Standard Hospital Emergency Management Guideline

A Training Manual for Healthcare Service Providers

Hospital Services Management
Directorate General of Health Services
Ministry of Health & Family Welfare

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH

STANDARD HOSPITAL EMERGENCY MANAGEMENT GUIDELINE

A TRAINING MANUAL FOR HEALTH CARE SERVICE PROVIDERS

Directorate General of Health Services (DGHS)
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প্রকাশক :
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হাসপাতাল শাখা
স্বাস্থ্য অধিদপ্তর, মহাখালী, ঢাকা-১২১২

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Preface:

It is with great pride that we publish this iteration of Standard Hospital Emergency Management Guideline – training manual for healthcare service providers. In the current context of the health care systems of Bangladesh Emergency care is often overlooked. The reasons for this are multi-factorial and beyond the scope of this preface to discuss. However, there is increasing recognition in the public perception for the development of this new and crucial branch of medical science.

This is our humble attempt to provide a standardised guide to the healthcare service providers who are tirelessly working in this field, often with minimal resources at their disposal. We believe this manual, in conjunction with the associated hands-on simulated training to be provided, will form the backbone of emergency medical care provision in Bangladesh.

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বাণী

আমাদের দেশে মা, শিশু এবং বৃদ্ধ সকলের জরুরী চিকিৎসা সেবা অতি প্রয়োজনীয়। জরুরী স্বাস্থ্য সেবা বলতে এক কথায় অতিদ্রুত সময়ের মধ্যে প্রশিক্ষণপ্রাপ্ত সেবাদানকারীর মাধ্যমে রোগীর সেবা প্রদান করা।

এই ধরনের সেবা কার্যক্রম বাস্তবায়নের লক্ষ্যে সকল স্বাস্থ্য সেবা প্রতিষ্ঠানগুলির সাথে সমন্বয় পূর্বক দ্রুত বাস্তবায়ন আমাদের দেশের জন্য এখনই উপযুক্ত সময়।

বর্তমান জরুরী স্বাস্থ্য সেবা কার্যক্রম শক্তিশালী করার জন্য এই গাইড লাইনটি ব্যবহারের মাধ্যমে চিকিৎসক সেবিকা সহ জরুরী বিভাগের কার্যক্রমকে উন্নীত করা সম্ভব বলে আমি মনে করি।

সেই লক্ষ্যে স্বাস্থ্য সেবা প্রতিষ্ঠানের জরুরী স্বাস্থ্য সেবা ব্যবস্থাপনাকে প্রাধান্য রেখেই প্রণীত এই গাইড লাইন HPNSP এর আওতায় স্বাস্থ্য অধিদপ্তরাধীন হসপিটাল সার্ভিসেস ম্যানেজমেন্ট" এর Operational Plan অধীন একটা প্রকাশনা। যাহা সেবাদানকারীর প্রশিক্ষণের মাধ্যমে নিজ কর্মক্ষেত্রে সফলতার স্বাক্ষর রাখতে পারবেন এটাই আমার বিশ্বাস।

বিশেষভাবে কৃতজ্ঞ তাঁদের প্রতি যারা এই প্রকাশনাটির সম্পাদন এবং সহ-সম্পাদনায় অক্লান্ত পরিশ্রম/ অবদান রেখেছেন। সেই সাথে বাংলাদেশের স্বাস্থ্য ব্যবস্থার উত্তরোত্তর উন্নতি কামনা করছি।

(অধ্যাপক ডাঃ আবুল কালাম আজাদ)

পরিচালক (হাসপাতাল ও ক্লিনিক সমূহ) এবং
লাইন ডাইরেক্টর (হসপিটাল সার্ভিসেস ম্যানেজমেন্ট)

বাণী

জরুরী স্বাস্থ্য সেবা সকল শ্রেণির মানুষের একটি মৌলিক চাহিদা যা বাস্তবায়ন করার জন্য এই গাইড লাইন HPNSP এর আওতায় স্বাস্থ্য অধিদপ্তরাধীন "হসপিটাল সার্ভিস ম্যানেজমেন্ট" এর Operational Plan অধীন একটি প্রকাশনা।

