION 6.10 SUSPECTED ANAPHYLAXIS


Resuscitation Council (UK)
Anaphylaxis algorithm
Anaphylactic reaction?
Airway, Breathing, Circulation, Disability, Exposure
Diagnosis - look for:
• Acute onset of illness
• Life-threatening Airway and/or Breathing and/or Circulation problems 1
• And usually skin changes
• Call for help
• Lie patient flat
• Raise patient's legs
Adrenaline 2
When skills and equipment available:
• Establish airway
• High flow oxygen
• IV fluid challenge 3
• Chlorphenamine 4
• Hydrocortisone 5
Monitor:
• Pulse oximetry
• ECG
• Blood pressure
1 Life-threatening problems:
Airway: swelling, hoarseness, stridor
Breathing: rapid breathing, wheeze, fatigue, cyanosis, SpO2 < 92%, confusion
Circulation: pale, clammy, low blood pressure, faintness, drowsy/coma
2 Adrenaline (give IM unless experienced with IV adrenaline)
IM doses of 1:1000 adrenaline (repeat after 5 min if no better)
• Adult 500 micrograms IM (0.5 mL)
• Child more than 12 years: 500 micrograms IM (0.5 mL)
• Child 6 -12 years: 300 micrograms IM (0.3 mL)
• Child less than 6 years: 150 micrograms IM (0.15 mL)
Adrenaline IV to be given only by experienced specialists
Titrate: Adults 50 micrograms; Children 1 microgram/kg
3 IV fluid challenge:
Adult - 500 – 1000 mL
Child - crystalloid 20 mL/kg
Stop IV colloid if this might be the cause of anaphylaxis
4 Chlorphenamine (IM or slow IV)
5 Hydrocortisone (IM or slow IV)
Adult or child more than 12 years 10 mg 200 mg
Child 6 - 12 years 5 mg 100 mg
Child 6 months to 6 years 2.5 mg 50 mg
Child less than 6 months 250 micrograms/kg 25 mg
March 2008
5th Floor, Tavistock House North, Tavistock Square, London WC1H 9HR
Telephone (020) 7388-4678 • Fax (020) 7383-0773 • Email enquiries@resus.org.uk
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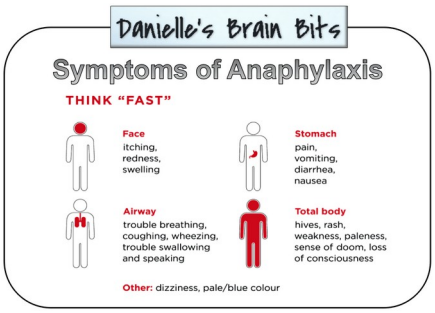


1. Adrenaline

a. Dose (intramuscular)

Adults and over 12 years	0.5mg	0.5ml of 1:1000
6 – 12 years	0.25mg	0.25ml of 1:1000
6 months – 6 years	0.12mg	0.12ml of 1:1000
Under 6 months	0.05mg	0.05ml of 1:1000

b. Dose intravenous - dilute solution

(ONLY if severe hypotension or life threatening shock. Give IM initially if you cannot obtain an IV access rapidly) Ensure ECG/heart rate monitoring

Adults and over 12 years	0.5mg	5ml of **1:10 000**

Give slowly – 1 ml (0.1mg) per minute until response is obtained

Under 12 years	0.01mg/kg	0.1ml/kg of **1:10 000**

2. **Fluids:** In adults use 1-2L crystalloid while in children 20ml/kg should be used

3. Antihistamines

Chlorpheniramine is usually used.

Dose:

Adult and over 12 years	10-20mg slow IV (or IM.)
6-12 years	5-10 mg slow IV (or IM)
1-6 years	2.5–5mg slow IV (or IM)

4. Steroids

Hydrocortisone is usually used.

Dose:

Adult and over 12 years	100 – 500mg slow IV (or IM) 6
–12 years	100mg slow IV (or IM)

5. Nebulizers

Consider using an inhaled beta $_2$ agonist such as 5mg salbutamol Bibliography:

British Association for Emergency Medicine

SECTION 6.11 SEIZURE PROTOCOL – ADULT

Status epilepticus

IV Lorazepam 2 milligrams, upto 0.1 miligram / kg or if Lorazepam is unavailable, IV Diazepam 5-10 milligram, upto 0.15 milligram / kg	+	IV Phenytoin 20-30 milligrams/kg at 50 milligrams/min or IV Fosphenytoin 20-30 milligrams/kg/PE at 150 milligram/min

Refractory status epilepticus

IV Phenobardital 20 milligrams/kg at 50-75 milligrams/min or Valproic acid 20-40 milligrams/kg at 5 milligrams/kg/min	or	IV propofol loading dose 2-5 milligrams/kg, then infusion of 2-10 milligrams/kg/hr or IV midazolam loading bolus 0.2 milligram/kg, then infusion of 0.05-2 milligrams/kg/hr	or	IV Ketamine bolus 1.5 milligrams/kg, then 0.01-0.05 milligram/kg/hr and/or Other drugs

Electroencephalographic monitoring?

Airway, blood pressure, temperature, IV access, electrocardiography, CBC, glucose, electrolytes, AED levels, ABG, tox screen

Management of seizures: recommendations

- Airway management is critical
- Place patient in left lateral decubitus position
- Remove Dentures
- Place Bite block or oropharyngeal airway to prevent tongue bite & allow access for suctioning
- Intubate if patient is persistently apneic or if there is an unavoidable airway threat.
- Premeds:
    - Benzodiapines
    - Neuromuscular blockade if there is Trismus

- **Pharmacological treatment:**

  - 1st line:
    - Benzodiazepines
  - 2nd line:
    - Phenytoin
    - Fosphenytoin
    - Phenobarbital
  - If still refractory:

•Valproate

•Propofol

•Barbiturate coma

•Isoflurane anesthesia

6 a. **1st line:**

- **Lorazepam**
  - Dose: – 0.1 mg/kg IV at 1 – 2 mg/min upto a maximum dose of 10 mg
  - Relatively longer duration of Seizure suppression
  - Recommended for Alcohol withdrawal seizures
- **Midazolam**

  •Dose: - 0.1 mg/kg IV or 0.2 mg/kg IM

  •Effective in Rectal and IM routes as well
- **Features of Benzodiazepines:**

  •Relatively short duration of anticonvulsant action
  - Sedation, potential for Hypotension and Respiratory depression

- b**. 2nd line**
  - **Phenytoin**
    - Dose: - 20 mg/kg IV at ≤ 50 mg/min
    - Continuous Cardiac & Blood pressure monitoring required during

infusions

- Suppresses Neuronal recruitment but does not suppress electrical activity at ictogenic focus
- Neither sedates nor causes respiratory depression

- Rapid IV administration may cause hypotension & cardiac bradydysrythmias due to its Propyene glycol diluents
- Onset – 10 – 30 mins
- Duration of Action – 24 hrs

2. **Fosphenytoin**
   - Dose: - 15 – 20 PE/kg at 100 – 150 mg PE/min; may be given IM
   - 1 PE = 1.5 mg of Fosphenytoin
   - Safety in pediatrics not well established
   - Water soluble, can be administered quickly without significant toxicity
   - Achieves free phenytoin level of 2 mcg/ml in 15 mins as compared to 25 mins with Phenytoin
   - Better tolerated, safer and more stable
   - Potential for a delayed hypertensive response
   - Consider fosphenytoin use when convulsions are refractory to Benzodiazepines
3. **Phenobarbital**
   - Dose: - 20 mg/kg IV at 60 – 100 mg/min
   - May be given as IM loading dose
   - Useful in pediatrics
   - CNS depressant – decreases both Ictal & Physiologic Cortical electrical activity
   - Cause sedation, respiratory depression and hypotension

While trying to control seizures with above drugs, try to treat underlying cause for seizures**:** e.g. Dextrose – hypoglycemia

- Pyridoxine – INH overdose
- Magnesium - Ecclampsia

6 c. If seizures refractory to the above drugs, try the following drugs/modalities of treatment:

- **Valproate**
  - Dose: - 20 mg/kg per rectally
  - Dilute 1:1 with water

- Slow onset of action
- Useful in
- Poly-drug resistant seizures
- Before prolonged transport while trying to avoid Barbiturate coma or General anesthesia

- **Propofol**
  - Dose: - 1 – 3 mg/kg IV bolus followed by infusion at 1 – 15 mg/kg/hr
  - Critical care monitoring required
  - It is a non-barbiturate anesthetic agent with Hypnotic & anticonvulsant activity
  - Binds to and modifies the Chloride channel in a manner different from Benzodiazepines
  - Synergistic with Benzodiazepines and Barbiturates
  - Effective in Refractory Status epilepticus
- **Barbiturate coma**
  - Dose: - 5 mg/kg IV at 25 mg/min, then titrate to EEG
  - Intubation, Ventilation and Pressor support may be required
  - Facilitates GABA – suppresses seizures but also suppresses all Brain stem activity
  - Prior Neurological consult required as it may induce Respiratory arrest, Myocardial depression and Hypotension while decreasing Intracranial pressure and increasing Cerebral perfusion
  - Pentobarbital most preferred
- **Isoflurane anesthesia**
  - Final alternative for refractory Ictus
  - Suppresses electrical seizure foci and is easily titrable
  - Halothane not preferred due to higher rate of hemodynamic and

hepatotoxic complications

- Patients require intubation and mechanical ventilation

- EEG monitoring also required as after Neuromuscular blockade, seizure activity may continue without any visible signs of seizures

Metabolic abnormalities causing seizures

- Hypoglycemia - <45 mg%
- Hyponatremia - <120 mEq/L
- Hypernatremia - >160 mEq/L
- Hypocalcemia - <7.5 mEq/L
- Hypomagnesemia - <1 mEq/L
- Hyperosmolar hyperglycemic syndrome
- Dialysis disequilibrium syndrome
- Hypothyroidism
- Hypoparathyroidism – due to secondary hypocalcemia
- Hepatic encephalopathy – use phenytoin to treat
- High anion-gap acidosis
- Cerebral hypoxia – suffocation, respiratory failure, circulatory collapse, carbon monoxide poisoning
- Hypertensive encephalopathy
- Acute intermittent porphyria

Drugs and Toxins causing seizures:

- Illicit drugs – Cocaine, amphetamines, Phencyclidine
- Overdoses – Anticholinergic agents (Cyclic antidepressants, Antihistamines)
- Withdrawal seizures – Ethyl alcohol, Sedative-hypnotics
- Toxic levels/Deliberate overdoses – Aspirin, Theophylline, Isoniazid, Lithium, Phenytoin, Carbamezapine
- Therapeutic doses – Antimicrobials, Cardiovascular agents, Neuroleptics and Sympathomimetics
- Plant toxins, Insecticides and Rodenticides

SECTION 6.12 BURNS

1. Burns can be classified as thermal burns, chemical burns, or electrical burns.

a. Thermal Burns

- Burns are quantified according to their surface area. The 'RULE OF NINE' is most commonly used.
- Burns depth is described as first / second/ third degree burns depending upon the involvement of the layer of skin / subcutaneous tissue.

b. Clinical Features

- Burns is painful, red with or without blister formation.
- In third degree burns is – skin is charredleathery and painless
- Injury due to smoke causes cough, wheeze and respiratory distress/ stride.
- Injury to upper airway causes hoarseness / stride
- CO poisoning may manifest as headache, vomiting , confusion, lethargy and coma
- Signs of shock.

c. Diagnosis

- History and physical examination
- In CO poisoning ,carboxy hemoglobin levels be obtained.
- Bronchoscopy -helps in diagnosing the extent of damage.

d. Treatment

- Patient to be admitted in a burns unit.
- Attention to airway, breathing and circulation, 100 % oxygen, intubation if necessary. IV-fluids – ringer lactate solution is ideal.
- Foleys catheterization of bladder- attach urometer
- NBM if more than 30 % burns
- Monitor vitals and urine output -(maintain 1 ml /kg / hour)
- Analgesics, tetanus prophylaxis

Do not apply OINTMENT – as you cannot assess the burnt area.

- Burnt area to be covered with clean , dry dressings.

e. Electrical Burns

- Are caused due to electrical injury. May be superficial or deep burn. Occular damage may occur in the tissues and organ in the path of the current.
- Skin burn wound charged central lesion, outer layer of erythema, small entry wound, large exit wound.
- Other injuries may be associated with skin burns due to throwing of the body away or falling from height.

TABLE 9-1 BURN RESUSCITATION FLUID RATES AND TARGET URINE OUTPUT BY BURN TYPE AND AGE

CATEGORY OF BURN	AGE AND WEIGHT	ADJUSTED FLUID RATES	URINE OUTPUT
Flame or Scald	ATLS 2018 UPDATE AHA children (≥14 years old)		0.5 ml/kg/hr 30–50 ml/hr
	Children (<14 years old)	3 ml LR x kg x % TBSA	1 ml/kg/hr
	Infants and young children (≤30kg)	3 ml LR x kg x % TBSA Plus a sugar-containing solution at maintenance rate	1 ml/kg/hr
Electrical Injury	All ages	4 ml LR x kg x % TBSA until urine clears	1-1.5 ml/kg/hr until urine clears

LR, lactated Ringer's solution; TBSA, total body surface area

- Cardio pulmonary arrest may be the primary cause of immediate death.
- Neurological symptoms / signs present – (temporary loss of consciousness, confusion,

seizures, headache, stroke, spinal cord injury).

f. Investigation

- CBP,S. Electrolytes,S. Calcium,BUN, Creatinine, Urine analysis,
- ABG,ECG
- Blood grouping typing,Coagulation Studies
- CK, CK- MB
- Urine analysis,
- Cervical films – for patients with head injury,ECHO

g. Treatment

- ABC'S
- Cervicalspine immobilization.
- Oxygen therapy and intubation of necessary .
- Cardiac monitoring, treat for VF , asystole, VT if present
- IV fluids, analgesics, tetanus prophylaxis.
- IV antibiotics.
- Wound exploration and debridement if necessary.
- Management of other injuries.
- Maintain urine output of 1 ml/ kg / hour

h. Chemical Burns

- Clinical features depend upon the agent, concentration and duration of exposure.
- Burns may be superficial / deep.
- Acids cause severe pain and blue -gray appearance of skin with erythema.
- Alkalis cause liquefaction necrosis, deeper tissue destruction and soft, gelatinous brownish eschars.
- Irritation of mucous membrane of ocular and upper airway, (dysphonia, strider), bronchoscopasm may be present.
- Shock & perforation of gut are potential complication.

i. Treatment

- Gastric Lavage is contraindicated.
- Hydrotherapy – cleaning with water , copious irrigation
- IV fluids, analgesic, tetanus prophylaxis.
- Vitals monitoring
- Evaluation of electrolytes,
- Blood urea and serum creatinine for assessing renal function and calcium levels advice at the earliest.

SECTION 6.13 ACUTE RESPIRATORY FAILURE

1. The priority is to resuscitate the patient promptly and adequately.

   Respiratory failure may manifest as a low pao2 and / or low pao_2 with high pao_2

   Patient may have bradypnoea / RR >30 / min cyanosis/ altered mental status.

2. **Diagnostic approach**

   a. Quick History and physical examination

   b. Initial Investigations: - ABG

   - CXR
   - 12-LEAD ECG
   - Blood Sugar
   - Blood urea
   - S. Creatinine

   c. Special Investigations:

   - Sputum
   - Blood Cultures
   - V-Q scan – Angiogram
   - Bronchoscopy
   - Cardiac Echo
   - Serology
   - CT. scans. Therapeutic

goals in respiratory failure.

   d. Physiologic Support

Adequate tissue oxygenation

Adequate ventilation

Reversal of respiratory muscle fatigue.

e. Reversal of primary pathology.

3. IMMEDIATE THERAPEAUTIC OPTION

1. OXYGEN THERAPY

a. Low Flow System (Flow < Patient demand)

- FiO2 varies with flow rate and patient demand.

Delivery System	Flow(b/m)	% FiO2
Nasal Canula	1-6	24 – 44
Simple Mask	5-8	40 – 60
Partial rebreather mask	>8	60 – 80
Non – rebreather mask	>10	80 - 100

b. **HIGH FLOW SYSTEM:** (Flow > patient demand)

- VENTI MASK --> 19 – 100 l/min., FiO2 24 – 70% (precise FiO2, Dry)
- AEROSOL MASK (Adds particulate water) Imprecise FiO2.

c. MASK CPAP

- Augments oxygenation via & increased mean airway pressure.
- Usually tolerated only for short periods.
- Risk of gastric distension / nausea / vomiting.
- Requires normal mental status.

2. ANTIBIOTICS

Appropriate antibiotics to be started

3. HAEMODYNAMIC MANAGEMENT

4. INTUBATION AND MECHANICAL VENTILATION

If increase of PCO2 and decrease of PaO2.

5. IF UPPER AIRWAY OBSTRUCTION PRESENT

- Call ENT Specialist / Anesthetist immediately.

Consider urgently (as appropriate)

Endotracheal Intubation

Tracheostomy

Cricothyroidotomy

Mini Tracheostomy

6. BRONCHODILATORS

- Nebulisation with Beta – Adrenergic Agonists.

SECTION 6.14 ACUTE DYSPNOEA

1. The priority is to relieve dysnoea and resuscitate promptly.
2. Dysnoea may be due to dual pathologies causing a mixed respiratory and metabolic acidosis e.g. dehydration, chest infection. (ABG will reveal this).
3. Consider AMI, tension pneumothorax, pulmonary, edema, cardiac arrhythmia, asthma /COPD, anemia, metabolic acidosis.
4. Psychiatric causes of hyperventilation are only made after excluding organic causes.
5. **Management**

ACUTE DYSPNOEA → If CARDIO respiratory compromise. ↓

↓ resuscitation

Quick history & physical examination.

↓

- Tachypnoea, RR >30mt
- Hypoapnoea
- Uses accessory muscles
- Altered mental status

↓

Pulse oximetry

Venous access

ECG monitoring

↓

ABG
CXR
2D Echo
12 Lead ECG
CBP
RBS

Maximum FiO2 If

Respiratory /

CARDIAC cause

↓

If respiratory failure? ⟶

↓

Intubate & ventilate

Treat underlying cause (metabolic, acidosis, anemias, anaphylaxis drug overdose) If no organic cause found

↓

Consider anxiety / Psychiatric causes (does blood gases show respiratory alkalosis)

Appropriate therapy (e.g. Paper bag re-breathing, low dose sedative)

SECTION 6.15 SNAKE BITE

1. The poisonous varieties of snakes grandly are Elapid (Cobra, Kraits, Mambas Coral Snakes), Viperidae (true Vipers), Hydrophyde (sea, snakes), Crotalidae (pit vipers) and Colubridae (Boomslegs, Bird snake)
2. Venoms are complex mixtures of several toxic proteins and enzymes
3. Snake venom of certain species (like cobra, kraits, coral snake) is neurotoxic and some other species (like pit vipers) is Haemotoxic.
4. **Manifestation**
    a. **Pit Vipers**- Following bite, severe pain develops at the site of wound, local swelling, ecchymosed and bulla appear. Later gangrene of the skin and subcutaneous tissues develop. Fever, nausea, vomiting, circulatory collapse, change in mental status can occur and death may occur after 6 to 48hrs.
    b. **Coral Snake**- Bite causes little pain ad local swelling. Within 10-15 minus, weakness begins, followed by ataxia, ptosis, pupillary dilatation, palatal and pharyngeal paralysis slurring of speech, salivation and nausea/vomiting. Patient develops respiratory

paralysis, seizures, becomes comtosed and dies within 8 to 72 hrs.

c. **COBRAS** - Bites are painful, severe hemolytic, local necrosis, sloughing and neurotoxin manifestations appear, (venom is myotoxic and neurotoxic,) generalized muscle pain, weakness and myoglobinuria can manifest.

d. Investigations

- Coagulation profile (PT, APTT, Platelet count)
- Serial RBC counts to evaluate for hemolysis.
- Urine myoglobin, urine analysis
- CBP,BUN, Blood glucose, Sr.Electrolytes
- Blood grouping and cross matching
- ECG, CXR, ABG.

e. Treatment

- **First Aid:-**

- Reassuring and calming the victim.

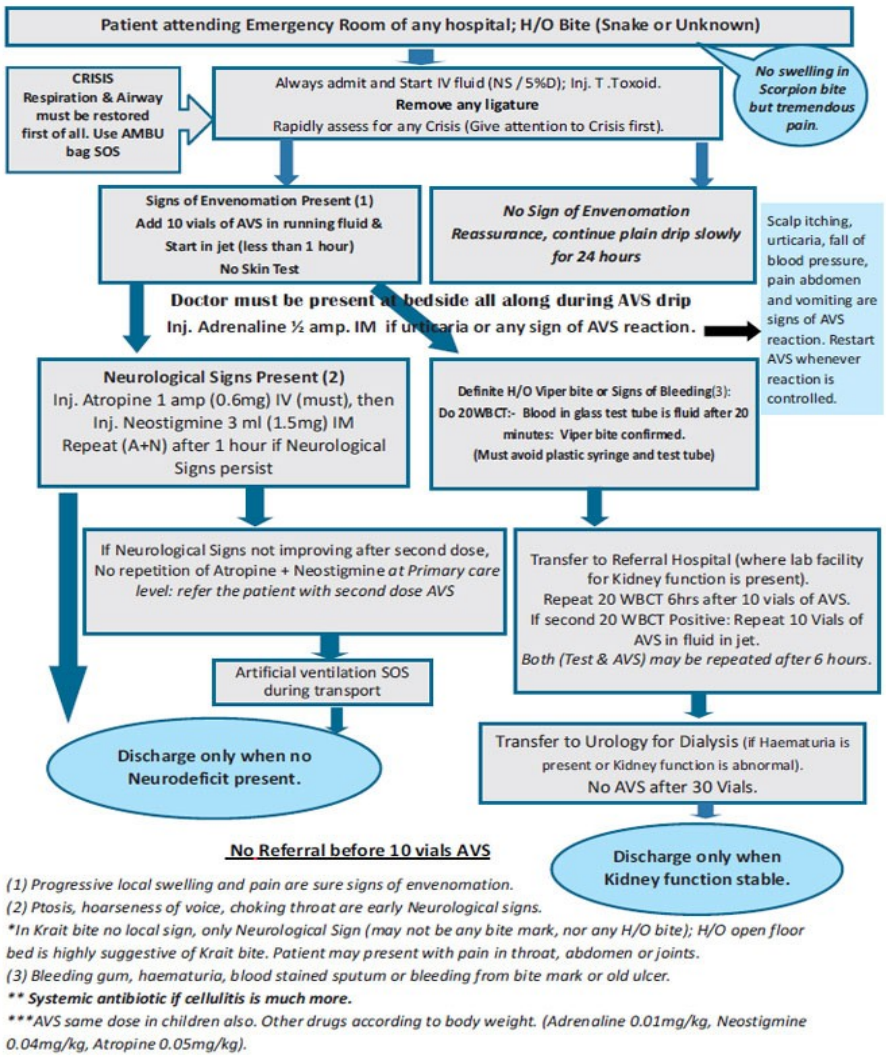
- Patient should be placed at rest and bitten extremity immobilized/

Wide constriction band should be placed a few centimeters above the bite, loose enough to admit one finger.

- If Cardio-Pulmonary Compromise - Basic resuscitation.
- If respiratory failure – correct with artificial ventilation.
- Anti-snake venom is the only specific treatment of snake venom poisoning.

Poly valent anti-snake venom available. Initial dose – 5 vials(50ml). Moderate envenomention-5-10 vials (50-100ml) severe envenomation 10- 20 vials (100-200 ml).