যাহা মান সম্পন্ন প্রশিক্ষণ মডিউলের ব্যাপারে বিষয় ভিত্তিক বিশেষজ্ঞ দক্ষ সেবাদানকারী এবং অভিজ্ঞদের সক্রিয় অংশগ্রহণে মডিউলটি সময়োপযোগি করেছেন তাঁদের সকলকে আন্তরিকভাবে ধন্যবাদ জানাই।

প্রশিক্ষণের মাধ্যমে জরুরী বিভাগের সকল সেবা দানকারীগণ সফলতার স্বাক্ষর রাখতে পারবেন বলে আমি আশা করি। প্রশিক্ষণের মাধ্যমে চিকিৎসক, সেবিকাদের স্বাস্থ্য সেবার মান উন্নত হবে এবং দেশের স্বাস্থ্য ব্যবস্থার উন্নতি সাধিত হবে। এই প্রকাশনা প্রশিক্ষণ মডিউল তৈরীতে সাহায্যকারী সকল স্তরের সদস্যগণকে আন্তরিক ধন্যবাদ জ্ঞাপন করছি।

(অধ্যাপক ডাঃ মোঃ আলী খান)

অত্যন্ত সার্বিকভাবে আমাদের দেশের স্বাস্থ্য সেবার মান উন্নয়নের কার্যক্রম চলমান। আন্তর্জাতিক পর্যায়ে আমাদের স্বাস্থ্যখাতের ভূমিকা উল্লেখযোগ্য। দক্ষ স্বাস্থ্য সেবাদানকারীর পরিশ্রম ও আন্তরিকতার মাধ্যমেই এই সাফল্য অর্জন সম্ভব হয়েছে। বর্তমানে স্বাস্থ্য, জনসংখ্যা এবং পুষ্টি সেক্টর প্রোগ্রামের কার্যক্রম শুরু হয়েছে। তারই ফলশ্রুতিতে সকল প্রশিক্ষণ মডিউলের সংশোধন ও সময়োপযোগী করার তাগিদ রয়েছে। জরুরী সেবা প্রদানকারী চিকিৎসক, সেবিকা সকলকে প্রশিক্ষণের আওতায় আনলে উক্ত মডিউলটির প্রকাশ ও হালনাগাদ করণ সার্থক হবে বলে আমার দৃঢ় বিশ্বাস।

প্রশিক্ষণ মডিউলটি অভিজ্ঞ, মননশীল ও বিশেষজ্ঞদের ব্যাপক অংশগ্রহণমূলক কর্মশালার মাধ্যমে চূড়ান্ত ও হালনাগাদ করা হয়েছে।

এই মডিউলটি চূড়ান্তকরণ ও যুগোপযোগী করণের প্রক্রিয়ায় সংশ্লিষ্ট সকল কর্মকর্তা, কর্মচারীদের আমার আন্তরিক অভিনন্দন ও শুভেচ্ছা।

ডাঃ আবুল মাসুদ মোঃ নূরুল করিম
ডেপুটি প্রোগ্রাম ম্যানেজার
ইমারজেন্সি ক্যাজুয়ালিটি সার্ভিস ম্যানেজমেন্ট
হাসপাতাল শাখা
স্বাস্থ্য অধিদপ্তর, মহাখালী ঢাকা

Message from the Bangladesh Society of Emergency Medicine

The Bangladesh Society of Emergency Medicine is honoured and proud to be a part of this essential and crucial instrument in the journey to improve emergency health care services in this country. This guide indeed holds the key to the very subject matter of Emergency Medicine.

Emergency Medicine is a relatively new branch of the mainstream medical sciences in which a doctor is trained to deal with any patient presenting in extremis, no matter whether the cause is medical, surgical, mental health related or one of the many other specialist branches of medicine. Many, including clinicians, still find this concept difficult to contemplate as it breaks the mould of traditional medicine.