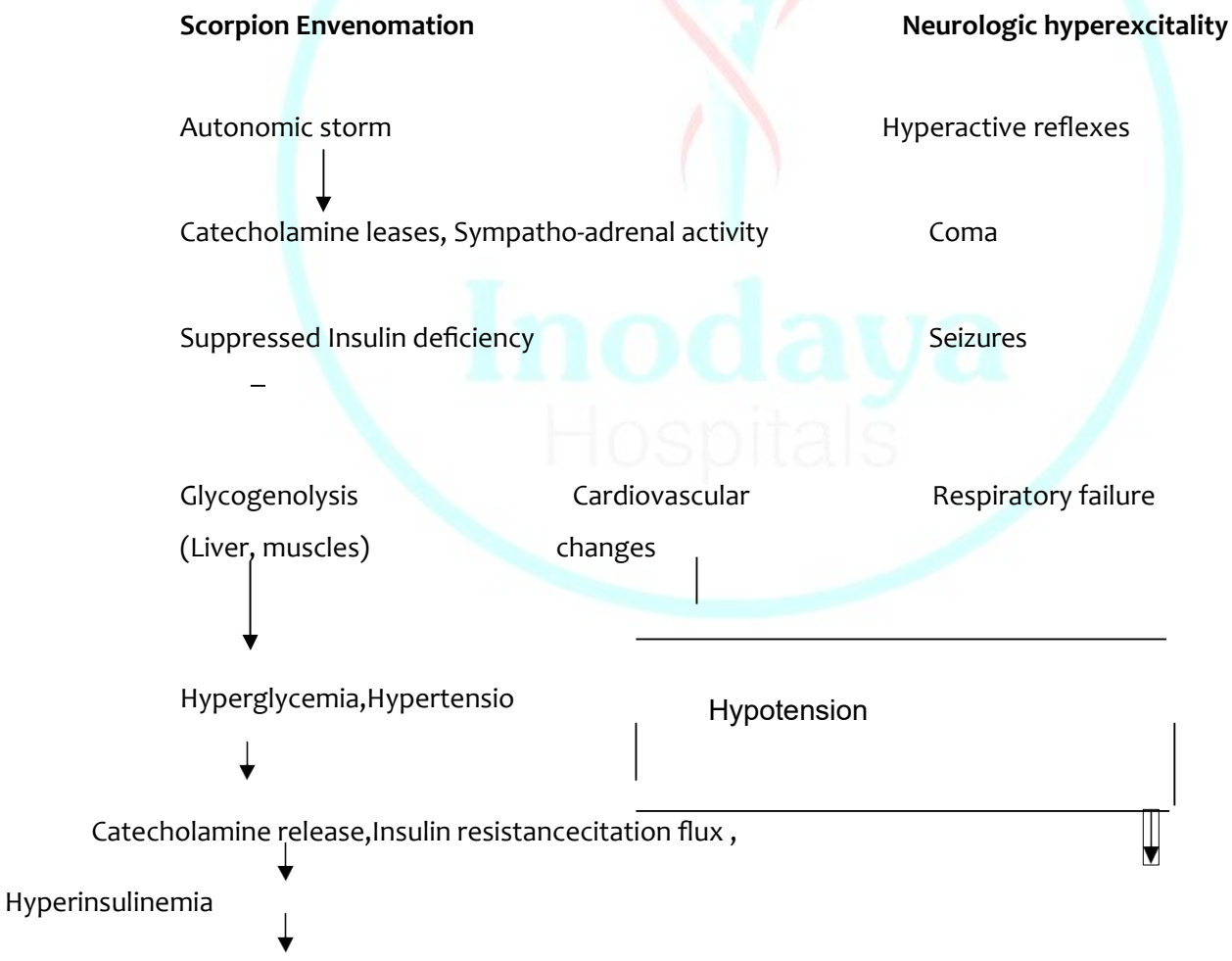
- Tetanus toxoid prophylaxis, antibiotics.



(1) Progressive local swelling and pain are sure signs of envenomation.
(2) Ptosis, hoarseness of voice, choking throat are early Neurological signs.
**In Krait bite no local sign, only Neurological Sign (may not be any bite mark, nor any H/O bite); H/O open floor bed is highly suggestive of Krait bite. Patient may present with pain in throat, abdomen or joints.*
(3) Bleeding gum, haematuria, blood stained sputum or bleeding from bite mark or old ulcer.
***** Systemic antibiotic if cellulitis is much more.***
****AVS same dose in children also. Other drugs according to body weight. (Adrenaline 0.01mg/kg, Neostigmine 0.04mg/kg, Atropine 0.05mg/kg).*

SECTION 6.16 SCORPION STING

1. Scorpions are eight – legged arthropods.
2. They have glands in terminal segment which produce venom, that is injected into the victim by a stinger on the tip of the tail.
3. Scorpion venom contains toxin which can be dangerous to life.



Death Cardiovascular Failure

a. Main Clinical Features

- Immediately burning sensation followed by local paresthesia at the site of the sting.
- Malaise, restlessness, neuralgic hypexcitality, Coma, Convulsions
- Lacrimation rhinorhoea, Salivation, perspiration nausea and vomiting
- Tachycardia , Cardiac arrthythimia,
- Hypo tension or Hypertension
- Features of pulmonary edema and shock.

b. Investigation

- Blood glucose,Complete Blood Pictures,Serum electrolytes,BUN /Sr. Creatinine
- Serum Amylase,ECG,Chest Radiograph,ABG,2D Echo

C.TREATMENT

- Local treatment --- 2% xylocine injection at the local site to reduce pain
- Treat shock / hypo tension / Pulmonary edema with appropriate measures.
- Insulin - infusion for hyperglycemia
- Administer Potassium Chloride to prevent hypokalemia Dose: 20 mEq/hr
- Diazepam or phenobarbital for reducing restlessness.
- Adrenergic blocks and dopamine / dobutmine drip for managing symptoms due to catecholamine

release.

- Specific anti-venom should be considered if the victim develop signs of central nervous system or cardiac involvement, (If available).
- Treat the complications – Myocarditis (which can cause RV & LV dysfunction) and pancreatitis.Death occurs within 12 hrs, sometimes as late as 2 days after the sting if not treated promptly

SECTION 6.17 ACUTE ABDOMINAL PAIN

1. Acute abdominal pain usually presents as an emergency and may be associated with other features like fever, vomiting or shock.

Causes

Consider obstruction, perforation or rupture of hollow viscous, dissection or rupture of major blood vessels (esp. Aortic aneurysm), ulceration, abdominal sepsis, ketoacidosis and adrenal crisis.

Approach of Patient with Pain abdomen

Pain abdomen **Extra-abdominal causes.**

↓

Intra-abdominal organs

Visceral Deep Somatic

Pain referred to the abdominal wall

Pain results from irritation of parietal peritoneum – consider Inflammation / infection /neoplasia

↓

Upper abdominal pain Peri umbilical epigastric pain Lower abdominal pain region

↓ ↓ ↓ ↓

Stomach, duodenum, liver, pancreas Small intestine Right colon Distal Colon urogenital

2. **Important factors in the assessment of Abdominal Pain**

   a. Duration

   b. Site and Radiation

   c. Severity

   d. Precipitating and relieving factors (food, drug, alcohol, posture, movement, defection)

   e. Nature (colicky, constant, sharp or dull, waking at night)

   f. Pattern (intermittent / continuous)

   g. Associated features (vomiting, dyspepsia, altered bowel habits)

3. **Clinical Features**

Depending upon the cause, major emergency entities are perforation of viscous, rupture of abdominal aortic aneurysm, acute appendicitis, strangulated hernia, small intestinal obstruction and intestinal ischemia.

a. Major signs on physical examination

- Febrile
- Pale and sweaty
- Considerable, distress, nausea, vomiting.
- Abdominal tenderness, distension, including guarding, rebound tenderness and rigidity
- Bowel sounds may be present or absent. They are high pitched and frequent in intestinal obstruction or gaseous distention and are absent in paralyticileus/ generalized peritonitis.
- Visible peristalsis may be present in intestinal obstruction.
- Ascites / abdominal mass
- Signs of shock may be present.
- Features of coagulopathy.

b. Physical examination of patient – Must Include

- Vitals signs
- Cardio – pulmonary evaluation
- Genito – urinary examination
- Examination of hernias
- Complete abdominal and rectal examination.

c. Initial Investigation

Depend on the clinical features.

- Haematocrit
- WBC
- ABG
- Serum electrolytes
- Blood urea, serum creatinine
- Blood glucose
- Serum Amylase / serum lipase

d. Radiological Studies

- X-Ray Abdominal → X-ray chest with boll down of diaphragm

→ Upright

→ Left lateral decubitus view

(If upright unobtainable)

- Ultrasound abdomen and pelvis
- CT Scan if required (to detect evidence of bowel perforation, inflammation, solid organ infarction, retro peritoneal bleeding, abscess or tumour)

e. Treatment

INFORM SURGEON IMMEDIATELY

- Nil by mouth
- IV fluids
- Correction of life threatening acid – base disturbances
- Correction of shock

- Analgesics to relieve pain. Narcotic analgesics may be with held till establishment of diagnosis made.
- Nasogastric tube aspiration unless contra indicated
- Assessment of need for emergency surgery by the surgeons.
- Careful follow up with frequent Re-examination
- Repeat investigation if required. Depending upon the changes in the clinical features:

SECTION 6.18 ACUTE PANCREATITIS

1. Acute pancreatitis is a consequence of premature activation of zymogen granules, releasing proteases which digest the pancreas and surrounding tissue.
2. Severity ranges from mild edema to severe necrosis and hemorrhage.
3. Commonest causes are alcohol, gall stones or idiopathic. Less common causes include abdominal trauma, hypocalcaemia hypertriglyceridemia and a variety of drugs.
4. **Causes of Acute Pancreatitis**

Gallstones (including microlithiasis)
Alcohol (acute and chronic alcohol consumption)
Hypertriglyceridemia
Endoscopic retrograde cholangiopancreatography
Drugs
Autoimmune disease (e.g., systemic lupus erythematosus, sjogren syndrome)
Genetic factors (PRSSI, SPINKI, CFTR)
Abdominal trauma
Postoperative complications (abdominal or cardiac surgery)
Bacterial infections (Legionella, Leptospira, Mycoplasma, Salmonella)
Viral infections (mumps virus, coxsackievirus, cytomegalovirus, echovirus, hepatitis B virus)
Parasitic infections (Ascaris, Cryptosporidium, Toxoplasma)
Hypercalcemia
Hyperparathyroidism
Ischemia
Posterior penetrating ulcer
Scorpion venom
Organophosphate insecticide
Pancreatic or ampullary tumor
Pancreas divisum with ductular narrowing on pancreatogram

Oddi sphincter dysfunction
Idiopathic

5. Prediction of severe acute Pancreatitis

RANSONS CRITERIA

At Admission	Within Next 48 hrs
Age >55 y (>70 y)	Decrease in hematocrit by >10% (same)
White blood cell count >16000/mm^3 (>18000/mm^3)	Estimated fluid sequestration >6L (>4L) Serum calcium level <8.0 milligrams/ dL (same)
Blood glucose level >200 milligrams/dL (>220 milligrams/dL)	Partial pressure of arterial oxygen <60 mm Hg (omitted)
Serum lactate dehydrogenase level >350 IU/L (>400 IU/L)	Increase in blood urea nitrogen level >5 milligrams/dL after IV fluid hydration (>2 milligrams/dL)
Serum aspertate aminotransferase level > 250 IU/L (same)	Base deficit of >4 mmol/L (>6mmol)

Patients with score >3 are prone to develop severe Pancreatitis

6. Clinical Features

- Severe, constant upper abdominal pain which radiates to back in 65% of cases.
- Marked epigastric tenderness
- Nausea and vomiting
- Bowel sounds are diminished / absent
- Hypoxemia / hypotension / shock / oliguria
- Discoluration of flanks (grey turner sign)
- Discolorations around the peri-umbilical region (Cullen's sign)
- Abdominal distension / Ascites.

7. Diagnosis

Certain investigations have important prognostic value

Eg: RBS, LDH, TLC, SGOT

- Elevation of serum amylase /serum lipase
- Ultrasound evidence of pancreatic swelling confirms diagnosis.
- CT scanning is used to define the viability of pancreas.

CT severity Index for Acute Pancreatitis

Grade of Acute Pancreatitis	**Score**
Normal pancreas	0
Pancreatic enlargement	1
Inflammation involving pancreas and peripancreatic fat	2
Single fluid collection or phlegmon	3
Two or more fluid collections or phlegmons	4
Degree of Pancreatic Necrosis	**Score**
No necrosis	0
Necrosis of one third of pancreas	2
Necrosis of one half of pancreas	4
Necrosis of more than one half of pancreas	6
Interpretation (minimum score=0 and maximum score =10)	

Severity Index	**Mortality (%)**	**Complications (%)**
0-1	0	0
2-3	3	8
4-6	6	35
7-10	17	92

8. Treatment

Treatment of acute pancreatitis is aimed at correcting any underlying predisposing factors and at the pancreatic inflammation itself. Examples of the former include early ERCP in patients

with gallstone pancreatitis who have obstructive jaundice or biliary sepsis reversal of hypercalcemia, cessation of possible causative drugs, and the administration of insulin to the poorly controlled diabetic with marked hypertriglyceridemia.

9. General Principles of treatment

- Supportive treatment
  - IV fluids
  - Pain Management
  - Nutrition
- Preventing infection in severe acute pancreatitis
  - Systemic antibiotics – In general, antibiotic therapy is not indicated for mild pancreatitis and should be given for infected pancreatic necrosis.
- Selective decontamination of the gut
  - Treatment of underlying cause
- Early Surgery – Early surgery within first 14 days should be avoided and is associated with increases mortality. Surgery is indicated in pancreatic necrosis and complications such as perforation, Bowel infraction, Abdominal compartment syndrome etc

SECTION 6.19 INTESTINAL OBSTRUCTION

1. May be due to mechanical causes or loss of peristalsis

a. **Causes**

- Paralytic ilens --- electrolyte deficiency

--- Infection

--- Retro peritoneal injuries

- Adhesion
- Incarcerated inguinal hernia
- Intraluminal causes (polyp, lymphoma, etc)
- Inflammatory bowel disease
- Congenital causes (atresia, stenosis)
- Foreign bodies
- Feacal impaction
- Intussusception

2. **Clinical Features**

- Crampy, intermittent abdominal pain
- Vomiting

- Inability to pass flatus
- Abdominal distension, localized, or generalized tenderness, visible peristalsis
- Signs of peritonitis
- Signs of sepsis / dehydration / shock
- Rectal examination may show faecal impaction / carcinoma.

3. **Investigations**

- X-Ray erect abdomen shows multiple fluid levels
- Left lateral decubites (C X R) in severe cases or in patients unable to stand.
- Laboratory tests – BUN , creatinine, CBP, Electrolytes, urinalysis,
- Liver , function tests , blood grouping & typing
- Sigmoidoscopy and barium enema if necessary
- Ultrasound abdomen / CT scan abdomen.

4. **Treatment**

- Nil by mouth, ryle's tube aspiration
- IV fluids
- Analgesics
- IV antibiotics
- Surgical interventions

SECTION 6.20 OPC POISONING PROTOCOL

Triage –

Assess ABC, Oxygen, IV access,

Cardiac Monitor

Labs : ABG / ECG / CBG
RBCs Choline esterase assay
Focused History

- Look for characteristic **signs / symptoms**

  of suspected poisoning

  Salivation

  - Lacrimation
  - Urinary Incontinence
  - Defecation
  - G I pain / disturbance
  - Emesis
  - Bradycardia
  - Bronchorrhea
  - Bronchospasm
  - Muscle weakness

Treatment : Body Decontamination, prevention of absorption, gastric lavage preferably within 1 hour upto 4 to 6 hours.

Activated charcoal :1gram/kilogram body weight through naso gastric tube.

Atropine : 1-2 mg bolus every 5 minutes in adult.

•to 0.04 mg / kg every 5 min in children

till mucus membrane hypersecretion decreases.

(airway clears)

May require upto 200 mg within 1st hour

Infusion 5 to 100 mg per hour titrated to secretion control.

PAM: 1-2 gram IV over 30-60min – 1st dose

500mg/hour IV infusion ; or repeat bolus dose every 4-8 hours.

PED 25-50mg/kg bolus followed by infusion of 10-25mg/kg/hr

Laboratory studies—Confirmation of OPC poisoning is based on depression of RBC acetylcholinesterase activity: Depressions greater than 25% are diagnostic of exposure, depression greater than 50% associated with symptoms and greater than 80-90% indicates severe poisoning.

During decontamination, treatment personnel should wear gloves and aprons to avoid self-contamination.

SECTION 6.21 RENAL COLIC

1. **Purpose:** To efficiently treat patients with suspected Renal Colic in the Emergency Department (ED), according to current literature guidelines.

a. Simple renal colic:

- Non traumatic flank pain
- Suspicion of ureteric colic.

b. Complicated renal colic:

- Pregnancy
- recent trauma
- abnormal vital signs or fever
- recent presentations for renal colic
- Large stone (>5mm)
- known history of single kidney
- uncontrollable pain
- age >55 years old
- Infection with stone
- Hydronephrosis
- Single kidney
- Severe pain
- Instrumentation (eg foley, suprapubic cath, stent)
- **Disposition**
- ED Consultant requests consultation
- known renal impairment
- Simple renal colic, pain free after medication = Urology OPD
- Past history of stone, pain controlled = Investigations and Urology OPD follow up
- Urology consulted in ED = disposition per Urology
- SSU admission in case of: persistent pain without obstruction (for pain control) mild to moderate infection (for IV antibiotics

SECTION 7.1 - GENERAL PATIENT CARE

This protocol provides general guidelines for patient management. Refer to additional protocols as appropriate for treatment of specific conditions. A length-based resuscitation tape is recommended to help EMS personnel quickly determine appropriate equipment size, normal vital signs, and correct drug dosages.

- Ensure scene safety.
- Perform a scene survey to assess environmental conditions and mechanism of illness or injury. If hazardous conditions are present (such as swift water, hazardous materials, electrical hazard, or confined space), contact an appropriate agency before approaching the patient. Wait for the designated specialist to secure the scene and patient as necessary.
- Form a first impression of the patient's condition.
- Observe standard precautions.
- Establish patient responsiveness. If cervical spine trauma is suspected, manually stabilize the spine.
- Assess the patient's airway for patency, protective reflexes and the possible need for advanced airway management. Look for signs of airway obstruction.
- Open the airway using head tilt/chin lift if no spinal trauma is suspected, or modified jaw thrust if spinal trauma is suspected.
- Suction as necessary.
- Consider placing an oropharyngeal or nasopharyngeal airway adjunct if the airway cannot be maintained with positioning and the patient is unconscious.
- Assess the patient's breathing, including rate, auscultation, inspection, effort, and adequacy of ventilation as indicated by chest rise. Obtain pulse oximeter reading.
- If chest rise indicates inadequate ventilation, reposition airway and reassess.
- If inadequate chest rise is noted after repositioning airway, suspect a foreign body obstruction of the airway. Refer to the appropriate protocol for treatment options.
- Assess for signs of respiratory distress, failure, or arrest. If present, refer to the

appropriate protocol for treatment options.

- If the child is not breathing or breathing is inadequate, initiate assisted ventilation using a bag-valve-mask device with high-flow, 100% concentration oxygen. Begin with two slow, deep breaths of about 1-1/2 seconds' duration, then ventilate at 20 breaths/minute for all ages. If abdominal distention arises, consider placing a nasogastric tube to decompress the stomach.
- If the airway cannot be maintained by other means, including attempts at assisted ventilation, or if prolonged assisted ventilation is anticipated, perform endotracheal intubation. Consider administration of pharmacological adjuncts, such as sedatives and paralvtic agents, to aid with intubation as permitted by medical direction. Confirm placement of endotracheal tube using clinical assessment and end-tidal C02 monitoring.
- If breathing is adequate, place the child in a position of comfort and administer high-flow, 100% concentration oxygen as necessary. Use a non-re-breather mask or blow-by as tolerated.
- Control hemorrhage using direct pressure or a pressure dressing.
- Assess circulation and perfusion by measuring heart rate and observing skin color and temperature, capillary refill time, and the quality of central and peripheral pulses. Blood pressure should be measured only in children older than three years.
- For children with absent pulses, initiate cardiopulmonary resuscitation at a combined rate of 120 compressions per minute for newborns (three compressions to each breath) or 100 compressions per minute for infants and children (fifteen compressions to each 2 breaths for children greater than 8 years of age until the airway is secured with intubation and five compressions to each breath for patients less than 8 years of age and those over 8 years of age with a secured airway). Compression depth is 1/2 to 3/4 inch for neonates, 1/2 to 1 inch for infants, and 1 to 1-1/2 inches for children.

There should be a pause in compressions for ventilation until the airway is secured with intubation.

- Initiate cardiac monitoring. For absent pulses initiate monitoring with either a manual defibrillator or AED and treat per appropriate protocol.

- If there is evidence of shock, obtain vascular access using an age-appropriate large-bore catheter with large-caliber tubing. If intravenous access cannot be obtained, proceed with intraosseous access. Administer a fluid bolus of normal

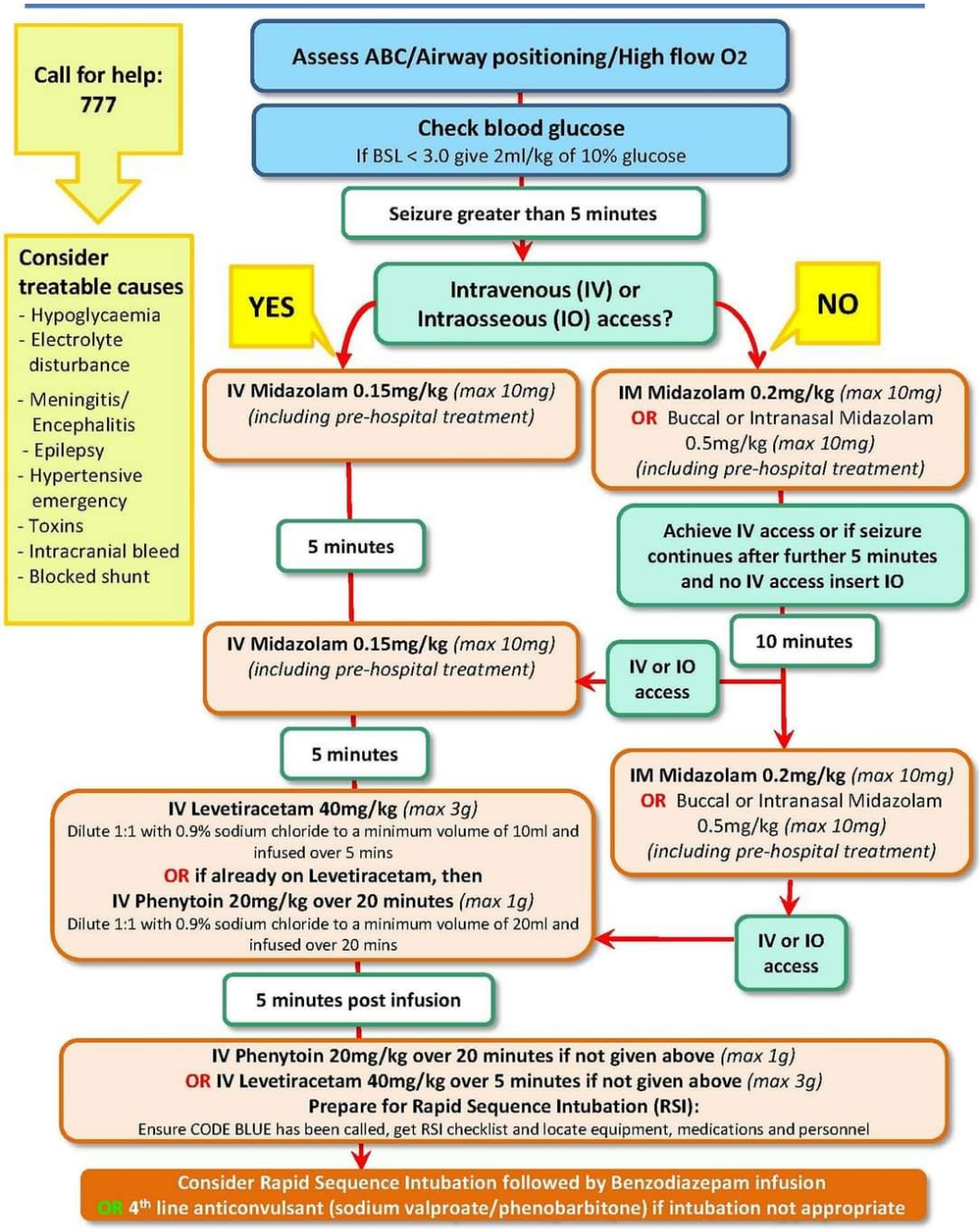
  saline at 20 ml/kg set to maximum flow rate (at a minimum < 20 minutes). Reassess patient after bolus. If signs of shock persist, bolus may be repeated at the same dose up to two times for a maximum total of 60 ml/kg.
- Evaluate mental status, including papillary reaction, distal function and sensation, and AVPU assessment.
- If spinal trauma is suspected, continue manual stabilization, place a rigid cervical collar, and immobilize the patient on long backboard or similar device.
- Expose the child only as necessary to perform further assessments. Maintain the child's body temperature throughout the examination.
- If the child's condition is critical or unstable, initiate transport. Perform focused history and detailed physical examination en-route to the hospital if patient status and management of resources permit.
- If the child's condition is stable, perform focused history and detailed physical examination on the scene, then initiate transport.
- Reassess the patient frequently.
- Contact direct medical oversight for additional instructions.