The aim of BSEM is to establish Emergency Medicine in its own right in Bangladesh, and have it included in the curriculum for all Medical Colleges as well as its own programme in post-graduate medicine.

Although our immediate neighbours have been running Emergency Medicine programmes for the last decade or so, we believe we are not too far from this dream and it is through endeavours like this that we shall see this subject take shape.

We pray to Allah to make this manual, and the provision of emergency medical service in Bangladesh, a great success.

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Founder Secretary, BSEM

Dr. Mir Saaduddin Ahmad
MBBS, MRCS, MRCEM, FRCEM, MPH
Emergency Medicine Consultant (UK)
and Life Member, BSEM

Acronyms

ABCD	Airway, Breathing, Circulation, Disability
ABCDE	Airway, Breathing, Circulation, Disability, Exposure
ABG	Arterial Blood Gas
ACE	Angiotensin Converting Enzyme
ACS	Acute Coronary Syndrome
AED	Automated External Defibrillator
ALS	Advanced Life Support
AP	Antero-posterior
APGAR	Appearance, Pulse, Grimace, Activity, Respiration
APLS	Advanced Paediatric Life Support
ARB	Angiotensin Receptor Blocker
ARDS	Acute Respiratory Distress Syndrome
ARM	Awareness, Recognition and Management
ATLS	Advanced Trauma Life Support
AVPU	Alert, Voice, Pain, Unresponsive
B/V	Both views
BBB	Blood Brain Barrier
BLS	Basic Life Support
BP	Blood Pressure
BUN	Blood Urea Nitrogen
C/S	Culture and sensitivity
CAB	Compression-Airway-Breathing
CBC	Complete Blood Count
CBF	Cerebral Blood Flow
cc	cubic centilitre
cm	centimetre
CNS	Central Nervous System
COPD	Chronic Obstructive Pulmonary Disease
CPP	Cerebral Perfusion Pressure
CPR	Cardiopulmonary Resuscitation
CRP	C-reactive protein
CSF	Cerebro-Spinal Fluid
CT	Computerised Tomography
CVA	Cerebro-Vascular Accident
CVS	Cardio-vascular system
CXR	Chest X-ray
D&V	Diarrhoea and Vomiting
DAI	Diffuse Axonal Injury
DC	Direct Current
DIC	Disseminated Intravascular Coagulation
DKA	Diabetic Ketoacidosis
DPL	Diagnostic Peritoneal Lavage
DVT	Deep Vein Thrombosis
ECG	Electrocardiogram
ED	Emergency Department
EDH	Epi-Dural Haemorrhage
EEG	Electro-Encephalogram
eFAST	extended Focused Assessment by Sonography in Trauma

EMO	Emergency Medical Officer
EMS	Emergency Medical Services
ENT	Ear, Nose and Throat
ER	Emergency Room
ESR	Erythrocyte Sedimentation Rate
F/U	Follow up
FB	Foreign Body
FHR	Foetal Heart Rate
GBS	Guillan-Barré Syndrome
GCS	Glasgow Coma Scale
GI	Gastro-intestinal
GTN	Glycerine Tri-nitrate
h	hour(s)
H/A	Head Ache
HDU	High Dependency Unit
HHS	Hyperglycaemic Hyperosmolar State
HIV	Human Immunodeficiency Virus
HS	Hypertonic Saline
HTN	Hypertension
HUS	Haemolytic Uraemic Syndrome
I/O	Intake / Output
ICH	Intra-Cerebral Haemorrhage
ICP	Intra-Cerebral Pressure
ICT	Inter-costal tube
ICU	Intensive Care Unit
IIH	Idiopathic Intracranial Haemorrhage
IM	Intra-muscular
Inj.	Injection
INR	International Normalised Ratio
IV	Intra-Venous
IVI	Intravenous Infusion
J	Joules
KG	Kilogram
kPa	Kilo Pascals
LFT	Liver Function Tests
LMP	Last Menstrual Period
LMWH	Low Molecular Weight Heparin
LOC	Loss of Consciousness
LRTI	Lower Respiratory Tract Infection
Max-Facs	Maxillo Facial
mcg	microgram
mg	milligram
MI	Myocardial Infarction
MILS	Manual In-line Stabilisation
min	minute(s)
mmHg	millimetres of mercury
MRI	Magnetic Resonance Imaging
NaCl	Sodium chloride
NG	Naso-gastric