SECTION 7.2 NEONATAL SEZURES

1. Types of neonatal seizures
   a. Subtle seizures (most common)
   b. Tonic
   c. Multifocal Clonic
   d. Myoclonic
   e. Focal Clonic

2. **Diagnosis**
   a. RBS
   b. Hematocrit
   c. Serum calcium
   d. Serum magnesium
   e. Blood CSF
   f. CBF analysis
   g. EEG

3. **Management**
   a. IV bolus of 10% Dextrose 2 ml/kg.
   b. IV 10% calcium Gluconate 2 ml /kg diluted 1:1 slowly over 5 mts.
   c. Inj magnesium sulphate 0.2 mg / kg IM
   d. Inj Pyridoxine – 50 –100 mg IV
   e. Inj Phenobarbitone 15-20 mg / kg loading if necessary and 10 mg /kg to be repeated in one hour if necessary
   f. Inj Dilantin Sodium – 10 mg / kg loading and repeated after ½ hour if necessary.
   g. Inj Diazepam – 0.5 mg. Kg
   h. Rectal valproic acid and carbamezepine


Call for help: 777
Assess ABC/Airway positioning/High flow O2
Check blood glucose
If BSL < 3.0 give 2ml/kg of 10% glucose
Seizure greater than 5 minutes
Consider treatable causes
- Hypoglycaemia
- Electrolyte disturbance
- Meningitis/ Encephalitis
- Epilepsy
- Hypertensive emergency
- Toxins
- Intracranial bleed
- Blocked shunt
YES
Intravenous (IV) or Intraosseous (IO) access?
NO
IV Midazolam 0.15mg/kg (max 10mg) (including pre-hospital treatment)
IM Midazolam 0.2mg/kg (max 10mg) OR Buccal or Intranasal Midazolam 0.5mg/kg (max 10mg) (including pre-hospital treatment)
5 minutes
Achieve IV access or if seizure continues after further 5 minutes and no IV access insert IO
10 minutes
IV Midazolam 0.15mg/kg (max 10mg) (including pre-hospital treatment)
IV or IO access
5 minutes
IM Midazolam 0.2mg/kg (max 10mg) OR Buccal or Intranasal Midazolam 0.5mg/kg (max 10mg) (including pre-hospital treatment)
IV Levetiracetam 40mg/kg (max 3g)
Dilute 1:1 with 0.9% sodium chloride to a minimum volume of 10ml and infused over 5 mins
OR if already on Levetiracetam, then
IV Phenytoin 20mg/kg over 20 minutes (max 1g)
Dilute 1:1 with 0.9% sodium chloride to a minimum volume of 20ml and infused over 20 mins
IV or IO access
5 minutes post infusion
IV Phenytoin 20mg/kg over 20 minutes if not given above (max 1g)
OR IV Levetiracetam 40mg/kg over 5 minutes if not given above (max 3g)
Prepare for Rapid Sequence Intubation (RSI):
Ensure CODE BLUE has been called, get RSI checklist and locate equipment, medications and personnel
Consider Rapid Sequence Intubation followed by Benzodiazepam infusion
OR 4th line anticonvulsant (sodium valproate/phenobarbitone) if intubation not appropriate

SECTION 7.3 NEONATAL HYPOGLYCEMIA

1. Definition

RBS < 30 mg / dl in term Infants

< 20 mg /dl in pre term infants

RBS < 40 mg /dl after 72 hours in irrespective of gestation.

2. Clinical Features

a. Abnormal cry
b. Hypothermia
c. Apathy, lethargy
d. Hypotonia
e. Apnea, jitteriness
f. Cardiac arrest
g. CCF
h. Poor feeding
i. Cyanosis, Tachypnoea
j. Convulsions and tremors

3. Screening

Initially RBS – checked at 1-hour intervals during first 4 hours subsequently 4 hourly during next 24 – 48 hours.

4. Management

a. Prevention

- Early **enteral*(39)** feeding (within 2 hours of birth) or IV dextrose infusion at the rate of 4 – 6 mg / kg /min, 2 ml / kg of 10% Dextrose
- Placed in neutral thermal environment
- Correct acidosis

5. Treatment

i. Aim – maintain RBS > 40 mg /dl

a. A symptomatic infants with border line hypoglycemia □ milk feed with RBS monitoring

b. Symptomatic neonates & a symptomatic neonates with low RBS

- 10% dextrose – 2 mg / kg IV start then infuse at rate of 8 mg / kg / min □ estimate RBS after 20 mts
- If RBS > 40 mg / dl

c. Maintain IV dextrose – 2 mg /kg / min for 12-24 hours start Enteral feeds

- If RBS 25 mg – 40 mg / dl

  Step while increase of dextrose infusion by 2 mg / kg / min / at 15 min interval till RBS > 40 mg / dl
- RBS < 25 mg /dl

  10% dextrose – 2 ml / kg IV stat (Infusion rate > 12 mg / kg / min.)

ii. In intractable hypoglycemia

a. Hydrocortisone IV /IM 5 mg / kg – BID – 3 – 5 days

b. Establish etiology

If Hyper insulinism – Diaz oxide 10- 15 mg /kg /day, 8 –12 hourly.

Pediatric Diabetic KetoAcidosis (DKA) Algorithm

Recognition of DKA

DKA can occur in existing or new onset type 1 or type 2 diabetes

Diagnostic criteria: Diabetes (random blood glucose ≥11.1 mmol/L) + Ketonuria + Acidosis

Clinical features: Polyuria, polydipsia, weight loss, dehydration, Kussmaul breathing, headache, decreased level of consciousness, abdominal pain, vomiting

Alert Pediatric Referral Centre

DKA Severity

	Mild	Moderate	Severe
pH	7.2 – 7.29	7.1 – 7.19	<7.1
HCO_3	10 – 14	5 – 9	<5

Hyperosmolar Hyperglycemic State (HHS)

Consider if:
- Glucose ≥33 mmol/L; HCO_3 >15
- Minimal acidosis/ketosis; negative or trace urine ketones
- Osmolality ≥330 mOsm/L

Discuss with Pediatric Referral Centre

Initial Management

- Assess ABCs, vital signs (including BP) + neurovitals (GCS, pupils)
- Rapid bedside glucose
- O_2 10-15 Lpm non-rebreather mask (if signs of shock)

- IV Access x 2 lines (consider intraosseous if unsuccessful)
- Serum glucose, electrolytes, venous gas, urea, creatinine, serum osmolality
- Urinalysis for glucose, ketones; bladder catheterization if needed

- Consider other investigations:
  - Obtain cultures (e.g. blood, urine, throat) if clinical evidence of infection
  - ECG for baseline assessment of K^+ status (if delay in obtaining serum K^+)

CAUTION!

Intubation and ventilation are ***high-risk procedures*** for DKA patients, and should never be undertaken without consultation with your pediatric referral centre or transport team.

Signs of CEREBRAL EDEMA?

- GCS <14 and/or irritability in younger children
- And/or Cushing's triad: ↑BP, ↓HR, ↓RR

YES

Cerebral Edema Management

- Call Pediatric Referral Centre
- Assess and manage ABCs
- Bed rest, elevate head of bed to 30°
- If hypoperfused (tachycardia, cap refill >2 sec, cool extremities), give 10 mL/kg NS bolus over 30 minutes; reassess after bolus and repeat x 1 if persistent hypoperfusion. Discuss further fluid management with Pediatric Referral Centre.
- Run IV fluids at 60% of rate outlined in Rehydration Table
- 3% NS (5 mL/kg IV over 15 min) OR Mannitol (0.5 – 1 g/kg IV over 20 min)
- Start insulin infusion 0.1 units/kg/hr IV after 1 hour of IV fluids
- Head CT not required prior to transport

NO

Fluid Resuscitation (Based on recent evidence)

Administer 10 mL/kg NS bolus over 30 minutes.

Persistent tachycardia, or other signs of hypoperfusion (cap refill >2 sec or cool extremities)?

NO

Rehydration Table: Total IV Fluids

Weight	mL/kg/hr
5 - <10 kg	6.5
10 - <20 kg	6
20 - <40 kg	5
≥40 kg	4 (MAX 250 mL/hr)

YES

Repeat 10 mL/kg NS bolus over 30 min. Reassess after each bolus and repeat if persistent hypoperfusion. Discuss with Pediatric Referral Centre.

Pediatric Referral Centre Discussion

CONSIDERATION OF:
- Difficult vascular access
- Additional treatment of cerebral edema
- Airway management
- Ongoing fluid management

IV Fluids and Insulin

- Rehydrate with IV NS until **glucose <15 mmol/L or decreases by >5 mmol/L/hr once the glucose is <25 mmol/L**. Then change to **D10WNS‡**
- Add 40 mmol/L KCl into IV fluid (if K^+ <5 mmol/L and patient has voided in ED)
- Start **insulin infusion 0.1 units/kg/hr IV after 1 hour of IV fluids**

NEVER use IV insulin bolus

NEVER administer sodium bicarbonate

Ongoing Monitoring Until Transfer

- Q 1 hour: Blood glucose, Fluid ins and outs, Neurovitals (GCS, pupils), HR and BP
- Q 2-4 hours: Electrolytes and venous gas, Monitor ECG for T-wave changes

Dedicate one IV line to use as saline

SECTION 7.4 - FOREIGN BODY AIRWAY OBSTRUCTION

The following protocol applies to an unconscious child or infant with a foreign body obstruction of the airway.

- Ensure scene safety.
- Perform a scene survey to assess environmental conditions and mechanism of illness or injury.
- Form a first impression of the patient's condition.
- Observe standard precautions.
- Confirm that the patient is unresponsive.
- Open the airway using a head tilt/chin lift.
- Attempt assisted ventilation using a bag-valve-mask device with high-flow, 100% concentration oxygen. If unsuccessful, reposition airway and attempt bag-valve-mask assisted ventilation again.
- Use age-appropriate techniques to dislodge the obstruction (for infants younger than one year, apply back blows with chest thrusts; for children one year and older, use abdominal thrusts).
- If unsuccessful, establish a direct view of the object and attempt to remove it with Magill forceps.
- If unsuccessful, attempt endotracheal intubation and ventilate the patient.
- If unsuccessful, perform needle cricothyrotomy and needle jet insufflation.
- Assess circulation and perfusion.
- Assess mental status.
- Expose the child only as necessary to perform further assessments. Maintain the child's body temperature throughout the examination.
- Initiate transport. Perform focused history and detailed physical examination en-

route to the hospital if patient status and management of resources permit.

- Reassess the patient frequently.
- Contact direct medical oversight for additional instructions.

SECTION 7.5 – RESPIRATORY DISTRESS, FAILURE,OR ARREST

A patient who presents with acute respiratory distress of sudden onset accompanied by fever, drooling, hoarseness, stridor, and tripod positioning may have a partial airway obstruction. Do nothing to upset the child. Perform critical assessments only. Enlist the parent to administer blow-by oxygen. Place the patient in a position of comfort. Do not attempt vascular access. Transport immediately.

Definitions

Respiratory distress is indicated by the following findings:

- alert, irritable, anxious
- stridor
- audible wheezing
- respiratory rate faster than normal for age
- intercostal retractions
- nasal flaring
- neck muscle use
- central cyanosis that resolves with oxygen administration
- mild tachycardia
- able to maintain sitting position (children older than four months)

Respiratory failure involves the findings above with any of the following additions or modifications:

- sleepy, intermittently combative, or agitated
- increased respiratory effort at sternal notch

- marked use of accessory muscles
- retractions, head bobbing, grunting
- central cyanosis,
- marked tachycardia
- poor peripheral perfusion
- decreased muscle tone

Respiratory arrest involves the findings above with any of the following additions or modifications:

- unresponsive to voice or touch

- absent or shallow chest wall motion
- absent breath sounds
- respiratory rate slower than 10 breaths per minute
- weak to absent pulses
- bradycardia or asystole
- limp muscle tone
- unable to maintain sitting position (children older than four months)

Procedure

- Ensure scene safety.
- Perform a scene survey to assess environmental conditions and mech2nism of illness or injury.
- Form a first impression of the patient's condition.
- Observe standard precautions.
- Establish patient responsiveness. If cervical spine trauma is suspected, manually stabilize the spine.
- Assess the patient's airway for patency, protective reflexes and the possible need for advanced airway management. look for signs of airway obstruction. Signs include
    - absent breath sounds
    - tachypnea
    - intercostal retractions
    - stridor or drooling
    - choking
    - bradycardia
    - cyanosis
- If foreign body obstruction of the airway is suspected, refer to the appropriate protocol for treatment options.
- Open the airway using head tilt/chin lift if no spinal trauma is suspected, or modified jaw thrust if spinal trauma is suspected.

- Suction as necessary.

•Consider placing an oropharyngeal or nasopharyngeal airway adjunct if the airway cannot be maintained with positioning and the patient is unconscious.

•Assess the patient's breathing, including rate, auscultation, inspection, effort, and adequacy of ventilation as indicated by chest rise. Assess for signs of respiratory distress, failure, or arrest. Obtain pulse oximeter reading.

•If chest rise indicates inadequate ventilation, reposition airway and reassess. If inadequate chest rise is noted after repositioning airway, suspect a foreign body obstruction of the airway. Refer to the appropriate protocol for treatment options.

•If signs of respiratory arrest or respiratory failure with inadequate breathing are present, assist ventilation using a bag-valve-mask device with high-flow, 100% concentration oxygen.

•If abdominal distention arises, consider placing a nasogastric tube to decompress the stomach.

•If the airway cannot be maintained by other means, including attempts at assisted ventilation, or if prolonged assisted ventilation is anticipated, perform endotracheal intubation. Consider administration of pharmacological adjuncts, such as sedatives and paralytic agents, to aid with intubation as permitted by medical direction. Confirm placement of endotracheal tube using clinical assessment and end-tidal Co2 monitoring.

•If breathing is adequate and patient exhibits signs of respiratory distress, administer high-flow, 100% concentration oxygen as necessary. Use a nonrebreather mask or blow-by as tolerated.

•If bronchospasm is present, refer to the appropriate protocol fortreatment options.

•Assess circulation and perfusion.

•Initiate cardiac monitoring.

•If the patient shows signs of severe respiratory failure or respiratory arrest, consider establishing vascular access and administering normal saline at a sufficient rate to keep the vein open. If intravenous access cannot be obtained, proceed with intraosseous access. Do not delay transport to obtain vascular access.

- Assess mental status.
- Expose the child only as necessary to perform further assessments. Maintain the child's body temperature throughout the examination.

•Initiate transport. Perform focused history and detailed physical examination en route to the hospital if patient status and management of resources permit.

•Reassess the patient frequently.

•Contact direct medical oversight for additional instructions.

•conditions and mechanism of illness or injury.

•Form a first impression of the patient's condition,

•Observe standard precautions,

•Establish patient responsiveness. if cervical spine trauma is suspected, manually stabilize the spine.

•Open the airway using head tilt/chin lift.

•For a patient receiving invasive ventilation via a ventilator, assess the patient to determine possible cause of respiratory distress by removing the patient from the ventilator and assisting ventilations with a bag-valve-mask via the tracheostomy tube. Use the following reactions to assisted ventilation with a bag-valve-mask to help determine the cause:

- If unable to ventilate the patient, there is significant resistance or there is poor air entry with bagvalve- mask ventilation, the problem is likely due to the tracheostomy tube refer to the Respiratory Distress in a Child with a Tracheostomy Protocol.
- If able to ventilate through the tracheostomy tube and the patient improves or the respiratory distress is still present, the problem is likely due to a medical problem refer to the Respiratory Distress, Failure and Arrest Protocol.
- If patient improves and is easy to ventilate with bag-valve-mask assisted ventilation, the problem is likely due to the ventilator. In this situation perform the following actions:
    - Assure that the ventilator is set to the correct settings given to you by the parents or other caregivers, the oxygen supply is not empty and that the power supply is connected to the ventilator.
    - Confirm that the circuit is securely connected.
    - Re-connect patient to ventilator circuit. Assure that connection between circuit

and tracheostomy tube is secure,

- If the tracheostomy tube has a cuff, assure that it is inflated by checking the pilot balloon, If the pilot balloon is deflated, re-inflate the c.uff by attaching a syringe to the pilot balloon valve and inflating with air until the pilot balloon is inflated.
- Ask the parents or other caregivers to perform any procedure they have been taught to correct ventilator problems.
- If the patient remains in distress, disconnect from ventilator and assist ventilations with a bagvalve- mask via the tracheostomy tube and prepare for transport.

•For a patient receiving non-invasive ventilation via either BiPAP or CPAPassess the cause of the problem by:

- Assuring that the device is set to the correct settings given to you by the parents or other caregivers, the oxygen supply is not empty and that the power supply is connected to the ventilator.
- Confirming that the patient is correctly attached to the device.
- Asking the parents or other caregivers to perform any procedure they have been taught to correct device problems.
- If the patient remains in distress, disconnect from the device and assist ventilations with a bagvalve-mask.
- If despite assisted ventilations with a bag-valve-mask the patient remains in distress refer to the Respiratory Distress, Failure and Arrest Protocol.

•Assess the patient's breathing, including rate, auscultation, inspection, effort, and adequacy of ventilation as indicated by chest rise. Assess for signs of respiratory distress, failure, or arrest. Obtain pulse oximeter reading.

•Record the ventilator settings which may include respiratory rate, tidal volume, pressure settings, inspired oxygen concentration and PEEP.

•If abdominal distention arises, consider placing a nasogastric tube to decompress the stomach.

- If bronchospasm is present, refer to the appropriate protocol for treatment options.
- Assess circulation and perfusion.
- Initiate cardiac monitoring.

•If the patient shows signs of severe respiratory failure or respiratory arrest, consider establishing vascular access and administering normal saline at a sufficient rate to keep the vein open. If intravenous access cannot be obtained, proceed with intraosseous access. Do not delay transport to obtain vascular access.

•Assess mental status.

•Expose the child only as necessary to perform further assessments. Maintain the child's body temperature throughout the examination.

•Initiate transport. Perform focused history and detailed physical examination en route to the hospital if patient status and management of resources permit.

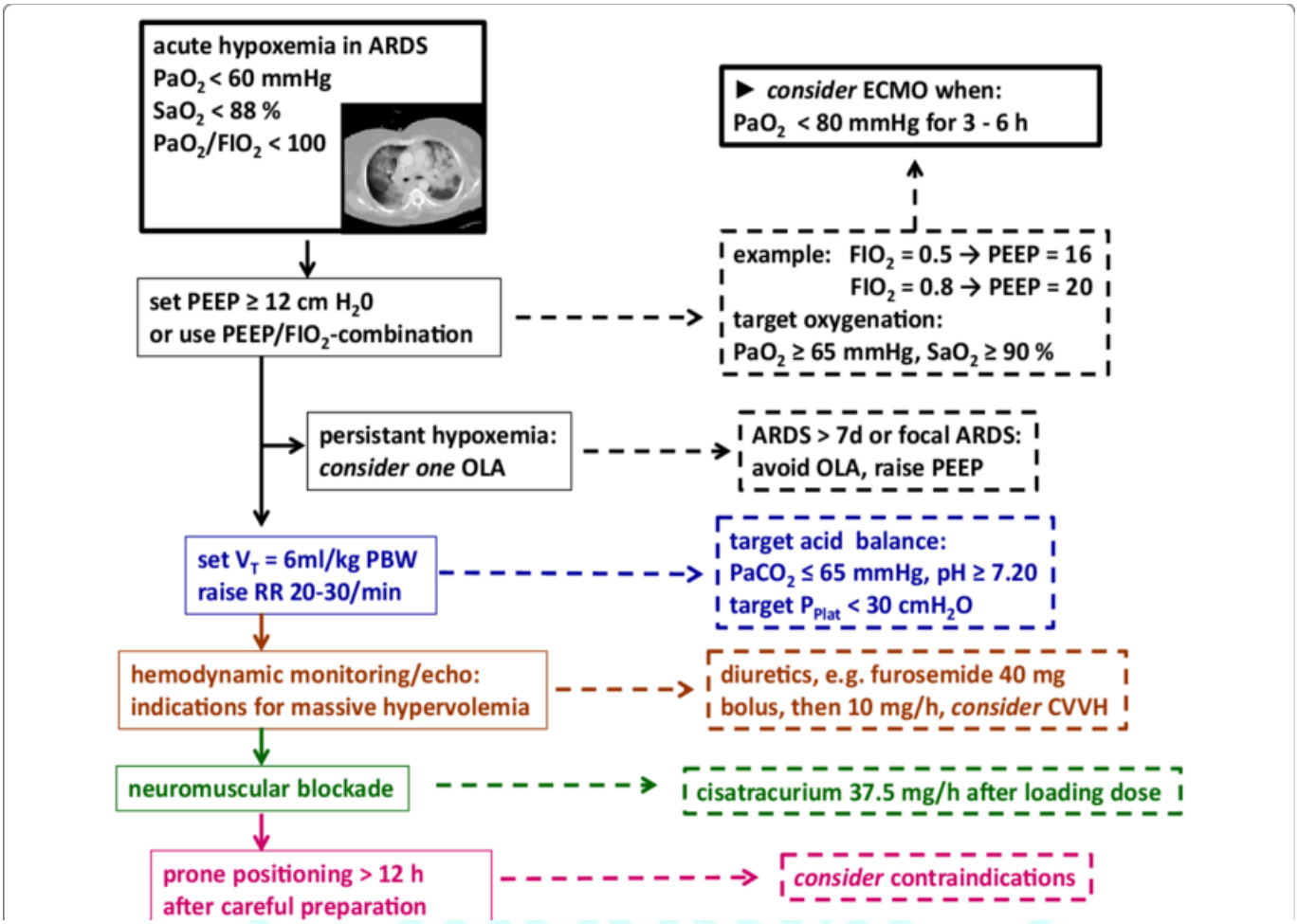
•Reassess the patient frequently

•Contact direct medical oversight for additional instructions.

BERLIN DEFINIFITION OF ARDS

	Acute Respiratory Distress Syndrome
Timing	Within 1 week of a known clinical insult or new or worsening respiratory symptoms
Chest imaging[a]	Bilateral opacities—not fully explained by effusions, lobar/lung collapse, or nodules
Origin of edema	Respiratory failure not fully explained by cardiac failure or fluid overload Need objective assessment (eg, echocardiography) to exclude hydrostatic edema if no risk factor present
Oxygenation[b]	
Mild	200 mm Hg < PaO_2/FIO_2 ≤ 300 mm Hg with PEEP or CPAP ≥5 cm H_2O[c]
Moderate	100 mm Hg < PaO_2/FIO_2 ≤ 200 mm Hg with PEEP ≥5 cm H_2O
Severe	PaO_2/FIO_2 ≤ 100 mm Hg with PEEP ≥5 cm H_2O

Abbreviations: CPAP, continuous positive airway pressure; FIO_2, fraction of inspired oxygen; PaO_2, partial pressure of arterial oxygen; PEEP, positive end-expiratory pressure.
[a] Chest radiograph or computed tomography scan.
[b] If altitude is higher than 1000 m, the correction factor should be calculated as follows: [PaO_2/FIO_2 × (barometric pressure/760)].
[c] This may be delivered noninvasively in the mild acute respiratory distress syndrome group.


acute hypoxemia in ARDS
PaO2 < 60 mmHg
SaO2 < 88 %
PaO2/FIO2 < 100
► consider ECMO when:
PaO2 < 80 mmHg for 3 - 6 h
example: FIO2 = 0.5 → PEEP = 16
FIO2 = 0.8 → PEEP = 20
target oxygenation:
PaO2 ≥ 65 mmHg, SaO2 ≥ 90 %
set PEEP ≥ 12 cm H20
or use PEEP/FIO2-combination
persistant hypoxemia:
consider one OLA
ARDS > 7d or focal ARDS:
avoid OLA, raise PEEP
set VT = 6ml/kg PBW
raise RR 20-30/min
target acid balance:
PaCO2 ≤ 65 mmHg, pH ≥ 7.20
target PPlat < 30 cmH2O
hemodynamic monitoring/echo:
indications for massive hypervolemia
diuretics, e.g. furosemide 40 mg
bolus, then 10 mg/h, consider CVVH
neuromuscular blockade
cisatracurium 37.5 mg/h after loading dose
prone positioning > 12 h
after careful preparation
consider contraindications

SECTION 7.6 - RESPIRATORY DISTRESS IN THE CHILD WITH A TRACHEOSTOMY

The following protocol applies to a patient with a tracheostomy who is experiencing respiratory distress

- Ensure scene safety.
- Perform a scene survey to assess environmental conditions and mechanism of illness or injury.
- Form a first impression of the patient's condition.
- Observe standard precautions.
- Open the airway using a head tilt/chin lift.
- Assess the tracheostomy to make sure that:
    - Tracheostomy tube is in place
    - Obturator has been removed
    - If it is a double lumen that the inner cannula is in place
    - For fenestrated tracheostomy tube that the decannulation plug or talk valve has been removed
- Assess the patient's breathing, including rate, auscultation, inspection, effort, and adequacy of ventilation as indicated by chest rise. Assess for signs of respiratory distress, failure, or arrest. Obtain pulse oximeter reading.
- If signs of respiratory arrest or respiratory failure with inadequate breathing are present, assist ventilation using a bag-valve-mask device with high-flow, 100% concentration oxygen via the tracheostomy. If unsuccessful, reposition airway and attempt bag-valve-mask assisted ventilation again. If tracheostomy tube is a double lumen tube, the inner cannula must be in place to attach bag-valve-mask device.
- If unable to ventilate via the tracheostomy or respiratory distress persists with poor or noisy (gurgling, rhonchi) breath sounds, attempt to suction through the tracheostomy using the

following procedure:

- Ask family and caregivers for patient's suctioning supplies and for assistance as they are more familiar with suctioning of patient. If patient's supplies are not available use a suction catheter of the same size as normally used for patient. If knowledge of size of catheter is not available, the size can be estimated by

doubling the inner diameter of the tracheostomy tube and rounding down to an available size catheter.

- For double cannula catheters, inner cannula may be removed, suctioned directly and then reinserted.
- Determine suction depth by comparing suction catheter to either obturator or patient's spare tracheostomy tube. If these are not available then maximum suction depth for catheter should be 3-6 cm.
- Assure that suction device is set to 100 mmhg for tracheostomy suctioning.
- Pre-oxygenate the patient via either non-rebreather mask over face (partial tracheostomy) or tracheostomy tube or via assisted ventilations with bag-valve-mask if patient has ineffective ventilations. If unable to ventilate then proceed immediately to the next step.
- Instill 2 to 3 **ml** of sterile normal saline into the tracheostomy tube
- Insert suction catheter into tracheostomy to pre-determined depth with suction off. Never force catheter while inserting. Apply suction while withdrawing catheter. Limit suctioning to no more than 10 seconds.
- Suctioning following steps D-G may be repeated up to two times, if significant secretions are removed and patient tolerates procedure.
- If unable to pass the suction catheter and patient remains in distress despite assisted ventilations proceed to step 10 to change tracheostomy tube.

•After suctioning, if the patient remains in distress with poor air movement again attempt assisted ventilation using a bag-valve-mask device with high-flow, 100% concentration oxygen via the tracheostomy.

•If unable to ventilate via the tracheostomy and the patient remains in distress, change the tracheostomy tube by either the following facilitated or direct technique:

Facilitated Technique

- Ask the patients family or care giver for a new tracheostomy tube and for

assistance with changing the tracheostomy tube as they may have more experience then pre hospital personnel.

- For a double cannula tracheostomy tube, remove the inner cannula and follow this technique to insert the outer cannula. Once the outer cannula is in place,

insert the inner cannula prior to confirming correct placement via assisted ventilation.

- Insert a suction catheter through a new tracheostomy tube
- If the tracheostomy tube has a cuff, deflate the cuff by connecting a syringe to the valve on the pilot balloon and withdrawing air until the pilot balloon collapses.
- Cut the tracheostomy ties or remove the tracheostomy holder device.
- Gently remove the old tracheostomy tube in the anatomical direction (outward and towards the patient's feet).
- Insert the suction catheter in to the stoma. Aim the suction catheter towards the patient's feet and only insert 3-6 cm into the airway.
- gently advance the new tracheostomy tube over the suction catheter while holding the catheter in place and using it as a guide.
- Remove the suction catheter from the tracheostomy tube.
- If unable to insert new tracheostomy try this same procedure with a smaller size tracheostomy tube.
- If still unable to insert the tracheostomy tube insert a similar internal diameter size endotracheal tube following same technique. The endotracheal tube should only be inserted to a depth equal to the length of the tracheostomy tube which would have been inserted.
- Attach bag-valve-mask and provide assisted ventilations. M. Confirm placement of the new tracheostomy tube using clinical assessment including bilateral chest expansion with good breath sounds, improvement in vital signs, and pulse oximetry. Secondary confirmation should be via endtidal C02 monitoring.

Direct Technique

•Ask the patients family or care giver for a new tracheostomy tube and for assistance with changing the tracheostomy tube as they may have more experience then prehospital personnel.

•For a double cannula tracheostomy tube, remove the inner cannula and follow this technique to

insert the outer cannula. Once the outer cannula is in place, insert the inner cannula prior to confirming correct placement via assisted ventilation.

•If the tracheostomy tube has a cuff, deflate the cuff by connecting a syringe to the valve on the pilot balloon and withdrawing air until the pilot balloon collapses.

•Cut the tracheostomy ties or remove the tracheostomy holder device.

•Gently remove the old tracheostomy tube in the anatomical direction (outward and towards the patient's feet).

•Gently insert the new tracheostomy tube in the anatomical direction. This will be with the curve downward, the tube aimed towards the patient's feet and in a curving motion. Make sure the obturator is in place for insertion and then remove after insertion.

•If unable to insert new tracheostomy try this same procedure with a smaller size tracheostomy tube

•If still unable to insert the tracheostomy tube insert a similar internal diameter size endotracheal tube following same technique. The endotracheal tube should only be inserted to a depth equal to the length of the tracheostomy tube which would have been inserted.

•Attach bag-valve-mask and provide assisted ventilations.

•Confirm placement of the new tracheostomy tube using clinical assessment including bilateral chest expansion with good breath sounds, improvement in vital signs, and pulse oximetry. Secondary confirmation should be via end-tidal C02 monitoring.

•If patient remains in distress with inadequate breathing and unable to replace the tracheostomy tube with a new tracheostomy tube or an endotracheal tube, attempt to perform orotracheal intubation using standard technique. This should only be attempted for patients with an intact airway proximal to the tracheostomy site (partial tracheostomy).

•If patient remains in distress with inadequate breathing and unable to replace tracheostomy tube and unable to perform orotracheal intubation, assist ventilations with a bag-valve-mask over the mouth and nose while occluding the stoma (this should only be performed on a patient with an intact airway proximal to the tracheostomy site) or over the stoma while occluding the mouth and nose. Assess for adequate ventilation by clinical assessment including bilateral chest expansion with good breath sounds, improvement in vital signs, and pulse oximetry.

•Continue with assisted ventilations for patients with continued respiratory distress and

inadequate breathing.

•If abdominal distention arises, consider placing a nasogastric tube to decompress the stomach.

•If breathing is adequate and patient exhibits continued signs of respiratory distress, administer high-flow, 100% concentration oxygen as necessary. Use a nonrebreather mask or blow-by as tolerated. In the patient with respiratory distress and absent breath sounds consider obstruction of the tracheostomy tube and proceed with step 9.

•If bronchospasm is present, refer to the appropriate protocol for treatment options.

•Assess circulation and perfusion:

•Assess mental status.

•Expose the child only as necessary to perform further assessments. Maintain the child's body temperature throughout the examination.

•Initiate transport. Perform focused history and detailed physical examination en route to the hospital if patient status and management of resources permit.

•Reassess the patient frequently.

•Contact direct medical oversight for additional instructions.

SECTION 7.7 - BRONCHOSPASM

A silent chest is an ominous sign indicating that respiratory failure or arrest is imminent.

Definition

Bronchospasm is usually accompanied by respiratory distress with the following findings:

- wheezing
- prolonged expiration
- increased respiratory effort (decreased effort may be noted as patient's condition approaches respiratory failure)
- severe agitation, lethargv
- suprasternal and substernal retractions
- tripod positioning

Procedure

- Ensure scene safety.
- Perform a scene survey to assess environmental conditions and mechanism of illness or injury.
- Form a first impression of the patient's condition.
- Observe standard precautions.
- Establish patient responsiveness. If cervical spine trauma is suspected, manually stabilize the spine.
- Assess the patient's airway for patency, protective reflexes and the possible need for advanced airway management. Look for signs of airway obstruction.
- Open the airway using head tilt/chin lift if no spinal trauma is suspected, or modified jaw thrust if spinal trauma is suspected.
- Suction as necessary.
- Consider placing an oropharyngeal or nasopharyngeal airway adjunct if the airway cannot be maintained with positioning and the patient is unconscious.
- Assess breathing. Obtain pulse oximeter reading.
- If breathing is inadequate, assist ventilation using a bag-valve-mask device with high-flow,

100% concentration oxygen. if abdominal distention arises, consider placing a nasogastric tube to decompress the stomach.

•If the airway cannot be maintained by other means, including attempts at assisted ventilation, or if prolonged assisted ventilation is anticipated, perform endotracheal intubation. Consider administration of pharmacological adjuncts, such as sedatives and paralytic agents, to aid with intubation as permitted by medical direction. Confirm placement of endotracheal tube using clinical assessment and end-tidal C02 monitoring.

•If breathing is adequate, place the child in a position of comfort and administer high-flow, 100% concentration oxygen as necessary. Use a nonrebreather mask or blow-by as tolerated.

•If the patient shows signs of respiratory failure with inadequate ventilation or respiratory arrest together with clinical evidence of bronchospasm or a history of asthma, administer one of the following systemic agents for bronchodilation:

- Epinephrine 1:1000 at 0.01 mg/kg (maximum individual dose 0.3 mg) SC
- Terbutaline at 0.01 mg/kg (maximum individual dose 0.4 mg) SC

•If the patient shows signs of respiratory distress or respiratory failure together with clinical evidence of bronchospasm or a history of asthma, administer one of the following inhaled beta-2 agonist bronchodilators:

- Albuterol 2.5 mg via nebulizer over a 10- to 15-minute period or 4 Puffs via metered- dose inhaler (MDI) with spacing device
- Levalbuterol 0.625-1.25 mg via nebulizer over a 10- to 15-minute period

If these respiratory findings persist, repeat the inhaled beta-2 agonist bronchodilator via nebulizer at 15-minute intervals throughout transport. Do not delay transport to administer medications.

•If the patient shows signs of respiratory distress or respiratory failure together with clinical evidence of bronchospasm or a history of asthma consider administering 500 mcg ipratropium bromide via nebulizer over a 10- to 15-minute period. Ipratropium bromide and either albuterol or levalbuterol may be mixed together and administered simultaneously.

•Assess circulation and perfusion.

•Initiate cardiac monitoring.

•If the patient shows signs of severe respiratory failure or respiratory arrest, consider establishing vascular access and administering normal saline at a sufficient rate to keep the vein open. If intravenous access cannot be obtained in a patient with respiratory arrest, proceed with intraosseous access. Do not delay transport to obtain vascular access.

•Consider administration of steroids in one of the following preparations as permitted by medical direction:

- Prednisone 2.0 mg/kg (maximum individual dose 60 mg) PO
- Methylprednisolone 2.0 mg/kg (maximum individual dose 125 mg) *IV*11M
- Hydrocortisone 4.0 mg/kg (maximum individual dose 250 mg) IV/IM

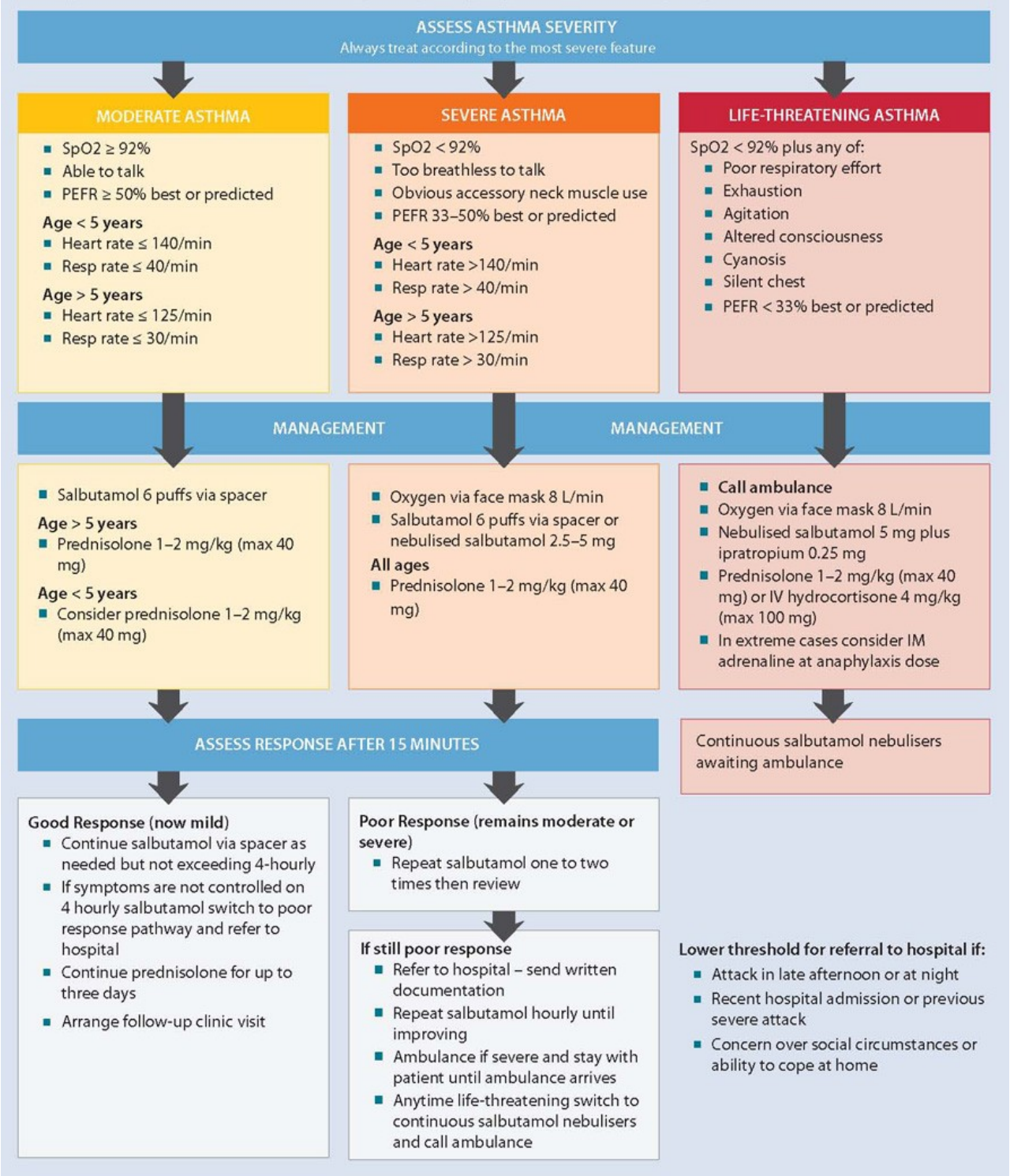
•Assess mental status.

•Expose the child only as necessary to perform further assessments. Maintain the child's body temperature throughout the examination.

•Initiate transport. Perform focused history and detailed physical examination en route to the hospital if patient status and management of resources permit.

•Reassess the patient frequently.

•Contact direct medical oversight for additional instructions.


ASSESS ASTHMA SEVERITY
Always treat according to the most severe feature
MODERATE ASTHMA
SpO2 ≥ 92%
Able to talk
PEFR ≥ 50% best or predicted
Age < 5 years
Heart rate ≤ 140/min
Resp rate ≤ 40/min
Age > 5 years
Heart rate ≤ 125/min
Resp rate ≤ 30/min
SEVERE ASTHMA
SpO2 < 92%
Too breathless to talk
Obvious accessory neck muscle use
PEFR 33–50% best or predicted
Age < 5 years
Heart rate >140/min
Resp rate > 40/min
Age > 5 years
Heart rate >125/min
Resp rate > 30/min
LIFE-THREATENING ASTHMA
SpO2 < 92% plus any of:
Poor respiratory effort
Exhaustion
Agitation
Altered consciousness
Cyanosis
Silent chest
PEFR < 33% best or predicted
MANAGEMENT
MANAGEMENT
Salbutamol 6 puffs via spacer
Age > 5 years
Prednisolone 1–2 mg/kg (max 40 mg)
Age < 5 years
Consider prednisolone 1–2 mg/kg (max 40 mg)
Oxygen via face mask 8 L/min
Salbutamol 6 puffs via spacer or nebulised salbutamol 2.5–5 mg
All ages
Prednisolone 1–2 mg/kg (max 40 mg)
Call ambulance
Oxygen via face mask 8 L/min
Nebulised salbutamol 5 mg plus ipratropium 0.25 mg
Prednisolone 1–2 mg/kg (max 40 mg) or IV hydrocortisone 4 mg/kg (max 100 mg)
In extreme cases consider IM adrenaline at anaphylaxis dose
ASSESS RESPONSE AFTER 15 MINUTES
Continuous salbutamol nebulisers awaiting ambulance
Good Response (now mild)
Continue salbutamol via spacer as needed but not exceeding 4-hourly
If symptoms are not controlled on 4 hourly salbutamol switch to poor response pathway and refer to hospital
Continue prednisolone for up to three days
Arrange follow-up clinic visit
Poor Response (remains moderate or severe)
Repeat salbutamol one to two times then review
If still poor response
Refer to hospital – send written documentation
Repeat salbutamol hourly until improving
Ambulance if severe and stay with patient until ambulance arrives
Anytime life-threatening switch to continuous salbutamol nebulisers and call ambulance
Lower threshold for referral to hospital if:
Attack in late afternoon or at night
Recent hospital admission or previous severe attack
Concern over social circumstances or ability to cope at home

SECTION 7.9 - ALTERED MENTAL STATUS

This protocol is intended for patients with an altered mental status of unknown etiology.

- Ensure scene safety.
- Perform a scene survey to assess environmental conditions and mechanism of illness or injury.
- Form a first impression of the patient's condition.
- Observe standard precautions.
- Establish patient responsiveness. If cervical spine trauma is suspected, manually stabilize the spine.
- Assess the patient's airway for patency, protective reflexes and the possible need for advanced airway management. Look for signs of airway obstruction.
- Open the airway using head tilt/chin lift if no spinal trauma is suspected, or modified jaw thrust if spinal trauma is suspected.
- Suction as necessary.
- Consider placing an oropharyngeal or nasopharyngeal airway adjunct if the airway cannot be maintained with positioning and the patient is unconscious.
- Assess breathing. Obtain pulse oximeter reading.
- If breathing is inadequate, assist ventilation using a bag-valve-mask device with high-flow, 100% concentration oxygen. If abdominal distention arises, consider placing a nasogastric tube to decompress the stomach.
- If the airway cannot be maintained by other means, including attempts at assisted ventilation, or if prolonged assisted ventilation is anticipated, perform endotracheal intubation. Consider administration of pharmacological adjuncts, such as lidocaine, sedatives, and paralytic agents, to aid with intubation as permitted by medical direction. Confirm placement of endotracheal tube using clinical assessment and end-

tidal Co2 monitoring.

- If breathing is adequate, place the child in a position of comfort and administer high-flow, 100% concentration oxygen as necessary. Use a nonrebreather mask or blow- by as tolerated.
- If signs of respiratory distress, respiratory failure, or respiratory arrest are present, refer to the appropriate protocol for treatment options.

- Assess circulation and perfusion.
- Initiate cardiac monitoring.
- Obtain vascular access. If intravenous access cannot be obtained, proceed with intraosseous access.
- Determine blood glucose level.
- If blood glucose level is lower than 80 mgfdl or cannot be determined, administer dextrose via intravenous or intra osseous route as follows:
  - D50W at 1.0 ml/kg for children older than two years
  - D25W at 2.0 ml/kg for children younger than two years
  - D10W at 5.0 ml/kg for neonates

If vascular access is unavailable, administer 1.0 mg glucagon via intramuscular injection.

- Repeat blood glucose determination 1 to 2 minutes after dextrose is administered.
- Dextrose may be repeated once at the same dosage if blood glucose level remains lower than 80 mg/dl or if the blood glucose levei cannot be determined and there is no change in the patient's mental status after the initial dose.
- Administer naloxone at 0.1 mgfkg (maximum individual dose 2.0 mg) via intravenous or intraosseous route. Naloxone may be given via endotracheal tube or intramuscular injection at the same dose if vascular access is not available.
- If there is evidence of shock or a history of dehydration, administer a fluid bolus of normal saline at 20 ml/kg set to maximum flow rate (at a minimum < 20 minutes). Reassess patient after bolus. If signs of shock persist, bolus may be repeated at the same dose up to two times for a maximum total of 60 mJ/kg.
- Assess mental status.
- Expose the child only as necessary to perform further assessments. Maintain the child's body temperature throughout the examination.
- If the child's'condition is critical or unstable, initiate transport. Perform focused history and detailed physical examination en route to the hospital if patient status

and management of resources permit.

- If the child's condition is stable, perform focused history and detailed physical examination on the scene, then initiate transport.

- Consider causes of altered mental status, such as chemical or drug intoxication, toxic exposure, head trauma, or seizure.
- Reassess the patient frequently.

Contact direct medical oversight for additional

SECTION 7.10 - SEIZURES

This protocol is intended for patients who are experiencing status epilepticus. To manage seizures in patients who are not experiencing status epilepticus, contact direct medical oversight for instructions.

Definition

In status epilepticus, the patient will be experiencing an active seizure when rescuers arrive, with

- a single episode of seizure activity lasting longer than 5 minutes, or
- two or more episodes of seizure activity between which the patient does not regain consciousness

Procedure

- Ensure scene safety.
- Perform a scene survey to assess environmental conditions and mechanism of illness or injury.
- Form a first impression ofthe patient's condition.
- Observe standard precautions.
- Establish patient responsiveness. Protect the patient from injury during involuntary muscular movements.
- Assess the patient's airway for patency, protective reflexes and the possible need for advanced airway management. Look for signs of airway obstruction.

•Open the airway using head tilt/chin lift if no spinal trauma is suspected, or modified jaw thrust if spinal trauma is suspected.

•Suction as necessary.

•Consider placing an oropharyngeai or nasopharyngeal airway adjunct if the airway cannot be maintained with positioning and the patient is unconscious.

- Assess breathing. Obtain pulse oximeter reading.
- If breathing is inadequate, assist ventilation using a bag-valve-mask device with high-flow, 100% concentration oxygen. If abdominal distention arises, consider placing a nasogastric tube to decompress the stomach.
- If the airway cannot be maintained by other means, including attempts at assisted ventilation, or if prolonged assisted ventilation is anticipated, perform endotracheal

intubation. Consider administration of pharmacological adjuncts, such as sedatives and paralytic agents, to aid with intubation as permitted by medical direction. The actively seizing patient should not be intubated without the usage of pharmacological agents. Confirm placement of endotracheal tube using clinical assessment and end-tidal C02 monitoring.