CONTENTS:

1. Basic Life Support

R Manzoor, MS Ahmad

Basic Life Support (BLS) in this manual will outline algorithms for cardiac arrest and choking in both adults and children. It is aimed at medical professionals and professionals who are expected to respond to emergencies. As BLS does not require the use of drugs, interventional or advanced airway skills it is also appropriate for members of the public as more often than not, they are likely to be the bystanders present in times of these medical emergencies. Certification of BLS provision can be obtained practicing the BLS algorithm in conjunction with simulated training.

Cardiac arrest

To effectively resuscitate a collapsed victim, it is essential to be familiar with the "chain of survival" and implement it in a seamless and effective manner.

The steps are as follows:

1. Early recognition of the medical emergency and activation of emergency medical services (EMS) – Call 999 anywhere in Bangladesh
2. Early and effective bystander cardio-pulmonary resuscitation (CPR) until arrival of EMS
3. Early and appropriate use of a defibrillator
4. Early advanced life support and post-resuscitation care, ideally in a hospital

The first three steps can be performed #by a qualified bystander particularly with the availability of automated external defibrillators (AEDs) in many public places.

The following sequence is recommended for the provision of BLS:

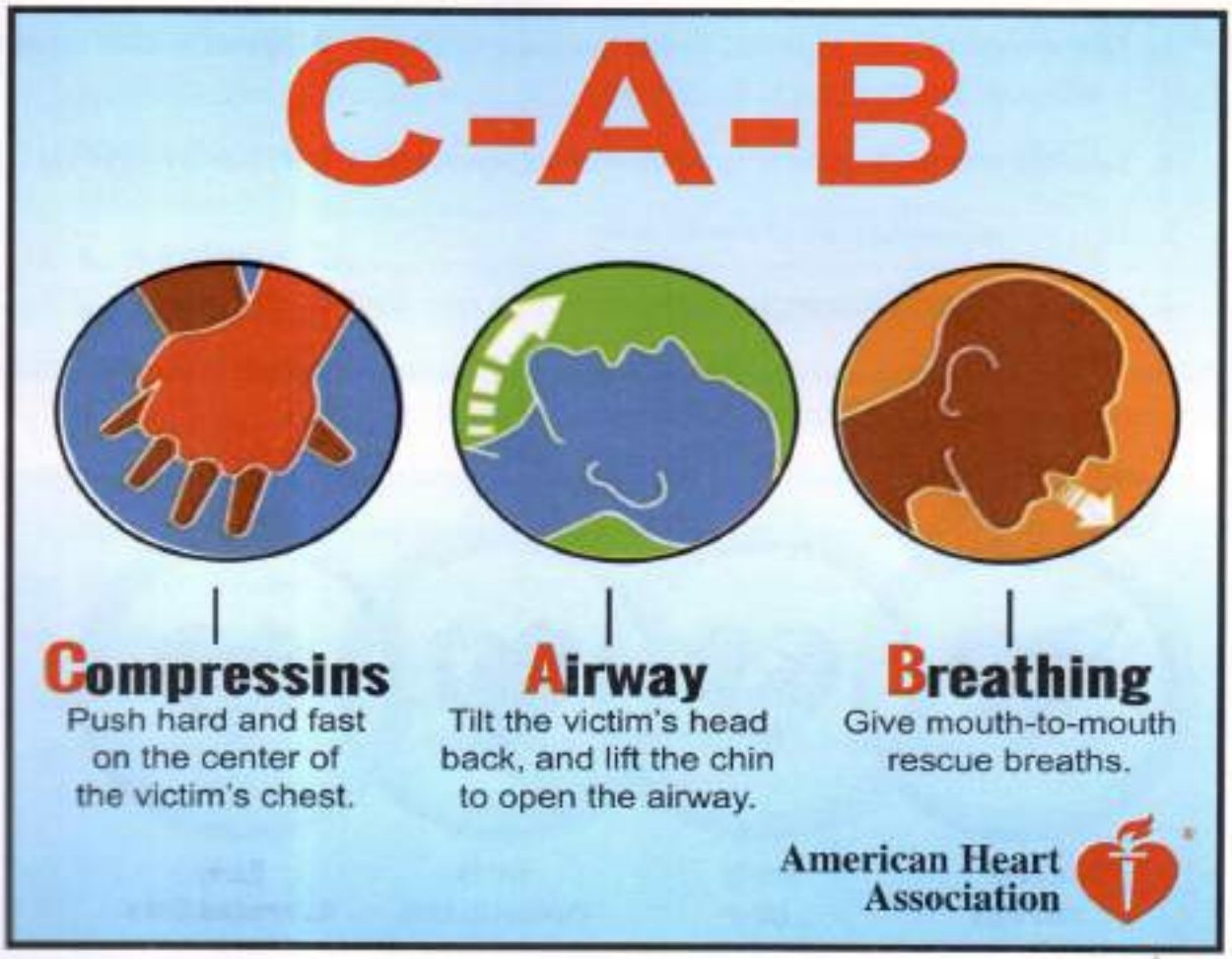
1. Ensure the scene is safe. Live electric wires, oncoming traffic and structural damage are some of the dangers that may interfere with the delivery of effective BLS. Ensure that both the victim and provider are safe from these.