- If breathing is adequate, place the child in a position of comfort and administer high-flow, 100% concentration oxygen as necessary. Use a non-re-breather mask or blow-by as tolerated.
- Assess circulation and perfusion.
- Initiate cardiac monitoring.
- Establish vascular access. Administer normal saline at a sufficient rate to keep the vein open.
- Determine blood glucose level.
- If blood glucose level is lower than 80 mg/dl or cannot be determined, administer intravenous dextrose as follows:
    - D50W at 1.0 ml/kg for children older than two years
    - D25W at 2.0 ml/kg for children younger than two years
    - D10W at 5.0 ml/kg for neonates

If vascular access is unavailable, administer 1.0 mg glucagon via intramuscular injection.

•Repeat blood glucose determination 1 to 2 minutes after dextrose is administered.

•Dextrose may be repeated once at the same dosage if blood glucose level remains lower than 80 mg/dl or if the blood glucose level cannot be determined and the patient is still in status epilepticus after the initial dose. 21. Administer an anticonvulsant(s) as chosen by medical direction, all intravenous anticonvulsants should be given slowly (over 1-2 minutes) to avoid apnea:

- Diazepam 01.- 0.2 mg/kg (maximum individual dose 10mg) via intravenous route or 0.5 mg/kg (maximum individual dose 10 mg) via rectal route
- lorazepam 0.1 mg/kg (maximum individual dose 5.0 mg) via intravenous or

intramuscular route

- Midazolam 0.1-0.15 mg/kg (maximum individual dose 5.0 mg) via intravenous or intramuscular route

- Fosphenytoin 20 phenytoin equivalents/kg (maximum individual dose 1000 phenytoin equivalents) via intravenous or intramuscular route

•If seizures persist, repeat any listed anticonvulsant except fosphenytoin at the same dose or contact direct medical oversight for further instructions.

•Assess mental status.

•Expose the child only as necessary to perform further assessments. Maintain the child's body temperature throughout the examination.

•If the child's condition is critical or unstable, initiate transport. Perform focused history and detailed physical examination en route to the hospital if patient status and management of resources permit.

•If the child's condition is stable, perform focused history and detailed physical examination on the scene, then initiate transport.

•Reassess the patient frequently.

•Contact direct medical oversight for additional instructions.

SECTION 7.11 - ANAPHYLACTIC SHOCK / ALLERGIC REACTION

The following protocol is intended for patients with allergic reaction or anaphylactic shock. For patients with generalized allergic manifestations that do not meet the criteria listed below, contact medical control prior to treatment.

Definitions

The patient with an allergic reaction will have

- generalized allergic manifestations, such as urticaria (hives)
- a history of allergic exposure

To meet the criteria for anaphylactic shock, the patient must have the findings listed above *plus* one of the following:

- partial or complete airway obstruction
- signs of shock, such as altered mental status, respiratory distress, weak or absent peripheral pulses, cyanosis

Procedure

- Ensure scene safety.
- Perform a scene survey to assess environmental conditions and mechanism of illness or injury.
- Form a general impression of the patient's condition.
- Observe standard precautions.
- Establish patient responsiveness. If cervical spine trauma is suspected, manually stabilize the spine.
- Assess the patient's airway for patency, protective reflexes and the possible need for advanced airway management. Look for signs of airway obstruction.
- Open the airway using head tilt/chin lift if no spinal trauma is suspected, or modified jaw thrust if spinal trauma is possible.
- Suction as necessary.
- Consider placing an oropharyngeal or nasopharyngeal airway adjunct if the airway cannot be maintained with positioning and the patient is unconscious.

•If patient meets criteria for anaphylactic shock, administer epinephrine 1:1000 solution at 0.01 mg/kg (maximum individual dose 0.3 mg) via subcutaneous injection. Massage the injection site vigorously for 30 to 60 seconds.

•Assess breathing. Obtain pulse oximeter reading.

•If breathing is inadequate, assist ventilation using a bag-valve-mask device with high-flow, 100% concentration oxygen. If abdominal distention arises, consider placing a nasogastric tube to decompress the stomach.

•If the airway cannot be maintained by other means, including attempts at assisted ventilation, or if prolonged assisted ventilation is anticipated, perform endotracheal intubation. Consider administration of pharmacological adjuncts, such as sedatives and paralytic agents, to aid with intubation as permitted by medical direction. Confirm placement of endotracheal tube using clinical assessment and end-tidal CO_2 monitoring as per medical direction.

•If breathing is adequate, place the child in a position of comfort and administer high-flow, 100% concentration oxygen as necessary. Use a nonrebreather mask or blow-by as tolerated.

•If bronchospasm is present in a patient with adequate ventilation, administer 2.5 mg albuterol via nebulizer over a 10- to 15-minute period. If bronchospasm persists, repeat 2.5 mg albuterol via nebulizer at 15-minute intervals throughout transport.

•Assess circulation and perfusion.

•Reassess patient for signs of anaphylactic shock. If criteria are still present, repeat epinephrine 1:1000 solution at 0.01 mg/kg (maximum individual dose 0.3 mg) via subcutaneous injection.

•Initiate cardiac monitoring.

•If the patient meets criteria for anaphylactic shock, establish vascular access using an ageappropriate large-bore catheter with large-caliber tubing. If intravenous access cannot be obtained in a child younger than six years, proceed with intraosseous access. Do not delay transport to obtain vascular access.

•If evidence of shock persists, administer a fluid bolus of normal saline at 20 ml/kg set to maximum flow rate. Reassess patient after bolus. If signs of shock persist, bolus may be repeated at the same dose up to two times for a maximum total of 60 ml/kg.

•Administer diphenhydramine at 1.0 mg/kg (maximum individual dose 50 mg) via intravenous

route or deep intramuscular injection.

- Consider administering steroids (such as methylprednisolone at 1.0 mg/kg) via intravenous route as permitted by medical direction.
- Assess mental status.

•Expose the child only as necessary to perform further assessments. Maintain the child's body temperature throughout the examination.

•If the child's condition is critical or unstable, initiate transport. Perform focused history and detailed physical examination en route to the hospital if patient status and management of resources permit.

•If the child's condition is stable, perform focused history and detailed physical examination on the scene, then initiate transport.

•Reassess the patient frequently.

•Contact medical control for additional instructions

SECTION 7.12 - TRAUMA

The priorities in pediatric trauma management are to prevent further injury, provide rapid transport, notify the receiving facility, and initiate definitive treatment. On-scene time for a traumatic injury should be no longer than 10 minutes unless there are extenuating circumstances, such as extrication, hazardous conditions, or multiple victims. Document these circumstances on the patient record. Inform the receiving hospital as early as possible about the patient's status and condition. This will allow hospital personnel extra time to mobilize resources.

- Ensure scene safety.
- Perform a scene survey to assess environmental conditions and mechanism of injury. If hazardous conditions are present (such as swift water, hazardous materials, electrical hazard, or confined space), contact an appropriate agency before approaching the patient. Wait for the designated specialist to secure the scene and patient as necessary.
- Form a general impression of the patient's condition.
- Observe standard precautions.
- Establish patient responsiveness. Manually stabilize the spine.
- Assess the patient's airway for patency, protective reflexes and the possible need for advanced airway management. Look for signs of airway obstruction.
- Open the airway using a modified jaw thrust.
- Suction as necessary.
- Considering placing an oropharyngeal or nasopharyngeal airway adjunct if the airway cannot be maintained with positioning and the patient is unconscious. Note that the nasopharyngeal airway is contraindicated in the presence of facial trauma.
- Evaluate breathing. Assess for symmetry of chest expansion, equal breath sounds, and adequate chest rise. Inspect the chest wall for signs of trauma. Obtain pulse oximeter reading.
- If breathing is inadequate, assist ventilation using a bag-valve-mask device with high-flow, 100% concentration oxygen. If abdominal distention arises, consider placing a nasogastric tube to decompress the stomach. If facial trauma is present or a basilar skull fracture is suspected, use an orogastric tube instead.

•If the airway cannot be maintained by other means, including attempts at assisted ventilation, or if prolonged assisted ventilation is anticipated, perform endotracheal intubation. Consider

administration of pharmacological adjuncts, such as sedatives and paralytic agents, to aid with intubation as permitted by medical direction. Confirm placement of endotracheal tube using clinical assessment and end-tidal CO_2 monitoring as per medical direction

- If breathing is adequate, place the child in a position of comfort and administer high-flow, 100% concentration oxygen as necessary. Use a nonrebreather mask or blow-by as tolerated.
- If absent breath sounds or signs of severe respiratory distress are noted together with a mechanism of injury that could cause a tension pneumothorax, perform needle decompression. Use an 18- or 20-gauge over-the-needle catheter. Insert the needle in the mid-clavicular line at the second intercostal space, just above the third rib.
- Control hemorrhage using direct pressure or a pressure dressing.
- Assess circulation and perfusion.
- Initiate cardiac monitoring.
- Assess mental status.
- Continue manual stabilization while placing a rigid cervical collar. Immobilize the patient on a long backboard or similar device.
- Expose the child only as necessary to perform further assessments. Maintain the child's body temperature throughout the examination.
- Initiate transport to an appropriate trauma facility no more than 10 minutes after arriving on the scene unless extenuating circumstances exist or directed by medical direction.
- Obtain vascular access using an age-appropriate large-bore catheter with large-caliber tubing and administer normal saline at a sufficient rate to keep the vein open. If extenuating circumstances delay transport, obtain vascular access on the scene, but do not delay transport to obtain vascular access.
- If there is evidence of shock, initiate vascular access in two sites. If intravenous access cannot be obtained in a child younger than six years, proceed with intraosseous access. Administer a fluid bolus of normal saline at 20 ml/kg set to maximum flow rate. Reassess patient after bolus. If signs of shock persist, bolus may be repeated at the same dose up to two times for a maximum total of 60 ml/kg.
- Splint obvious fractures of long bones.
- Perform focused history and detailed physical examination en route to the hospital if patient status and

management of resources permit.

- Reassess the patient frequently.
- Contact medical control for additional instructions

SECTION 7.13 - BURNS

- Ensure scene safety.
- Perform a scene survey to assess environmental conditions and mechanism of illness or injury. If hazardous conditions are present (such as swift water, hazardous materials, electrical hazard, or confined space), contact an appropriate agency before approaching the patient. Wait for the designated specialist to secure the scene and patient as necessary.
- Form a general impression of the patient's condition.
- Observe standard precautions.
- Stop the burning process. If a dry chemical is involved, brush it off, then flush with copious amounts of water. If a caustic liquid is involved, flush with copious amounts of water. Remove all of patient's clothing prior to irrigation. Be prepared to treat hypothermia, which may arise secondary to these interventions. For chemical burns with eye involvement, immediately begin flushing the eye with normal saline. Continue flushing throughout assessment and transport.
- Establish patient responsiveness. If cervical spine trauma is suspected, manually stabilize the spine. Remove the patient's clothing and jewelry in any affected area.
- Assess the patient's airway for patency, protective reflexes and the possible need for advanced airway management. Look for signs of airway obstruction.
- Open the airway using head tilt/chin lift if no spinal trauma is suspected, or modified jaw thrust if spinal trauma is suspected.
- Suction as necessary.

- Consider placing an oropharyngeal or nasopharyngeal airway adjunct if the airway cannot be maintained with positioning and the patient is unconscious.
- Assess breathing. Obtain pulse oximeter reading. Refer to the appropriate protocol for management of respiratory distress.
- If breathing is inadequate, assist ventilation using a bag-valve-mask device with high- flow, 100% concentration oxygen. If abdominal distention arises, consider placing a nasogastric tube to decompress the stomach.
- If the airway cannot be maintained by other means, including attempts at assisted ventilation, or if prolonged assisted ventilation is anticipated, perform endotracheal intubation. This step should also be undertaken if inhalation injury is suspected. Consider administration of pharmacological adjuncts, such as sedatives and paralytic agents, to aid with intubation as permitted by medical direction. Confirm placement of endotracheal tube using clinical assessment and end-tidal CO_2 monitoring as per medical direction.
- If breathing is adequate, place the child in a position of comfort and administer high- flow, 100% concentration oxygen as necessary. Use a nonrebreather mask for potential inhalation injury or any serious thermal burn.
- Assess circulation and perfusion.
- For electrical burns, initiate cardiac monitoring and determine rhythm. If a dysrhythmia is present, refer to the appropriate protocol for treatment options.
- If there is evidence of shock in a patient with major thermal burns, obtain vascular access using an age-appropriate large-bore catheter with large-caliber tubing. If intravenous access cannot be obtained in a child younger than six years, proceed with intraosseous access. Administer a fluid bolus of normal saline at 20 ml/kg set to maximum flow rate. Reassess patient after bolus. If signs of shock persist, bolus may be repeated at the same dose up to two times for a maximum total of 60 ml/kg.
- Assess mental status.
- If spinal trauma is suspected, continue manual stabilization, place a rigid cervical collar, and immobilize the patient on a long backboard or similar device.
- Expose the child only as necessary to perform further assessments. Maintain the child's

body temperature throughout the examination.

- Apply a burn sheet or dry sterile dressings to burned areas. To prevent hypothermia, avoid moist or cool dressings and do not leave wounds or skin exposed.
- Initiate transport. Perform focused history and detailed physical examination en route to the hospital if patient status and management of resources permit.
- Pain management is usually indicated. Refer to the appropriate protocol for treatment options.
- Reassess the patient frequently.
- Contact medical control for additional instructions

SECTION 7.14 - TOXIC EXPOSURE

- Ensure scene safety.
- Perform a scene survey to assess environmental conditions and mechanism of illness or toxicity. If hazardous conditions are present (such as swift water, hazardous materials, electrical hazard, or confined space), contact an appropriate agency before approaching the patient. Wait for the designated specialist to secure the scene and patient as necessary.
- Look for the source of the toxic exposure. Collect any containers or medication bottles to transport with the patient to the hospital. Consult a local poison control center as appropriate.
- Form a general impression of the patient's condition.
- Observe standard precautions.
- Establish patient responsiveness. If cervical spine trauma is suspected, manually stabilize the spine.
- Assess the patient's airway for patency, protective reflexes and the possible need for advanced airway management. Look for signs of airway obstruction.
- Open the airway using head tilt/chin lift if no spinal trauma is suspected, or modified jaw thrust if spinal trauma is suspected.

- Suction as necessary.
- Consider placing an oropharyngeal or nasopharyngeal airway adjunct if the airway cannot be maintained with positioning and the patient is unconscious.
- Assess breathing. Obtain pulse oximeter reading.
- If breathing is inadequate, assist ventilation using a bag-valve-mask device with high- flow, 100% concentration oxygen. If abdominal distention arises, consider placing a nasogastric tube to decompress the stomach.
- If the airway cannot be maintained by other means, including attempts at assisted ventilation, or if prolonged assisted ventilation is anticipated, perform endotracheal intubation. Consider administration of pharmacological adjuncts, such as sedatives and paralytic agents, to aid with intubation as permitted by medical direction. Confirm placement of endotracheal tube using clinical assessment and end-tidal CO_2 monitoring as per medical direction.
- If breathing is adequate, place the child in a position of comfort and administer high- flow, 100% concentration oxygen as necessary. Use a nonrebreather mask or blow-by as tolerated.
- Assess circulation and perfusion.
- **Initiate cardiac monitoring.**
- Obtain vascular access as indicated.
- If respiratory depression is present and a narcotic overdose is suspected, administer naloxone at 0.1 mg/kg (maximum individual dose 2.0 mg) via intravenous, intraosseous, or intramuscular route.
- Treatment for other toxic exposures may be instituted as permitted by medical direction, including the following:
    - High-dose atropine for organophosphates
    - Sodium bicarbonate for tricyclic antidepressants
    - Glucagon for calcium channel blockers or beta-blockers
    - Diphenhydramine for dystonic reactions
    - Dextrose for insulin overdose

Contact medical control for specific information about individual toxic exposures and treatments.

- Assess mental status.
- Expose the child only as necessary to perform further assessments. Maintain the child's body temperature throughout the examination.
- If the child's condition is critical or unstable, initiate transport. Perform focused history and detailed physical examination en route to the hospital if patient status and management of resources permit.
- If the child's condition is stable, perform focused history and detailed physical examination on the scene, then initiate transport.
- Reassess the patient frequently.
- Contact medical control for additional instructions.

SECTION 7.15 - NEAR DROWNING

Hypothermia may offer some degree of cerebral protection in a near-drowning incident, but it also increases cardiac irritability. Refractory dysrhythmias may arise during assessment and treatment. Contact medical control as early as possible.

- Ensure scene safety.
- Perform a scene survey to assess environmental conditions and mechanism of illness or injury. If hazardous conditions are present (such as swift water, hazardous materials, electrical hazard, or confined space), contact an appropriate agency before approaching the patient. Wait for the designated specialist to secure the scene and patient as necessary.
- Form a general impression of the patient's condition.
- Observe standard precautions.
- Establish patient responsiveness. If cervical spine trauma is suspected, manually stabilize the spine.
- Assess the patient's airway for patency, protective reflexes and the possible need for

advanced airway management. Look for signs of airway obstruction.

- Open the airway using head tilt/chin lift if no spinal trauma is suspected, or modified jaw thrust if spinal trauma is suspected.
- Suction as necessary.
- Consider placing an oropharyngeal or nasopharyngeal airway adjunct if the airway cannot be maintained with positioning and the patient is unconscious.
- Assess breathing. Obtain pulse oximeter reading.
- If breathing is inadequate, assist ventilation using a bag-valve-mask device with high- flow, 100% concentration oxygen. If abdominal distention arises, consider placing a nasogastric tube to decompress the stomach.
- If the airway cannot be maintained by other means, including attempts at assisted ventilation, or if prolonged assisted ventilation is anticipated, perform endotracheal intubation. Consider administration of pharmacological adjuncts, such as sedatives and paralytic agents, to aid with intubation as permitted by medical direction. Confirm placement of endotracheal tube using clinical assessment and end-tidal CO_2 monitoring as per medical direction.

- If breathing is adequate, place the child in a position of comfort and administer high- flow, 100% concentration oxygen as necessary. Use a nonrebreather mask or blow-by as tolerated.
- Assess circulation and perfusion.
- Initiate cardiac monitoring and determine rhythm. Consult the appropriate protocol for treatment of specific dysrhythmias.
- Obtain vascular access. Administer normal saline at a sufficient rate to keep the vein open.
- Assess mental status.
- If spinal trauma is suspected, continue manual stabilization, apply a rigid cervical collar, and immobilize the patient on a long backboard or similar device.
- Expose the child only as necessary to perform further assessments. Maintain the child's body temperature throughout the examination.
- If the child's condition is critical or unstable, initiate transport as quickly as possible. Perform focused history and detailed physical examination en route to the hospital if patient status and management of resources permit.
- If the child's condition is stable, perform focused history and detailed physical examination on the scene, then initiate transport.
- Reassess patient frequently.
- Contact medical control for additional instructions

SECTION 7.16 - PAIN MANAGEMENT

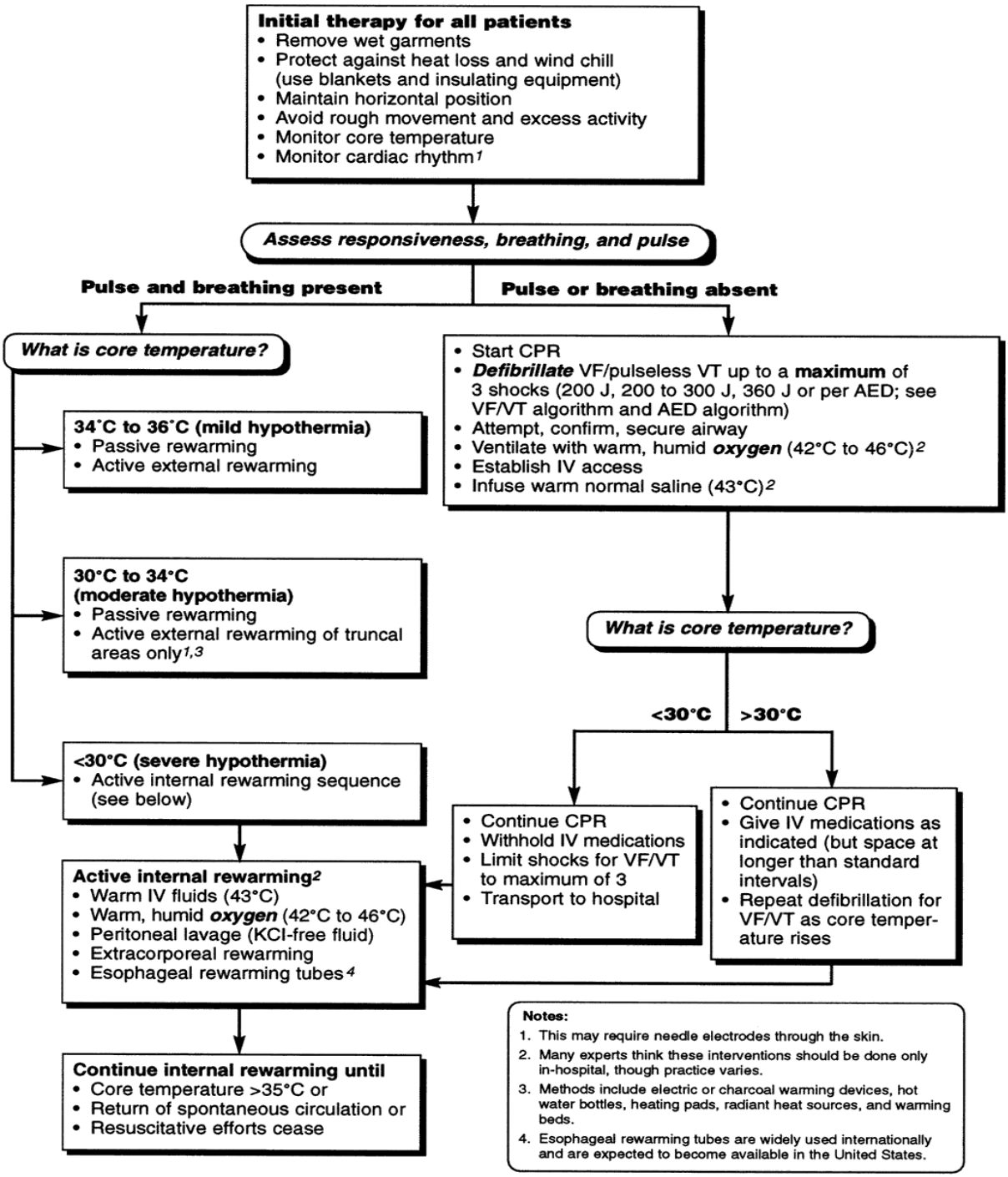
This protocol is intended for patients who require pain management in addition to other clinical interventions. Pain medication often causes sedation and affects a patient's mental status. As a result analgesia should not be administered in a patient with head trauma.

- Ensure scene safety.
- Perform a scene survey to assess environmental conditions and mechanism of illness or injury.
- Form a general impression of the patient's condition.
- Observe standard precautions.
- Establish patient responsiveness. If cervical spine trauma is suspected, manually stabilize the spine.
- Assess the patient's airway for patency, protective reflexes and the possible need for advanced airway management. Look for signs of airway obstruction.
- Open the airway using head tilt/chin lift if no spinal trauma is suspected, or modified jaw thrust if spinal trauma is suspected.
- Suction as necessary.
- Consider placing an oropharyngeal or nasopharyngeal airway adjunct if the airway cannot be maintained with positioning and the patient is unconscious.
- If the airway cannot be maintained by other means, including attempts at assisted ventilation, or if prolonged assisted ventilation is anticipated, perform endotracheal intubation. Consider administration of pharmacological adjuncts, such as sedatives and paralytic agents, to aid with intubation as permitted by medical direction. Confirm placement of endotracheal tube using clinical assessment and end-tidal CO_2 monitoring as per medical direction.

- Assess breathing. Carefully note adequacy of ventilation. Obtain pulse oximeter reading.
- If breathing is inadequate, assist ventilation using a bag-valve-mask device with high-flow, 100% concentration oxygen. If abdominal distention arises, consider placing a nasogastric tube to decompress the stomach.

- If breathing is adequate, place the child in a position of comfort and administer high- flow, 100% concentration oxygen as necessary. Use a nonrebreather mask or blow-by as tolerated.
- Assess circulation and perfusion. Obtain baseline blood pressure.
- Obtain vascular access. Administer normal saline at a sufficient rate to keep the vein open.
- Assess mental status.
- Expose the child only as necessary to perform further assessments. Maintain the child's body temperature throughout the examination.
- If the child's condition is critical or unstable, initiate transport. Perform focused history and detailed physical examination en route to the hospital if patient status and management of resources permit.
- If the child's condition is stable, perform focused history and detailed physical examination on the scene, then initiate transport.
- Assess the patient's pain using a numerical scale or visual analogue scale as appropriate to child's abilities.
- Administer one of the following analgesic agents:
    - Morphine 0.1 mg/kg (maximum individual dose 10 mg) via intravenous or subcutaneous route
    - Fentanyl 1.0 mcg/kg (maximum individual dose 100 mcg) via intravenous route
    - Nitrous oxide
- After drug administration, reassess the patient using the appropriate pain scale. Carefully note adequacy of ventilation and perfusion.
- Reassess the patient frequently.
- Contact medical control for further instructions.

SECTION 7.17 – HYPOTHERMIA



SECTION 8.1 CODE BLUE PROTOCOL (ACLS)

- ACLS reflects the newest American heart association guidelines to be followed globally.
- Training in resuscitation is a fundamental requirement for medical, nursing and paramedical staff.
- Most trials are to be conducted periodically to upgrade the skills and improve the efficiency of the staff members.
- Code blue team is constituted which is activated in response to an emergency / crisis call requiring cardiopulmonary resuscitation.
- Code blue is activated by paging systems / Telephone and is alerted by the staff witnessing the event.

- **Code team:**
  - ER Physician / CMO
  - Anesthetist
  - Primary consultant / registrar
  - Duty cardiologist / registrar / DMO
  - Nurse - Shift incharge
  - Nurse taking care of the patient
  - Male nurse - 2
  - Ward boy.
  - Transport boys – 2
  - Security personnel
  - Lift boy

All code team members having direct patient contact will be certified in basic life support. and current Advance Cardiac Life Support (ACLS)

In situation where team leader is occupied with cases in emergency department, the anesthetist will play a dual role of a team leader and taking care of airway and ventilations.

- **Equipment required:**
  - All airway equipment.
  - Defibrillator
  - Suction apparatus
  - Oxygen cylinder
  - Emergency drugs
- **Code protocol**
  - **Phase I:**
  - Consists of assessing the victim, identifying code, initiating cardiopulmonary resuscitation (CPR), and obtaining emergency equipment.
  - This phase lasts until the code team arrives--within about 3 minutes.

  First responder:
  - Assesses victim
  - Identifies Code
  - Call for help
  - Immediately initiate one-person CPR

  Second Responder:
  - Calls Code specifying the exact ward and bed number. (eg; 5th A, room no. 505)
  - Arranges for all necessary equipment
  - Assists in two person CPR.

  Phase II :
  - Begins with the arrival of the code team.
  - It encompasses the initiation of advanced cardiac life support (ACLS) protocols and evaluation of the patient's response to therapy.

  Team leader:

- First, one person is designated as the code team leader.
- Usually an **ER physician** directs and coordinates the resuscitation efforts
- The team leader usually stands at the foot or head of the bed and needs a clear view of the patient to ensure that procedures and patient assessments are performed rapidly and correctly.
- Team leader also assigns roles to other members of the code blue team if any member is engaged with another case. (eg; if duty cardiologist is in cath lab, defibrillation can be done by any other member the team leader deems fit)

•Airway:

- The most experienced person in managing airway and breathing (Usually **Anaesthetist**) should be in charge of the airway and breathing.
- Will instruct the preparation of definitive airway while giving rescue breaths using Bain's circuit / AMBU bag during CPR

•Access:

- 2 IV Lines (preferably 18G or less) secured in each hand by **shift incharge**
- Maintain I.V. lines, prepare and administer drugs and fluids, regulate I.V. drip rates and carefully dispose of needles
- Deliver drugs as instructed by the team leader promptly.
- Take blood samples / ABG
- Should have full knowledge of drugs present in the code blue drugs tray.

•Defibrillation:

- **Primary consultant / Duty cardiologist / registrar** must be prepared for defibrillation
- Most victims of cardiac arrest die from lethal arrhythmias. Rapid defibrillation is the key to survival from ventricular fibrillation

•Chest Compression:

- Initially started by first responder and the second responder.
- Relieved later by the **male nurses** in code team
- **Nurse incharge of the patient/ male nurses** should be trained in performing effective CPR

- **Counselling**
- To patients attenders to be done by the **primary consultant** or the treating doctor.
- **Time keeper / recorder:**
  - At the start of the code**, nurse incharge of the patient** should begin recording the events and interventions on record.
  - Document all events and interventions, including the type and time of arrest, respiratory management, procedures, medication administration, I.V. fluids and medications, vital signs, cardiac rhythms, defibrillations, patient response to treatment, patient outcome, and termination of code.

- **Role of other members**
- **Administrator / RMO** to smoothen the transfer process to a high dependency unit / ICU.
- **Ward boy** assists the nursing staff involved in the code and follows orders of the team leader.
- **Transport boys** to help in shifting of patients carefully to the high dependency unit / ICU.
- **Security** to maintain order at the concerned ward and prevent overcrowding.
- **Lift boy** to keep lift ready in concerned floor and wait till patient is shifted.

•**Phase III**

- Begins after initial ACLS measures have been instituted and their effectiveness evaluated.
- The victim's cardiac rhythm and response to treatment continue to guide interventions.
- Upon return of spontaneous circulation and stabilization the patient should be transferred to a high dependency unit / ICU immediately under supervision of the **team leader** and the **anesthetist**.
- Further care is directed by the **primary consultant** and the **ICU incharge.**
- Detailed documentation of the code, the type of arrest, interventions used, drugs administered, blood gas values, the time of arrest, time of initiation of CPR and duration of arrest is done by the **team leader** with the help of the time keeper.

Scene 2

CODE BLUE TEAM ARRIVES

⬇

INTRODUCE THEMSELVES

⬇

ROLE 1-MALE NURSE /ICU INCHARGE: Relieves first responder (WARD INCHARGE) and continues CPR and act as BACKUP COMPRESSOR.

⬇

FIRST RESPONDER(WARD INCHARGE) ⟶ checks BP,sugar levels and acts as backup compressor

ROLE 2:RESPIRATORY THERAPIST : Relieves second responder (ward nurse)from airway and arranges equipments for advanced airway

⬇

ROLE 3:SECOND RESPONDER (WARD NURSE) ⟶ act as **RECORDER** standing on right side of patients

foot AND RECORD ALL EVENTS DURING RESUCITATION

ROLE 4:ER NURSE INCHARGE: Operates Defebrillator,IV access, administer drugs as per orders with crash cart.

keeps sharp objects container left to trolley.

Pre arrange inj Epinephrine,ATROPINE,AMIODARONE.

ROLE 5: ER PHYSICIAN/ANESTHETIST: Goes for advanced airway in case of difficult intubation and acts as TEAM LEADER.

COORDINATOR: COUNCELLING TO ATTENDERS regarding poor prognosis/consent for resuscitation and procedures and shifting to ICU

TRANSPORT: Getting ready for transport with stretcher

SECURITY: CALMING AND CONTROLLING ATTENDERS,CLEARS THE WAY,SHOWING WAY TO TEAM MAKING ARRANGEMENTS FOR LIFT READY.

⬇

TERMINATION OF TEAM AFTER ROSC

⬇

CODE GREEN

Scene 1

1.**ward incharge** check alertness

⬇

Asks for help and to activate code blue

⬇

Check pulse and breathing lessthan 10 sec

⬇

Release side ways and keeps cardboard on back and starts compressions @ 30:2

2. ward nurse :

Brings patients medical record,brings crash trolley and defibrillator

Acts as second compressor relieving to first responder(ward incharge)

And continues CPR

1.WARD INCHARGE:

ATTACH OXYGEN AND SUCTION

⬇

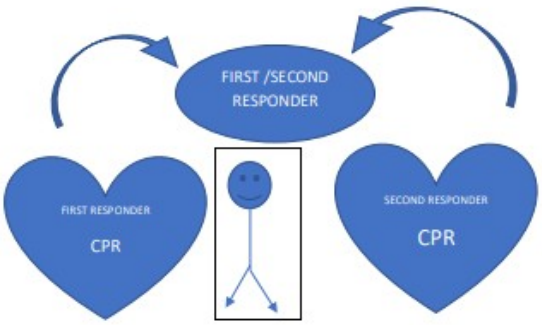
GIVES 2 BREATHS WITH AMBU

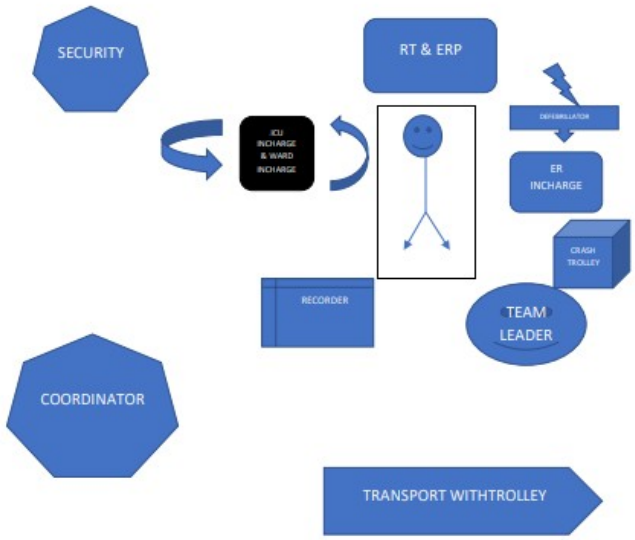
⬇

ATTACHES DEFIBRALLOTOR LEADS

⬇

SWITCH ROLES WITH SECOND RESPONDER





SECTION 8.3 RESPIRATORY COMPROMISE

1. Establishing and maintaining a patent airway with adequate ventilation is a critical yet often mismanaged skill in BLS and ACLS.

Case 1 presents adults compromised by shortness of breath progressing to respiratory arrest with a pulse.

2. **CRITICAL ACTIONS:**

a. Recognize an emergency and respond:

b. Primary ABCD Survey:

Open the airway (head tilt-chin lift or, if trauma is suspected, jaw thrust without headextension)

Check for breathing (look, listen, and feel, at least 5 seconds but not more than 10 seconds)

If breathing is absent or inadequate, give 2 breaths with bag- mask(1 second per breath) that cause the chest to rise

Check carotid pulse. Do not initiate chest compressions if pulse is present

Perform rescue breaths at the correct rate of 1 breath every 5 to 6 seconds (10 to 12 breaths/min)

c. Secondary ABCD Survey:

Remember

- Treat associated arrhythmias if they are not corrected **first** by good ventilation.
- Patient should not go without O2 for greater than 30 seconds during intubation or assessments.
- Right mainstem bronchus intubations are common due to its straighter angle and larger diameter.

3. **UNACCEPTABLE ACTIONS**

a. Fail to assess and manage the airway.

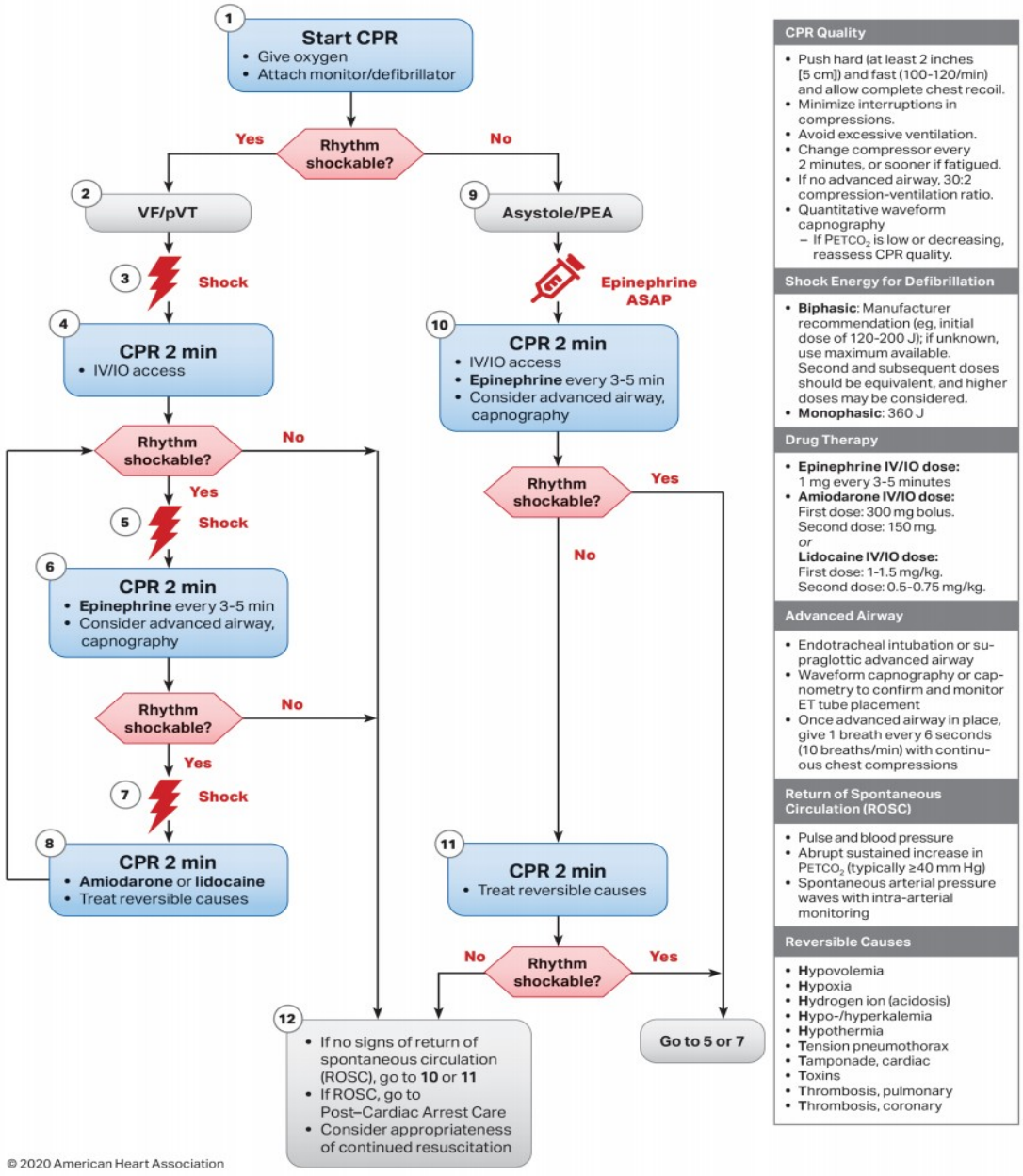
b. Use inappropriate airway adjuncts or insufficient amounts of O2.

c. Fail to oxygenate the patient prior to intubation attempts.

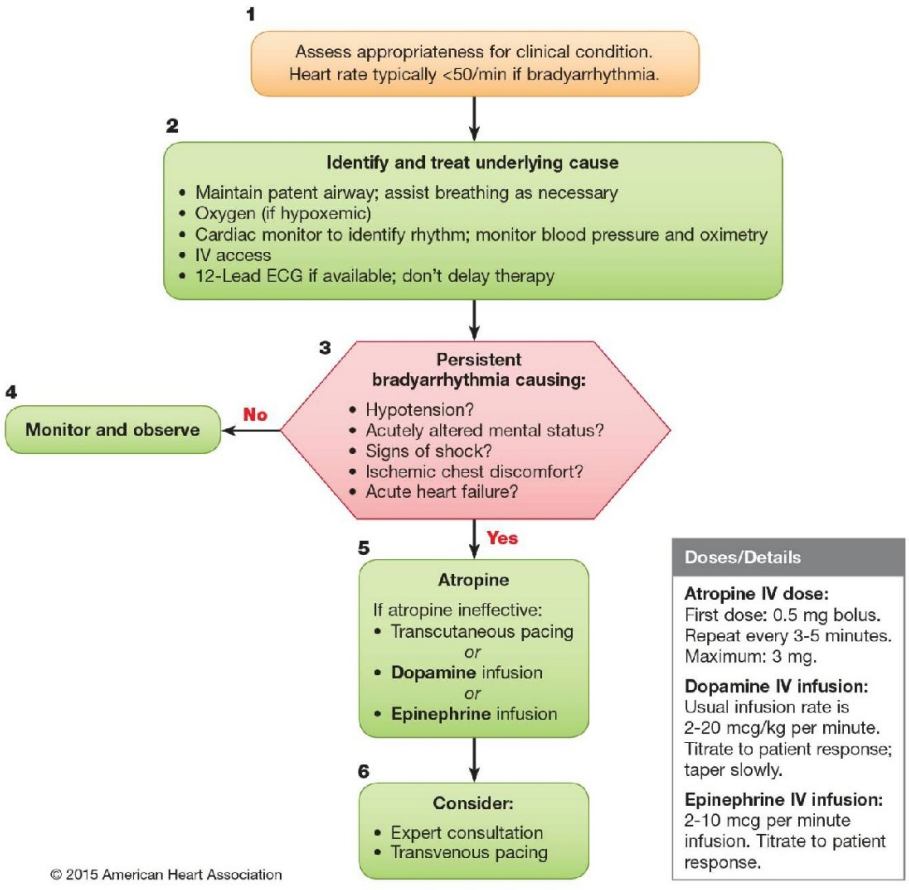
d. Allow intubation or assessment to take >30 seconds (patient is not being ventilated).

e. Fail to confirm tube placement by primary and secondary methods.

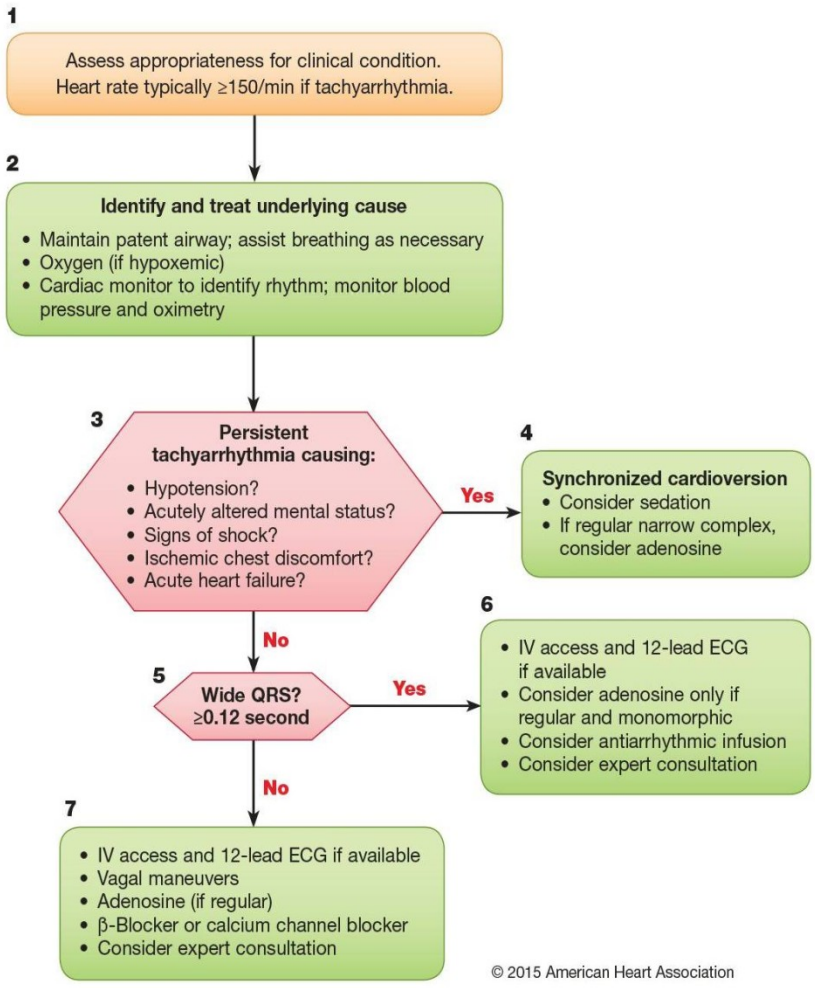
Figure 4. Adult Cardiac Arrest Algorithm.



Adult Bradycardia With a Pulse Algorithm

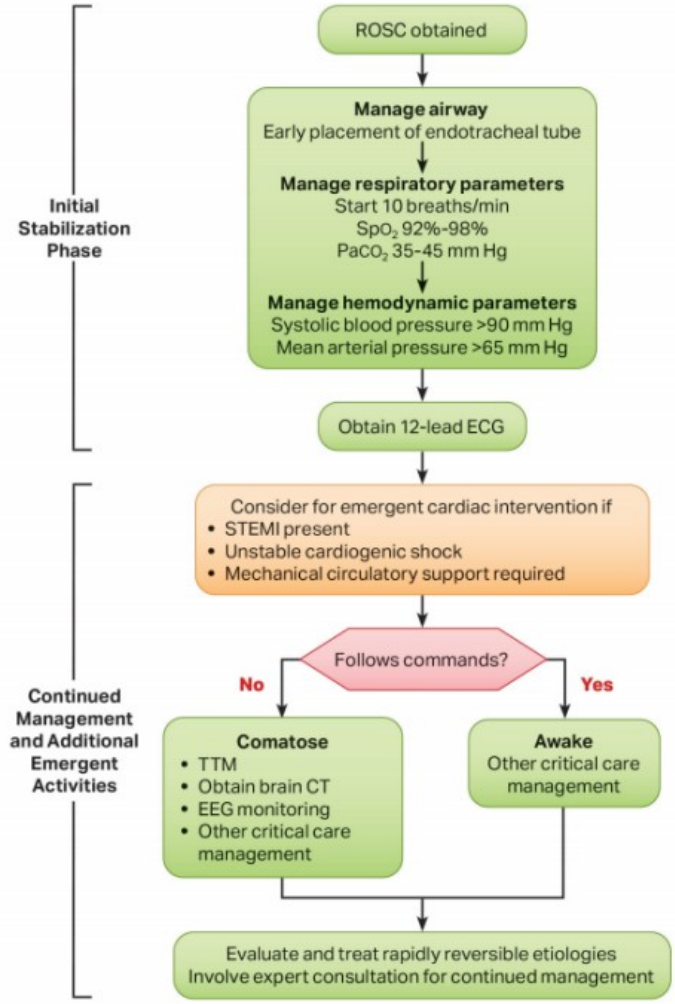


Adult Tachycardia With a Pulse Algorithm



Doses/Details
Synchronized cardioversion: Initial recommended doses: • Narrow regular: 50-100 J • Narrow irregular: 120-200 J biphasic or 200 J monophasic • Wide regular: 100 J • Wide irregular: defibrillation dose (*not* synchronized)
Adenosine IV dose: First dose: 6 mg rapid IV push; follow with NS flush. Second dose: 12 mg if required.
Antiarrhythmic Infusions for Stable Wide-QRS Tachycardia
Procainamide IV dose: 20-50 mg/min until arrhythmia suppressed, hypotension ensues, QRS duration increases >50%, or maximum dose 17 mg/kg given. Maintenance infusion: 1-4 mg/min. Avoid if prolonged QT or CHF.
Amiodarone IV dose: First dose: 150 mg over 10 minutes. Repeat as needed if VT recurs. Follow by maintenance infusion of 1 mg/min for first 6 hours.
Sotalol IV dose: 100 mg (1.5 mg/kg) over 5 minutes. Avoid if prolonged QT.

Figure 7. Adult Post–Cardiac Arrest Care Algorithm.