2. Assess the victim's level of conscious by shaking their shoulders and asking if they are alright. Look to see if the chest is rising with breathing and feel for a pulse if trained to do so. If there is no response, call for an ambulance and ask for an AED.

3. Commence CPR by placing the palm of two interlocked hands in the centre of the chest (over the breast bone) and compressing the chest to a third of its diameter. Count aloud for 30 compressions in about 18 seconds and then provide two rescue breaths lasting 2 seconds each.

4. Repeat the cycle until EMS arrive or the victim starts to show signs of life.

5. If an AED is available, it should be connected immediately, and its instructions followed.



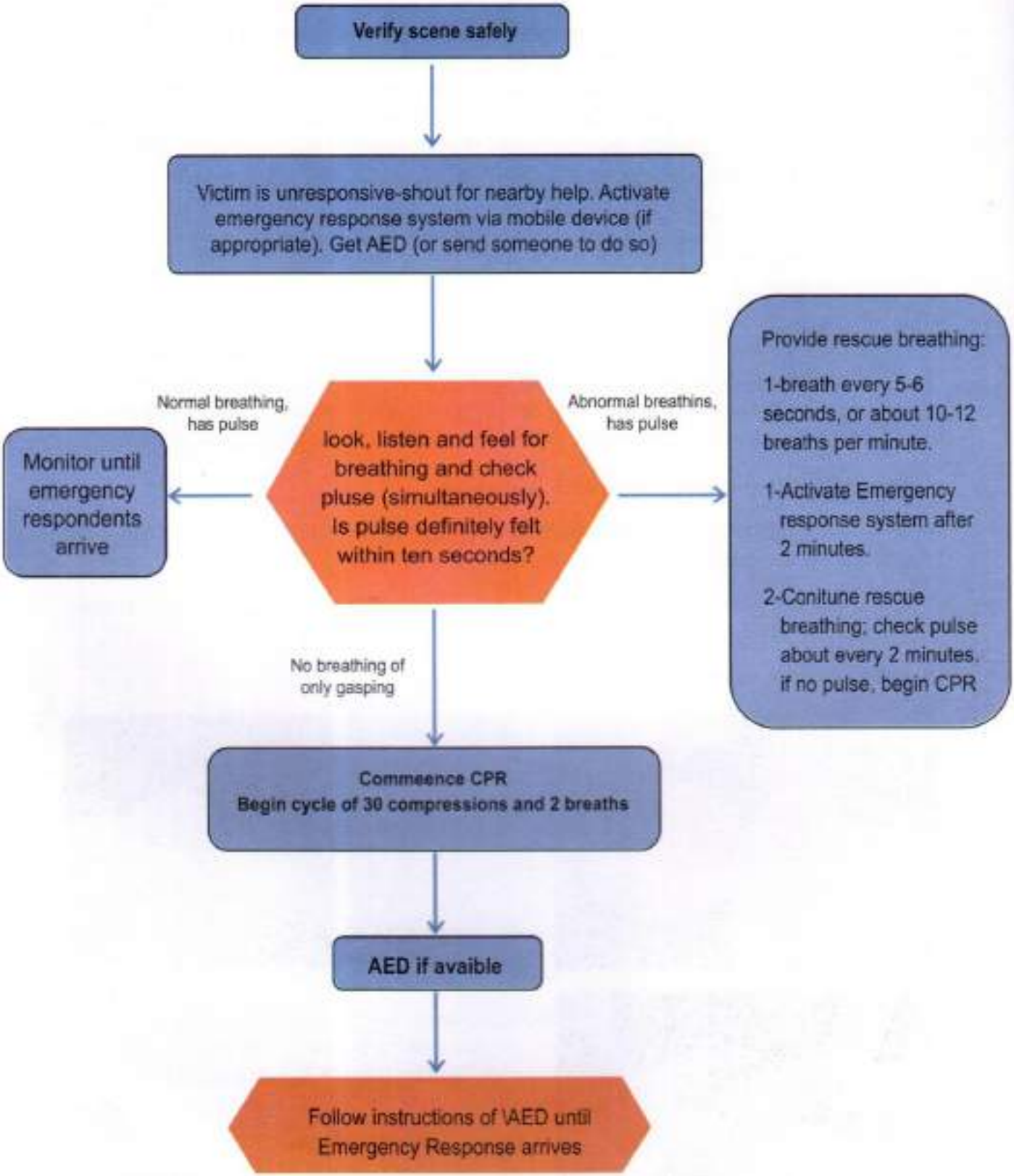
CPR for BLS:

High quality CPR improves a victim's chances of survival. The mnemonic CAB emphasizes the overriding need to initiate chest compressions to optimise the circulation in a patient in cardiopulmonary arrest. A clear and patent airway ensures the easy flow of gases between the lungs and atmosphere. This can be achieved by a head-tilt and chin-lift or by a jaw thrust. Breathing allows for the inspiration and expiration that is required for respiration. The critical characteristics of high-quality CPR include the following:

1. Start compressions within 10 seconds of recognition of cardiac arrest
2. Push hard, push fast: Compress at a rate of 100 to 120 compressions per minute
   Minimum depth of:
   - At least 2 inches (5 cm) for adults with two hands.
   - At least one third the depth of the chest, about 2 inches (5 cm), for children, with one hand.
   - At least one third the depth of the chest, about 1.5 inches (4 cm) for infants with two fingers.
3. Allow complete chest recoil after each compression.
4. Minimize interruptions in compressions (try to limit interruptions to less than 10 seconds). It takes about 15 to 20 compressions to get the circulation flowing.
5. Give effective breaths that make the chest rise. Chest compressions can facilitate ventilation.
6. Avoid excessive ventilation

Pictures demonstrating different hand positions for providing CPR in an infant (top left), child (top right) and an adult (left)

BLS Cardiac Arrest Algorithm



Choking

Choking occurs when a foreign body obstructs the airway passage. It can present with cough, the inability to speak or with collapse. Choking can affect infants, children or adults. Although the principal of managing a choking victim is the same for all age groups, the approach and methods will differ due to physiological and anatomical variations.