Initial Stabilization Phase

Resuscitation is ongoing during the post-ROSC phase, and many of these activities can occur concurrently. However, if prioritization is necessary, follow these steps:

- Airway management: Waveform capnography or capnometry to confirm and monitor endotracheal tube placement
- Manage respiratory parameters: Titrate FiO_2 for SpO_2 92%-98%; start at 10 breaths/min; titrate to $PaCO_2$ of 35-45 mm Hg
- Manage hemodynamic parameters: Administer crystalloid and/or vasopressor or inotrope for goal systolic blood pressure >90 mm Hg or mean arterial pressure >65 mm Hg

Continued Management and Additional Emergent Activities

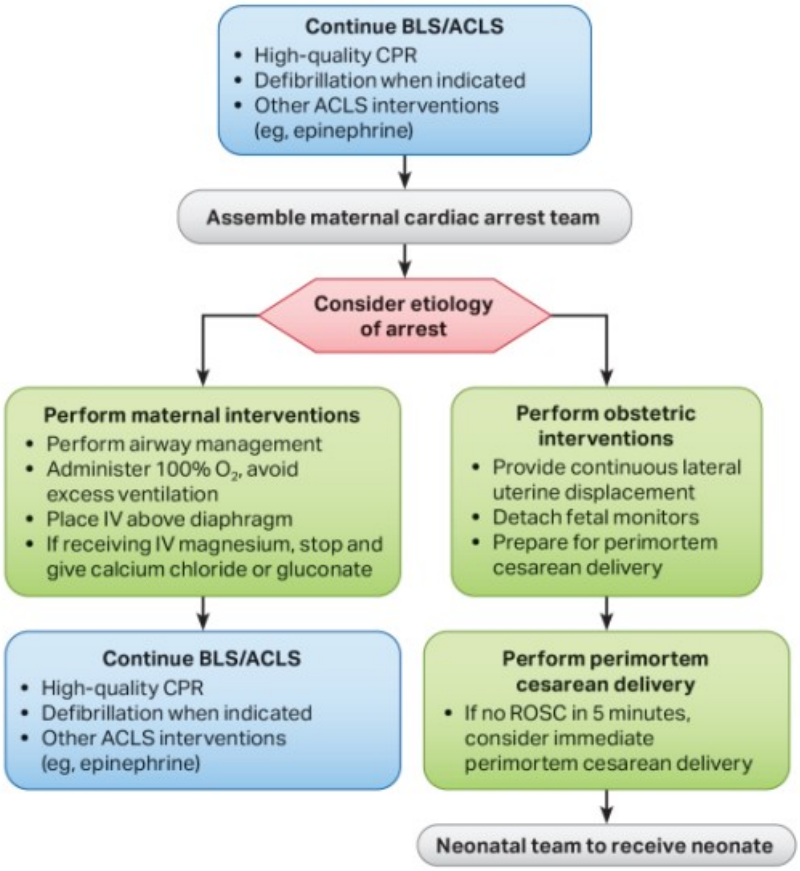
These evaluations should be done concurrently so that decisions on targeted temperature management (TTM) receive high priority as cardiac interventions.

- Emergent cardiac intervention: Early evaluation of 12-lead electrocardiogram (ECG); consider hemodynamics for decision on cardiac intervention
- TTM: If patient is not following commands, start TTM as soon as possible; begin at 32-36°C for 24 hours by using a cooling device with feedback loop
- Other critical care management
  - Continuously monitor core temperature (esophageal, rectal, bladder)
  - Maintain normoxia, normocapnia, euglycemia
  - Provide continuous or intermittent electroencephalogram (EEG) monitoring
  - Provide lung-protective ventilation

H's and T's

Hypovolemia
Hypoxia
Hydrogen ion (acidosis)
Hypokalemia/**h**yperkalemia
Hypothermia
Tension pneumothorax
Tamponade, cardiac
Toxins
Thrombosis, pulmonary
Thrombosis, coronary

Figure 9. Cardiac Arrest in Pregnancy In-Hospital ACLS Algorithm.



Maternal Cardiac Arrest

- Team planning should be done in collaboration with the obstetric, neonatal, emergency, anesthesiology, intensive care, and cardiac arrest services.
- Priorities for pregnant women in cardiac arrest should include provision of high-quality CPR and relief of aortocaval compression with lateral uterine displacement.
- The goal of perimortem cesarean delivery is to improve maternal and fetal outcomes.
- Ideally, perform perimortem cesarean delivery in 5 minutes, depending on provider resources and skill sets.

Advanced Airway

- In pregnancy, a difficult airway is common. Use the most experienced provider.
- Provide endotracheal intubation or supraglottic advanced airway.
- Perform waveform capnography or capnometry to confirm and monitor ET tube placement.
- Once advanced airway is in place, give 1 breath every 6 seconds (10 breaths/min) with continuous chest compressions.

Potential Etiology of Maternal Cardiac Arrest

A Anesthetic complications
B Bleeding
C Cardiovascular
D Drugs
E Embolic
F Fever
G General nonobstetric causes of cardiac arrest (H's and T's)
H Hypertension

Pediatric Bradycardia With a Pulse Algorithm.

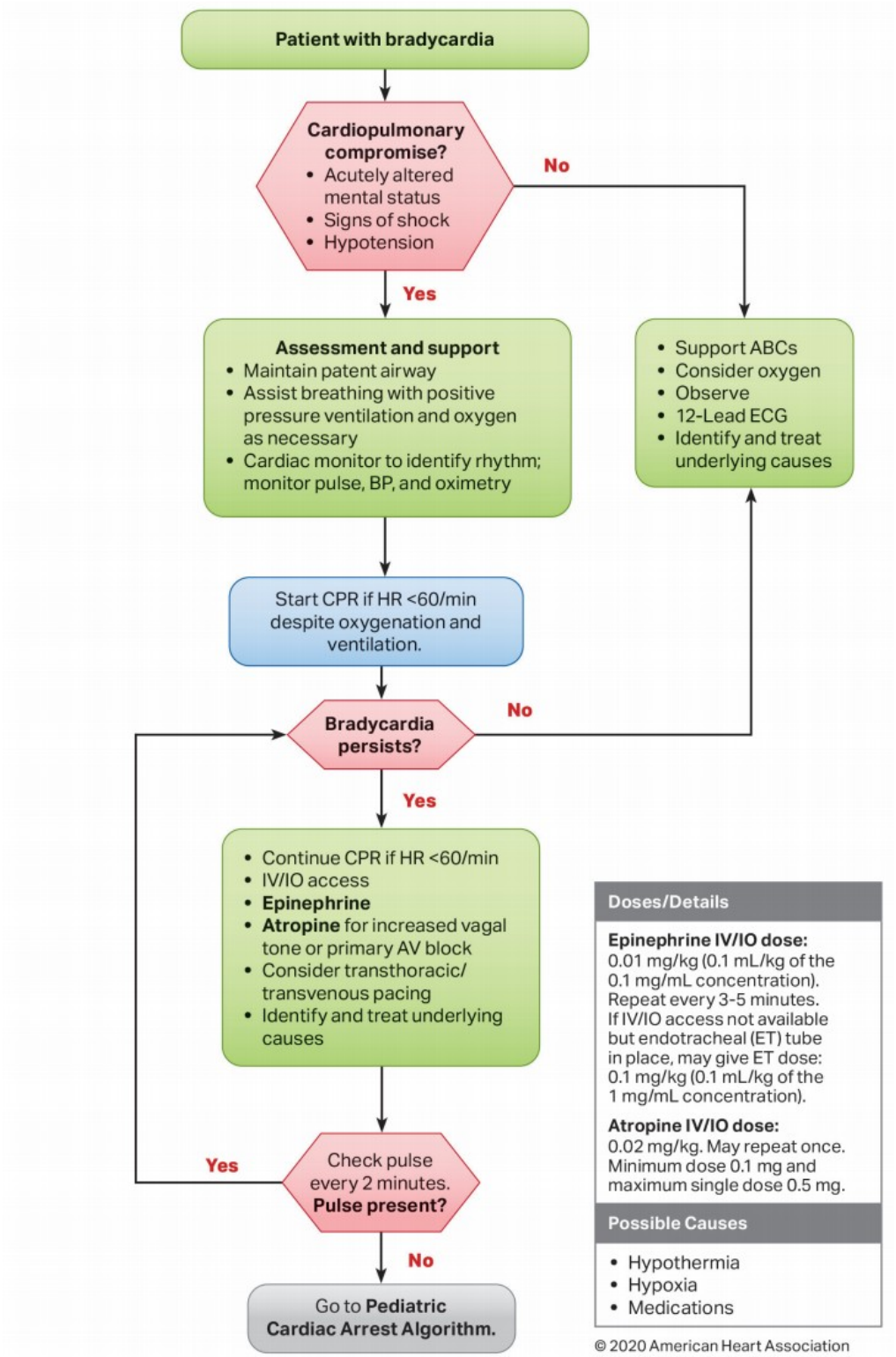


Figure 13. Pediatric Tachycardia With a Pulse Algorithm.

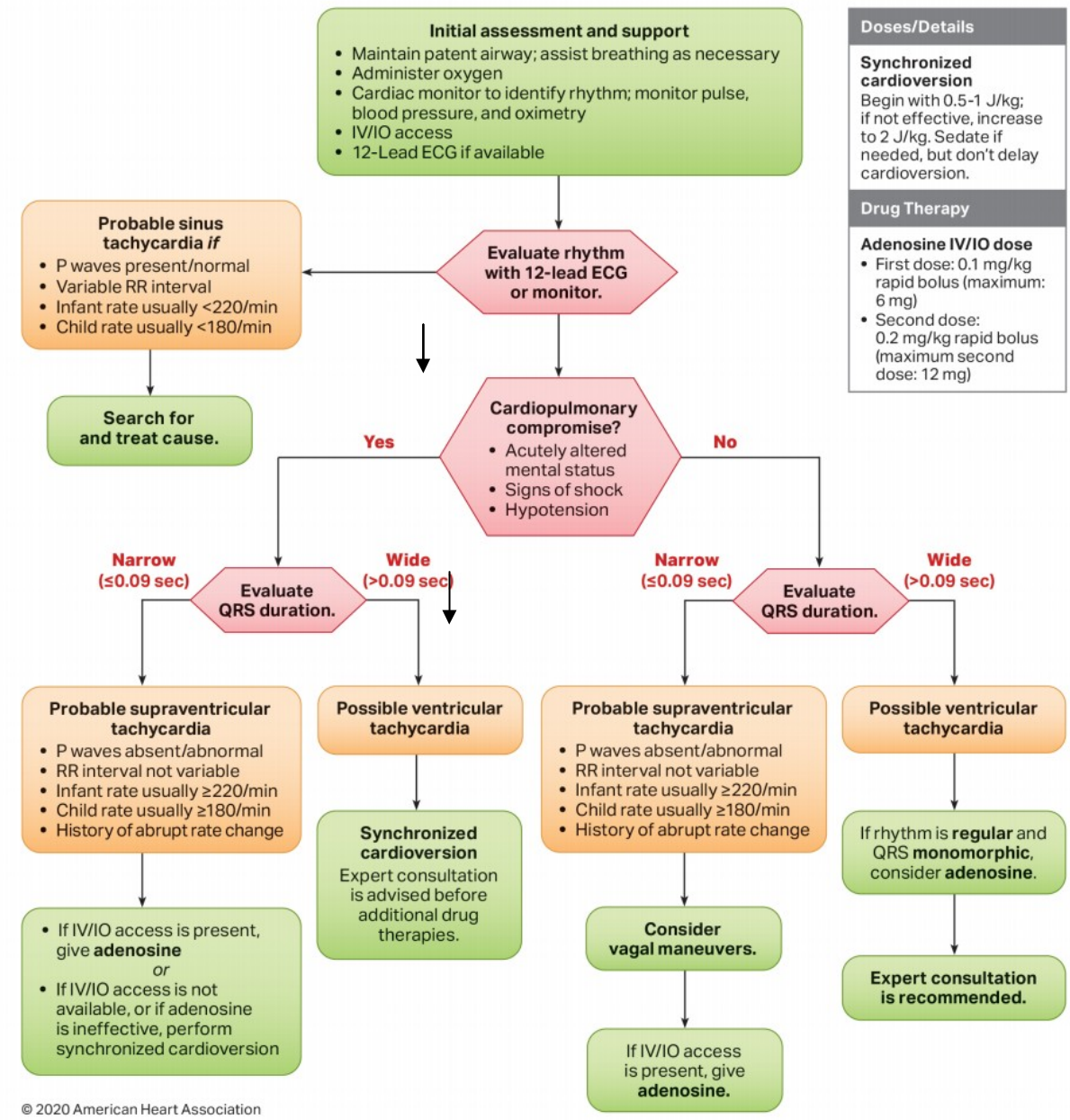
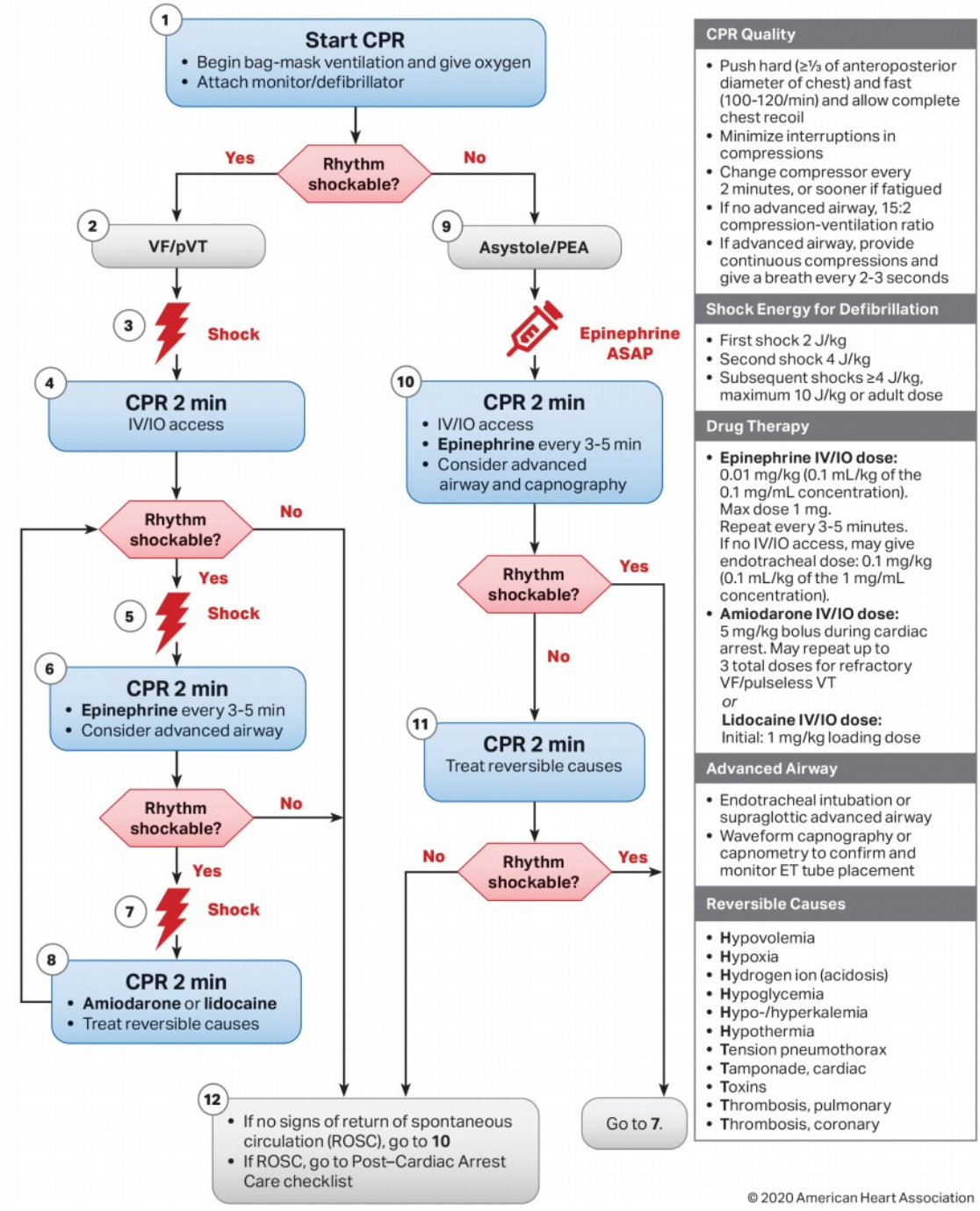
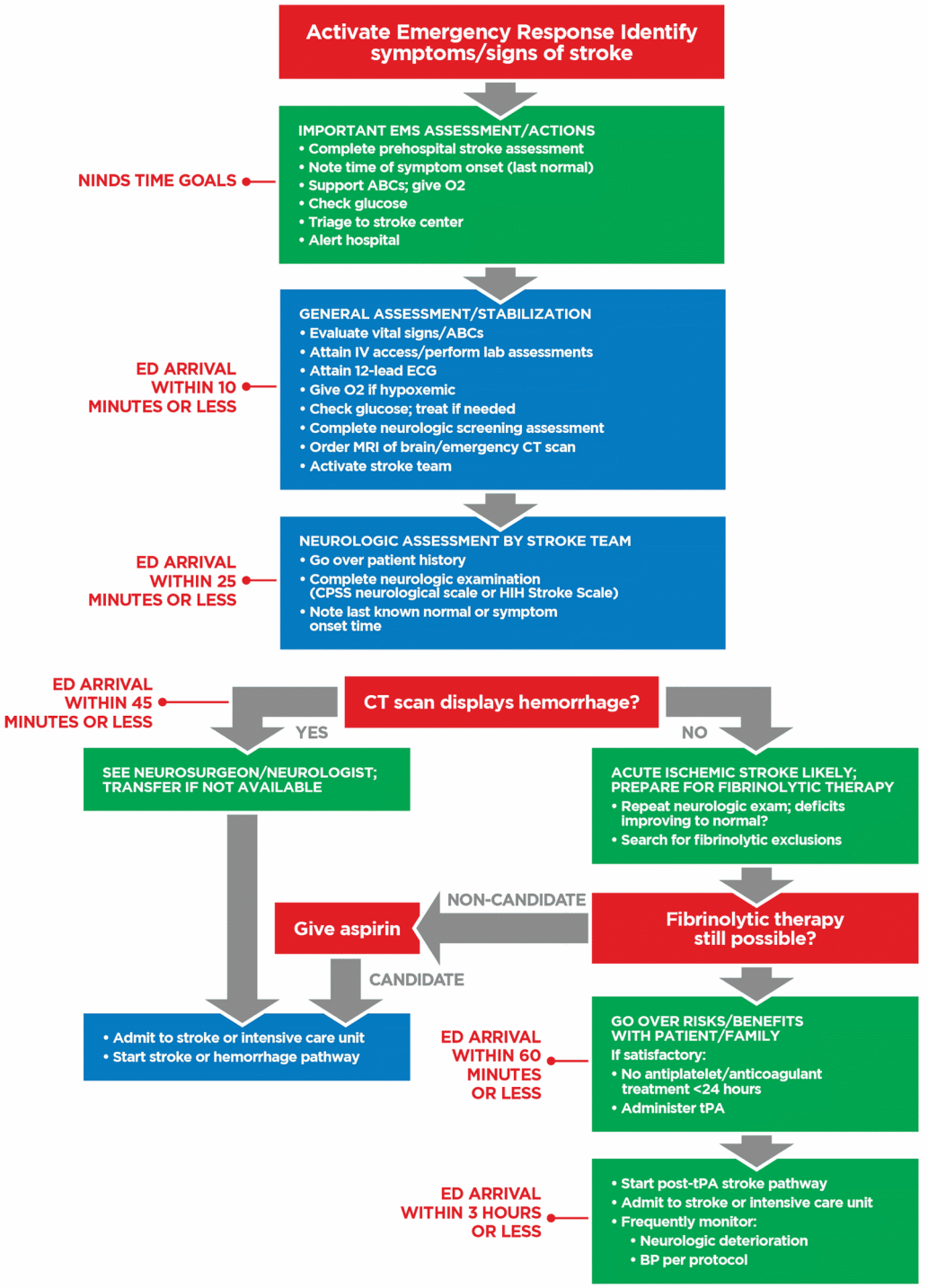


Figure 11. Pediatric Cardiac Arrest Algorithm.





STROKE **SECTION 8.6 PROTOCOL**

Time is BRAIN

Door to needle	→	60 min
Symptoms onset to needle	→	3hrs/4.5 hrs
Symptoms onset to endovascular therapy	→	6 hrs
Door to admission	→	3 hrs

Mnemonic for Exclusion criteria

S:SAH/SDH
H:HEPARIN USE IN 48 hrs
E:Elevated HTN>180/110mmhg
O:operations (cranial surgeries)
N:Neoplasm
T:TRAUMA (Head trauma)
Give:glucose <50mg/dl />400mg/dl
T:Thrombocytopenia (<1lakh)
P:PT>15sec
A:AV Malformation/anticoagulant use with INR>1.7
In:ICH
Stroke:Stroke in past 2 mnths

By Dr AHAMED NAEEMUDDIN

SHE WONT GIVE TPA In STROKE

1. Fibrinolytic checklist:

All boxes must be checked before tPA can be given

Inclusion criteria:

Yes

- ☐ Age 18 yrs or older?
- ☐ Clinical diagnosis of ischemic stroke with a measurable neurologic deficit?
- ☐ Time of symptom onset (when patient was last seen normal) well established as <180 minutes (3 hours) before treatment would begin?

Exclusion criteria:

Contraindications No

- ☐ Evidence of intracranial haemorrhage on pre-treatment noncontract head CT?
- ☐ Clinical presentation suggestive of subarachnoid haemorrhage even with normal CT?
- ☐ CT shows multilobar infarction (hypodensity greater than 1/3rd cerebral hemisphere?
- ☐ History of intracranial haemorrhage?
- ☐ Uncontrolled hypertension: at the time treatment should begin, SBP>185 mmHg or DBP>110 mmHg despite repeated measurements?
- ☐ Known arteriovenous malformation, neoplasm or aneurysm?

- ☐ Acute bleeding diathesis, including but not limited to
  - Platelet count<100,000/mm³?
  - Heparin received within 48 hrs, resulting in an aPTT that is greater than upper limit of normal for laboratory?
  - Current use of anticoagulant (eg. Warfarin) that has produced an elevated INR>1.7 or PT>15 seconds?
- ☐ Within 3 months of intracranial or intraspinal surgery, serious head trauma, or previous stroke?
- ☐ Arterial puncture at a non-compressible site within past 7 days?

Relative contraindications/precautions:

May receive fibrinolysis if 1 or 2 relative contraindications are present

- ☐ Only minor or rapidly improving stroke symptoms (clearing spontaneously)?
- ☐ Within 14 days of major surgery or serious trauma?
- ☐ Recent gastrointestinal or urinary tract hemorrhage (within previous 21 days)?
- ☐ Recent acute myocardial infarction (within previous 3 months)?

2. Fibrinolysis:

tPA	
Dose	**0.9 mg/kg with max dose of 90 mg**
Initial bolus	**10% of the above dose over 1 minute**
Infusion dose	**Remainder as infusion over 1 hour**

3. **Blood pressure control:**

Blood pressure control, mm Hg	Treatment
A. Not eligible for fibrinolysis	
Systolic ≤ 220 or Diastolic ≤ 120	• Treat other symptoms of stroke (eg. Headache, pain, agitation, nausea, vomiting) • Treat other acute complications of stroke, including hypoxia, increased ICP, seizures or hypoglycaemia
Systolic > 220 or Diastolic 121 to 140	• Labetalol 10 to 20 mg IV for 1 to 2 minutes • May repeat or double every 10 minutes (max dose 300 mg) Or • Nicardipine 5 mg/hr IV infusion as initial dose; titrate to desired effect by increasing 2.5 mg/hr every 5 minutes to max of 15 mg/hr • Aim for a 10 to 15% reduction in blood pressure
Diastolic > 140	Nitroprusside 0.5 mcg/kg per minute IV infusion as initial dose with continuous blood pressure monitoring Aim for a 10 to 15% reduction in blood pressure
Blood pressure control,mm Hg	Treatment
B. Eligible for fibrinolytic therapy	
Pre-treatment	
Systolic > 185 or Diastolic > 110	• Labetalol 10 to 20 mg IV for 1 to 2 minutes • May repeat 1 time or nitropaste 1 to 2 inches
During/after treatment	
Monitor blood pressure	• Check blood pressure every 15 minutes for 2 hrs, then every 30 minutes for 6 hrs, and finally every hour for 16hrs
Diastolic > 140	• Sodium nitroprusside 0.5 mcg/kg per minute IV infusion as initial dose and titrate to desired blood pressure
Systolic > 230 or Diastolic 121 to 140	• Labetalol 10 to 20 mg IV for 1 to 2 minutes • May repeat or double every 10 minutes to max dose of 300 mg, or give initial labetalol dose, then start labetalol drip at 2 to 8 mg/minuteOr

	• Nicardipine 5 mg/hr IV infusion as initial dose and titrate to desired

	effect by increasing 2.5 mg/hr every 5 minutes to max of 15 mg/hr; if blood pressure is not controlled by nicardipine, consider sodium nitroprusside
Systolic 180 to230 or Diastolic 105 to 120	• Labetalol 10 mg IV for 1 to 2 minutes • May repeat or double every 10 minutes to max dose of 300 mg, or give initial labetalol dose, then start labetalol drip at 2 to 8 mg/minute

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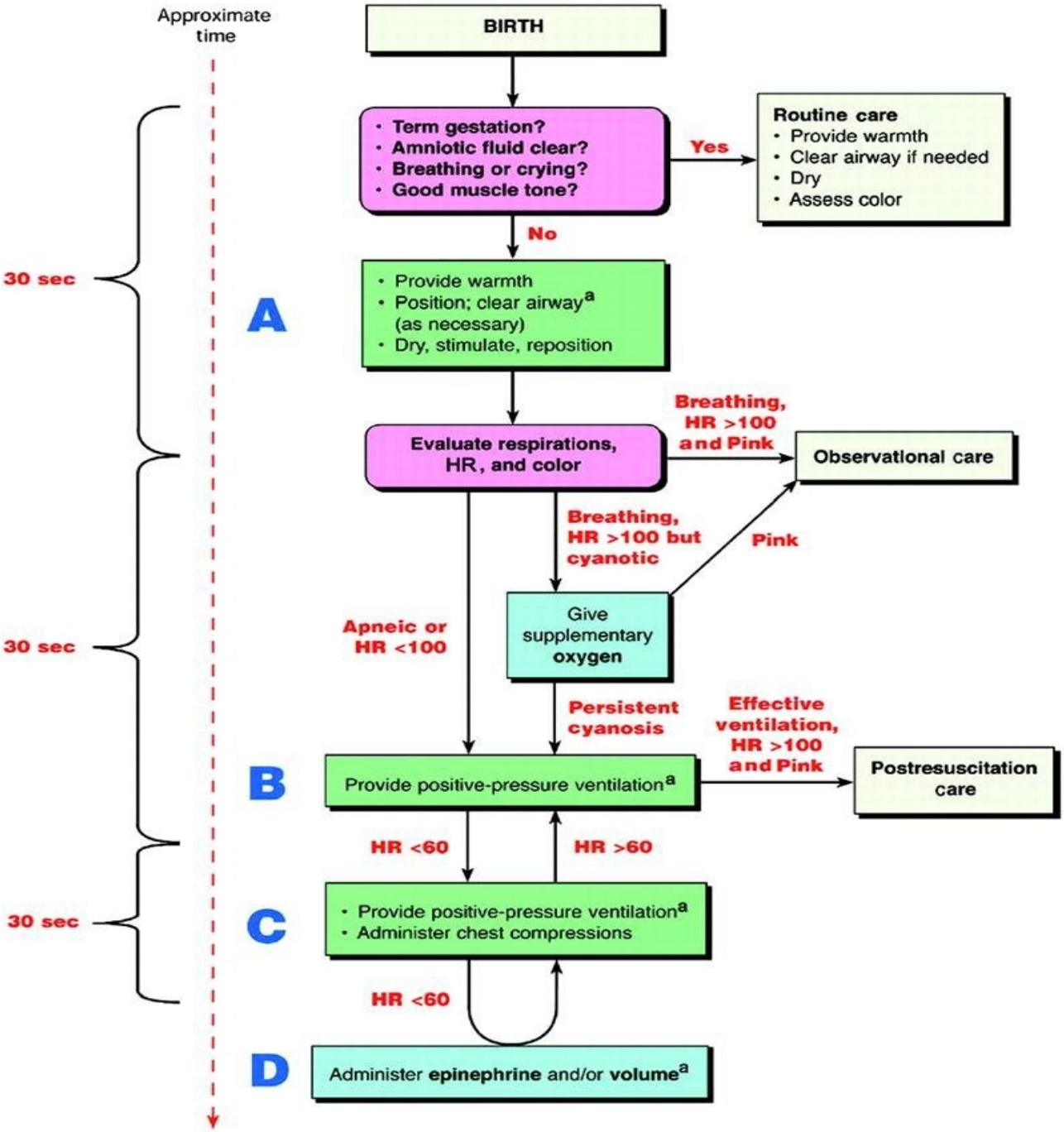
1. Guidelines for the early management of adults with ischemic stroke. A guideline from the American Heart Association/American Stroke Association Stroke Council, Clinical Cardiology Council, Cardiovascular Radiology and Intervention Council, and the Atherosclerotic Peripheral Vascular Disease and Quality of Care Outcomes in Research Interdisciplinary Working Groups
2. Adams HP Jr, del Zoppo G, Alberts MJ, Bhatt DL, Brass L, Furlan A, Grubb RL, Higashida RT, Jauch EC, Kidwell C, Lyden PD, Morgenstern LB, Qureshi AI, Rosenwasser RH, Scott PA, Wijdicks EFM, American Heart Association, American Stroke Association Stroke Council, Clinical Cardiology Council. Guidelines for the early management of adults with ischemic stroke: a guideline from the American Heart Association/American Stroke Association Stroke Council, Clinical Cardiology Council, Cardiovascular Radiology [trunc]. Stroke 2007 May;38(5):1655-711. [738 references]

SECTION 8.7 NEONATAL RESUSCITATION



REF: http://circ.ahajournals.org/cgi/content/full/112/24_suppl/IV-188

SECTION 8.7.2 - NEW BORN RESUSCITATION

This protocol describes procedures for the resuscitation of a newly delivered infant.

- Ensure scene safety.
- Perform a scene survey to assess environmental conditions.
- Observe standard precautions.
- Suction the infant's airway using a bulb syringe as soon as the infant's head is delivered and before delivery of the body. Suction the mouth first, then the nasopharynx
- Once the body is fully delivered, dry the baby, replace wet towels with dry ones, and wrap the baby in a thermal blanket or dry towel. Cover the infant's scalp to preserve warmth.
- Open and position the airway. Suction the infant's airway again using a bulb syringe. Suction the mouth first, then the nasopharynx.
- If thick meconium is present and the patient exhibits either absent or depressed respirations, hear rate less than 100 bpm or poor muscle tone, initiate endotracheal intubation before the infant takes a first breath. Suction the airway using an appropriate suction adapter while withdrawing the endotracheal tube. Repeat this procedure until the endotracheal tube is clear of meconium. If the infant's heart rate becomes bradycardic, discontinue suctioning immediately and provide ventilation until the infant recovers. Note; If the infant is already breathing or crying, this step may be omitted.
- Assess breathing and adequacy of ventilation.
- If ventilation is inadequate, stimulate the infant by gently rubbing the back and flicking the soles of the feet.
- If ventilation is still inadequate after brief stimulation, begin assisted ventilation at 40 to 60 breaths per minute using a bag-valve-mask device with high-flow, 100% concentration oxygen.

If the ventilation remains inadequate despite assisted ventilation perform endotracheal intubation.

•If ventilation is adequate and the infant displays central cyanosis, administer high-flow, 100% concentration oxygen via blow-by. Hold the tubing 1 to 1-1/2 inches from the infant's mouth and nose and cup a hand around the end of the tubing to help direct the oxygen flow toward the infant's face.

•Assess heart rate by auscultation or by palpation of the brachial artery or umbilical cord stump.

•If the heart rate is slower than 60 beats per minute after 30 seconds of assisted ventilation with high-flow, 100% concentration oxygen, initiate the following actions;

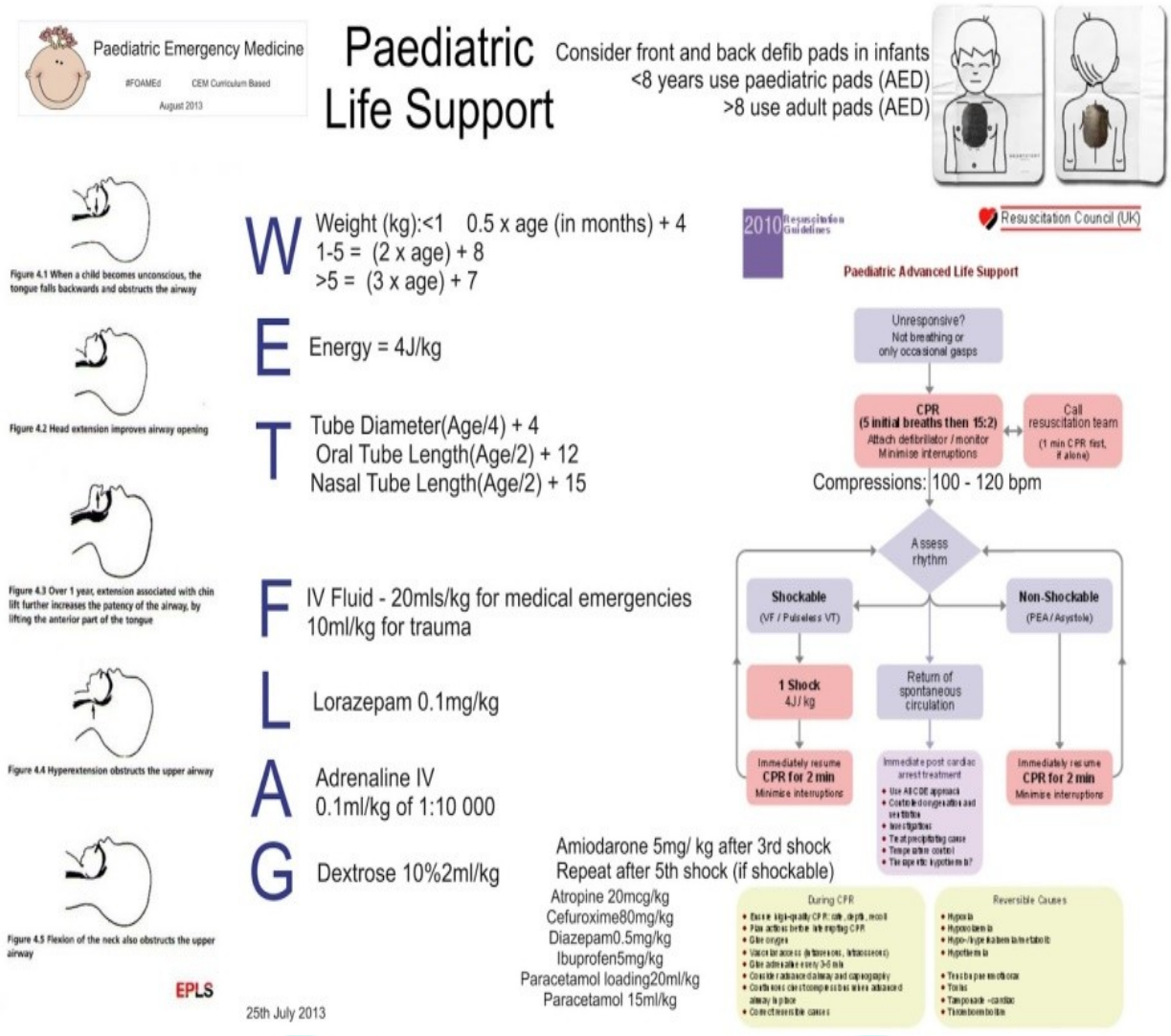
- Continue assisted ventilation.
- Perform endotracheal intubation if not already done.
- Begin chest compressions at a combined rate of 120/minute (three compressions to each ventilation with a pause for ventilation until the air way is secured with intubation).
- If there is no improvement inheart rate after intubation and ventilation, administer 1:10,000 epinephrine solution at 0.01 mgJkg (maximum individual dose 1.0 mg) via endotracheal tube, or establish vascular access and administer the same dose. In the neonate, vascular access may be obtained intraosseously, intravenously, or through the umbilical vein (if medical direction permits). Repeat epinephrine at the same dose every 3 to 5 minutes as needed.
- Initiate transport. Reassess heart rate and respirations en route.

•If the heart rate is faster than 100 beats per minute, initiate the following actions;

- Assess skin color. If central cyanosis is still present, continue blow-by oxygen.
- Initiate transport. Reassess heart rate and respirations en route.

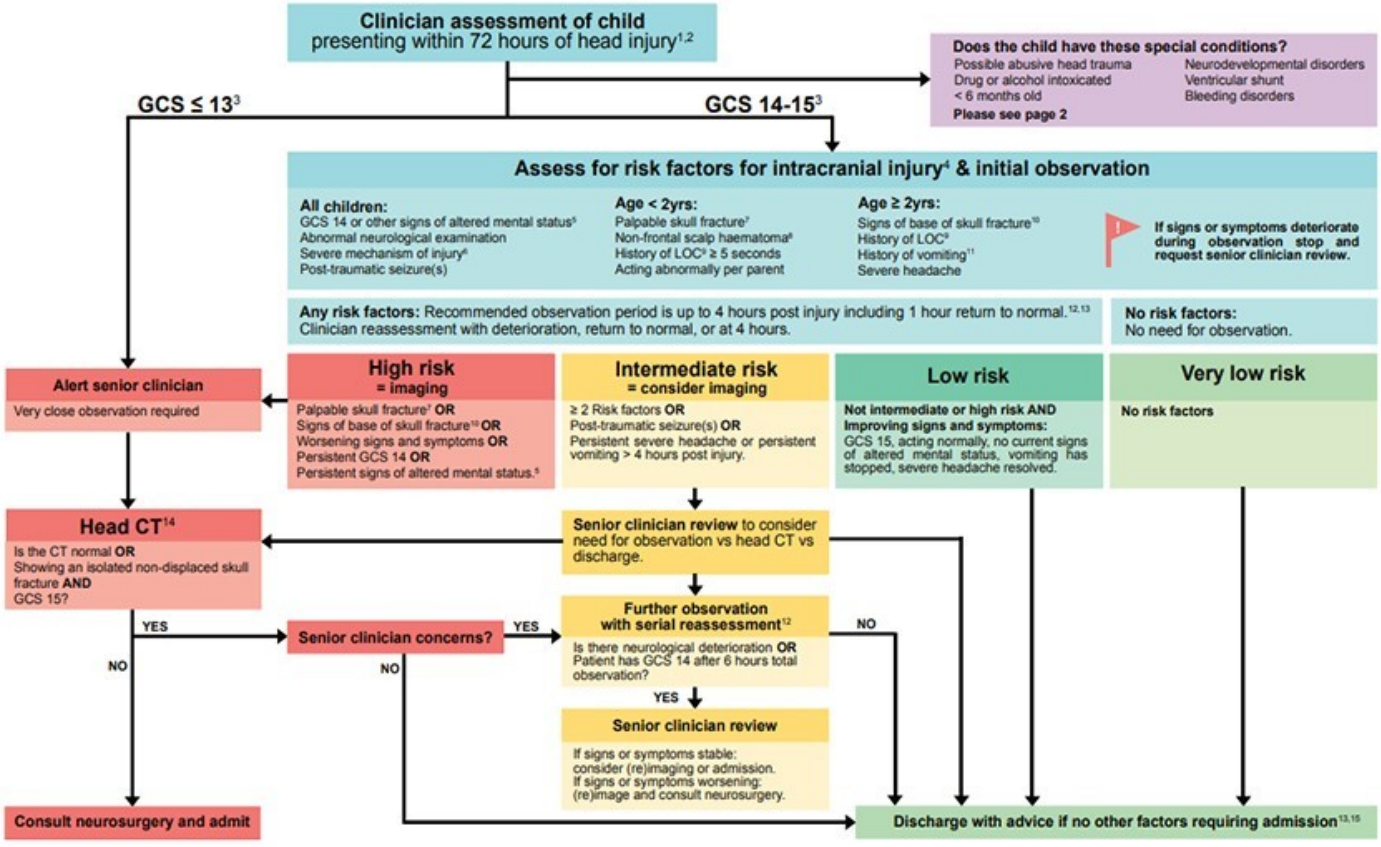
•Reassess the patient frequently.

Contact direct medical oversight for additional instructions


Paediatric Emergency Medicine
#FOAMEd CEM Curriculum Based
August 2013
Paediatric Life Support
Consider front and back defib pads in infants
<8 years use paediatric pads (AED)
>8 use adult pads (AED)
Figure 4.1 When a child becomes unconscious, the tongue falls backwards and obstructs the airway
Figure 4.2 Head extension improves airway opening
Figure 4.3 Over 1 year, extension associated with chin lift further increases the patency of the airway, by lifting the anterior part of the tongue
Figure 4.4 Hyperextension obstructs the upper airway
Figure 4.5 Flexion of the neck also obstructs the upper airway
EPLS
25th July 2013
W
Weight (kg):<1 0.5 x age (in months) + 4
1-5 = (2 x age) + 8
>5 = (3 x age) + 7
E
Energy = 4J/kg
T
Tube Diameter(Age/4) + 4
Oral Tube Length(Age/2) + 12
Nasal Tube Length(Age/2) + 15
F
IV Fluid - 20mls/kg for medical emergencies
10ml/kg for trauma
L
Lorazepam 0.1mg/kg
A
Adrenaline IV
0.1ml/kg of 1:10 000
G
Dextrose 10%2ml/kg
Amiodarone 5mg/ kg after 3rd shock
Repeat after 5th shock (if shockable)
Atropine 20mcg/kg
Cefuroxime80mg/kg
Diazepam0.5mg/kg
Ibuprofen5mg/kg
Paracetamol loading20ml/kg
Paracetamol 15ml/kg
2010 Resuscitation Guidelines
Resuscitation Council (UK)
Paediatric Advanced Life Support
Unresponsive?
Not breathing or
only occasional gasps
CPR
(5 initial breaths then 15:2)
Attach defibrillator / monitor
Minimise interruptions
Call
resuscitation team
(1 min CPR first,
if alone)
Compressions: 100 - 120 bpm
Assess
rhythm
Shockable
(VF / Pulseless VT)
Non-Shockable
(PEA / Asystole)
1 Shock
4J / kg
Return of
spontaneous
circulation
Immediately resume
CPR for 2 min
Minimise interruptions
Immediate post cardiac
arrest treatment
Use ABCDE approach
Immediately resume
CPR for 2 min
Minimise interruptions
During CPR
Reversible Causes

-
-
-
- ***REFERENCE***

  - ✓ ***AMERICAN HEART ASSICIATION 2020***
  - ✓ ***SEPSIS SURVIELLANCE CAMPAIGN SEPSIS 2018***
  - ✓ ***ATLS –AHA 2018 UPDATE***
  - ✓ ***PALS 2020***



Head injuries are frequent form of traumatic injuries.

Treatment

The management of head injured patients should be based on the Glasgow Coma Scale and Score (GCS) (see below in section on Coma).

Patients requiring hospitalization are –

- ***History of unconsciousness sat any time since injury.***
- ***Amnesia for the incident or subsequent events.***
- ***Severe and persistent headache, nausea, vomiting.***
- ***Bleeding from nose/ear.***
- ***Seizures or presence of black eye.***
- ***Suspected fracture of skull and haematoma of scalp.***

Minor injury (GCS 13-15) -

- ***Be kept under observation for a few hours and then sent home with proper instructions to the family members.***
- ***Decision for X-ray skull and CT scan depends on degree of trauma to the rest of body and skull, in addition to the worsening of symptoms and signs.***

Moderate head injury (GCS 9-12)-

- ***May be observed in the Emergency Department for a period of 4 hours with 30 minutely neurological observations (conscious state, PR, RR, BP, pupils and limb power).***
- ***May be discharged, if there is improvement at 4 hours to normal conscious state and no further vomiting (patient should be able to tolerate oral fluids in the hospital) and with full written and verbal instructions to caregiver on when to report back immediately.***
- ***If the patient is still drowsy or vomiting at 4 hours or there is any deterioration during this time,***

consult with a neurosurgeon regarding admission and further investigation.

Severe head injury (GCS 8 or less)-

Should be admitted to the hospital. A CT scan should be done in all such cases and treated as follows:

1. *Check and maintain ABC and BP (see section on Cardiopulmonary Resuscitation).*
2. *Establish IV access.*
3. *IV fluids according to volume loss: Crystalloids such as normal saline (0.9%) is a fluid of choice.*
4. *Check for and stabilize extra cranial injuries*
5. *A head injury may be accompanied by a cervical injury. If spinal injuries are excluded, then transfer the patient in side position with head down, to a tertiary care centre where neurosurgical interventions are available.*
6. *If spinal injury is suspected then transfer the patient on a hard board, place two sand bags on either side of the head.*
7. *Assessment by Glasgow Coma Scale (as given in a table 1.1 & 1.2 on Coma) Patients with score 8 or less or with deterioration of level of consciousness should be transferred to a centre where facilities for neurosurgical interventions are available.*
8. *A subdural, epidural or large intracerebral haematoma must immediately be attended to by a neurosurgeon.*
9. *Hyperthermia, hypoxia and hypercarbia exacerbate intracranial pressure, so does an awkward head position like acute flexion. These conditions must be appropriately treated, if necessary by mechanical ventilation.*
10. *In case of raised intracranial pressure, give Inj. Mannitol (20%) 0.25-1 g IV every 3 to 4 hours.*

Grading of coma

Table 1.1. Glasgow Coma Scale in adults

Feature	*Coma score*
Eye opening (E)	
Spontaneous	*4*
To loud voice	*3*
To pain	*2*

Nil 1

Best motor response (M)

Obeys command 6

Localizes pain 5

Withdraws (flexion) 4

Abnormal flexion posturing 3

Extension posturing 2

None 1

Verbal response (V)

Oriented 5

Confused, disoriented 4

Inappropriate words 3

Incomprehensible sounds 2

None 1

Total Coma Score 3/15—15/15

Note: Coma score=E+M+V. Patients scoring 3 or 4 have an 85% chance of dying or remaining vegetative, while scores above 11 indicate only a 5 to 10% likelihood of death or vegetative state and 85% chance of moderate disability or good recovery. Intermediate scores correlate with proportional chances of recovery.

Table 1.2. Glasgow Coma Scale in children under 5 years of age

Feature	*Scale Responses*	*Score Notation*
Eye opening	*Spontaneous*	*4*
	To voice	*3*
	To pain	*2*
	None	*1*
Verbal response	*Orientated/ interacts/ follows objects/ smiles/ alert/ coos/*	*5*
	Confused/ consolable	*4*

Inappropriate words/ moaning 3

None 1

Best motor response Obey commands/ normal movement 6

Localise pain/ withdraw to touch 5

Withdraw to pain 4

Flexion to pain 3

Extension to pain 2

None 1

TOTAL COMA 'SCORE' 3/15–15/15

References

1. Concussion and Other Head Injury. In: Harrison's Principles of Internal Medicine. Fauci, Braunwald, Kasper et al (eds), 18th Edition, McGraw Hill Company Inc., New York, 2012; pp. 3377-3382.

2. Early management of patients with a Head Injury. Scottish Intercollegiate Guidelines Network (SIGN) 2009.

3. Head Injury (G 56) National Institute for Health and Clinical Excellence (NHS) Nice Guideline 2007.

4. Guidelines for the management of severe traumatic head injury. J Neurotrauma 2007: 24 suppl 1; S1 – 96

Head Injury initial management

- *State of consciousness with pupil function and Glasgow Coma Scale (bilateral motor function) must be recorded and documented at repeated intervals.*
- *The goals are normoxia*, normocapnia**, and normotension***. A fall in arterial oxygen saturation below 90% must be avoided.*

** Normoxia - sPO2>90%*

*** Normocapnia - paCO2 = 35 -40 mmHg{4.7kPa}*

**** Normotension - SBP ≥90 mmHg*

- *Intubation with adequate ventilation (with capnometry and blood gas analysis if available) must be carried out in unconscious patients (reference value GCS ≤ 8).*

- *A Cranial Computed Tomography scan must be performed in the case of polytrauma after stabilization with suspected traumatic brain injury.*
- *A (monitoring) CT scan must be performed in the case of neurologic deterioration.*
- *Glucocorticoids must not be administered in the treatment of TBI.*
- *If severely elevated intracranial pressure is suspected, particularly with signs of transtentorial herniation (pupil widening, decerebrate rigidity, extensor reaction to painful stimulus, progressive clouded consciousness), the following treatments can be given:*

o *Hyperventilation where ABG analysis is available **

o *Mannitol ***

* *20 breaths per minute to maintain paCO2 at 30-35 mm of Hg*

** *20% solution at 0.5-2 gm/kg over 30 to 60 minutes*