Adults:

1. If the victim is coughing forcefully, do not interfere but encourage them to cough.
2. Intervention is necessary when the victim shows signs of severe airway obstruction such as inability to speak or breathe, silent cough or turning blue.
3. Intervene by giving back blows to help dislodge any foreign body. Abdominal thrusts to the upper abdomen just below the breastbone can also be applied.
4. The Heimlich manoeuvre is performed by standing behind the victim, encircling arms around the abdomen, making a fist with the right hand and supporting it with the left hand. Thrusts are then given in an upward and backward direction.
5. Alternate between five back blows and five abdominal thrusts until foreign body is dislodged.
6. If the victim is pregnant, chest thrusts can be used as an alternative to abdominal thrusts.
7. If the patient loses consciousness, lower them down to the floor and commence CPR in accordance to the BLS protocol. Before giving the two rescue breaths, look in to the airway to see if there is a foreign body that can easily be removed.
8. Do not perform a blind finger sweep, as you may risk pushing any foreign body deeper in to the airway.

Adults and Adolescents	Children (Age 1 year to Puberty)	Infants (Age 1 year /less)
1. Ask "Are you choking?" If victim nods yes and cannot talk, severe airway obstruction is present. Take steps immediately to relieve obstruction. 2. Give abdominal thrusts / Heimlich manoeuvre or chest thrusts for pregnant or obese victims. 3. Repeat abdominal thrust or chest thrust if victim is pregnant or obese until effective or victim becomes unresponsive.	1. Ask "Are you choking?" If victim nods yes and cannot talk, severe airway obstruction is present. Take steps immediately to relieve obstruction. 2. Give abdominal thrusts / Heimlich manoeuvre. 3. Repeat abdominal thrust until effective or victim becomes unresponsive.	1. If victim cannot make any sounds or breathe, severe airway obstruction is present 2. Give up to 5 back slaps and up to 5 chest thrusts 3. Repeat step 2 until effective or the victim becomes unresponsive

4. Activate the emergency response system via mobile device if appropriate or send someone to do so. After about 2 minutes of CPR. If you are alone with no mobile device, leave the victim and activate the emergency response system if no one has already done so.
5. Lower the victim to the floor. Begin CPR, starting with chest compressions. Do not check for a pulse.
6. Before you deliver breaths, look into the mouth. If you see a foreign body that can be easily removed, remove it.
7. Continue CPR until advanced providers arrive.

Infants:

Abdominal thrusts should not be given to infants because it can cause intra-abdominal trauma. Position the infant on your forearm, face down for back blows. After five back blows, turn the infant around and place two fingers on its breast bone to perform five chest thrusts.

Children:

The choking child (above the age of 1 year) can be treated as above, but adjustments must be made for the height difference. The diagram below illustrates this well.

CONSCIOUS CHOKING

Cannot Cough, Speak, Cry or Breathe

After checking the scene for safety and the injured or ill person, have someone CALL 9-1-1 and get consent. For children and infants, get consent from the parent or guardian, if present.

1 GIVE 5 BACK BLOWS

- **Adult:**
- **Child:**
- **Infant:**

2 GIVE 5 ABDOMINAL THRUSTS

- **Adult:**
- **Child:**
- **Infant:** (chest thrusts for infant)

TIP: *For infants, support the head and neck securely. Keep the head lower than the chest.*

3 REPEAT STEPS 1 AND 2 UNTIL THE:

- Object is forced out.
- Person can cough forcefully or breathe.
- Person becomes unconscious.

WHAT TO DO NEXT

- IF PERSON BECOMES UNCONSCIOUS – Carefully lower the person to the ground and give CARE for unconscious choking, beginning with looking for an object.
- Make sure **9-1-1** has been called.

American Red Cross

2. Advanced Life Support

R Manzoor, MS Ahmad

Advanced Life Support is part of the chain of survival that is described in the Basic Life Support Section in this manual. It occurs when the Emergency Medical Service takes over from the lay rescuer. As a result, ALS may be provided in the community by trained pre-hospital personal or in-hospital, either in the Emergency Department or by the Emergency response team. It involves the use of drugs, advanced airway skills as well as invasive skills.

ALS provides guidelines on how to deal with patients in cardio-pulmonary arrest, but more crucially it aims to prevent patients reaching the stage of arrest. This is done by identifying the acutely unwell patient and treating peri-arrest conditions. This chapter will deal with the ALS algorithm as well as protocols for dealing with several peri-arrest conditions.

Advanced Life Support

Cardio-respiratory arrest can be caused by a multitude of factors. Here we discuss them by physiological priority.

Airway Obstruction

Causes	Recognition	Treatment
CNS depression	Difficulty breathing	Remove foreign body with forceps by direct visualisation
Blood	Choking	
Vomitus	Distress	Use suction for liquids like blood and gastric contents
Foreign body	Noisy breathing (partial obstruction)	
Direct trauma		Simple manoeuvres like head tilt/chin lift of jaw thrust
Pharyngeal swelling	See-saw movement of chest and abdomen	
Spasm (laryngeal, bronchial)		Oro or nasopharyngeal airway
Epiglottitis	Strenuous respiratory movements	Endo-tracheal intubation
Bronchial secretions		Surgical airway

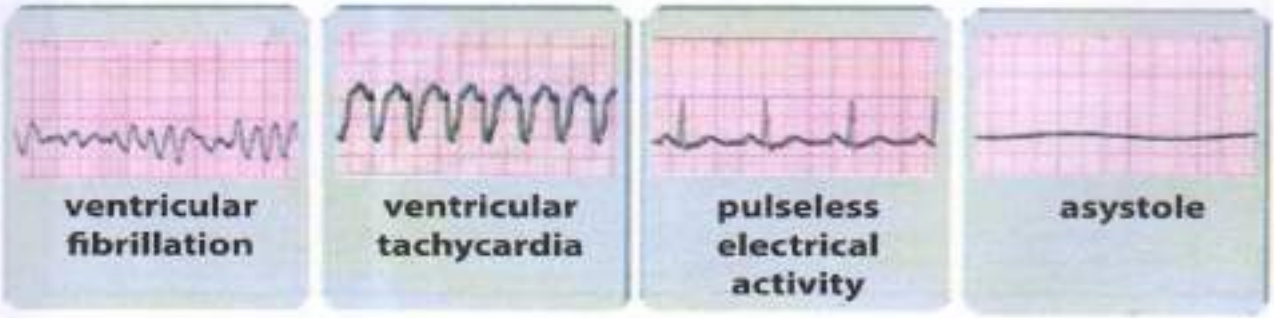
Breathing Problems

Causes	Recognition	Treatment
Decreased respiratory drive – CNS depression	Short of breath Distressed	High flow oxygen via non-rebreathe mask
Decreased respiratory effort – spinal cord lesions, muscle weakness, malnourishment	Hypoxia Cyanosis	Treat underlying cause – e.g., chest drain for pneumothrax
	Tachypnoea	Respiratory support by non-invasive ventilation or endo-tracheal intubation
Lung disorders – pneumo- or haemothorax, infection, COPD, ARDS, PE, oedema	Hypercarbia	

Circulatory Problems

Causes	Recognition	Treatment
Acute Coronary Syndromes	Chest pain	High flow oxygen
Hypertensive heart disease	Shortness of breath	Aspirin – 300 mg orally
Valve disease	Tachycardia	Nitro-glycerine – sublingual
Drugs (tricyclics, digoxin, etc.)	Bradycardia	Morphine titrated to effect
Hereditary cardiac disease	Tachypnoea	Treatment of underlying cause:
Acidosis	Hypotension	Correction of acid-base or electrolyte imbalance
Electrolyte imbalance	Poor peripheral perfusion	Correction of rate, rhythm or output
Electrocution	Altered mental stage	Ionotropic support
Secondary heart problems (severe blood loss, anaemia, sepsis, etc.)	Oliguria	

Cardiac rhythms during an arrest are classified as either shockable rhythms or non-shockable rhythms. Shockable rhythms include ventricular fibrillation (VF) and ***pulseless*** ventricular tachycardia (VT). Non-shockable rhythms are asystole and pulseless electrical activity (PEA).

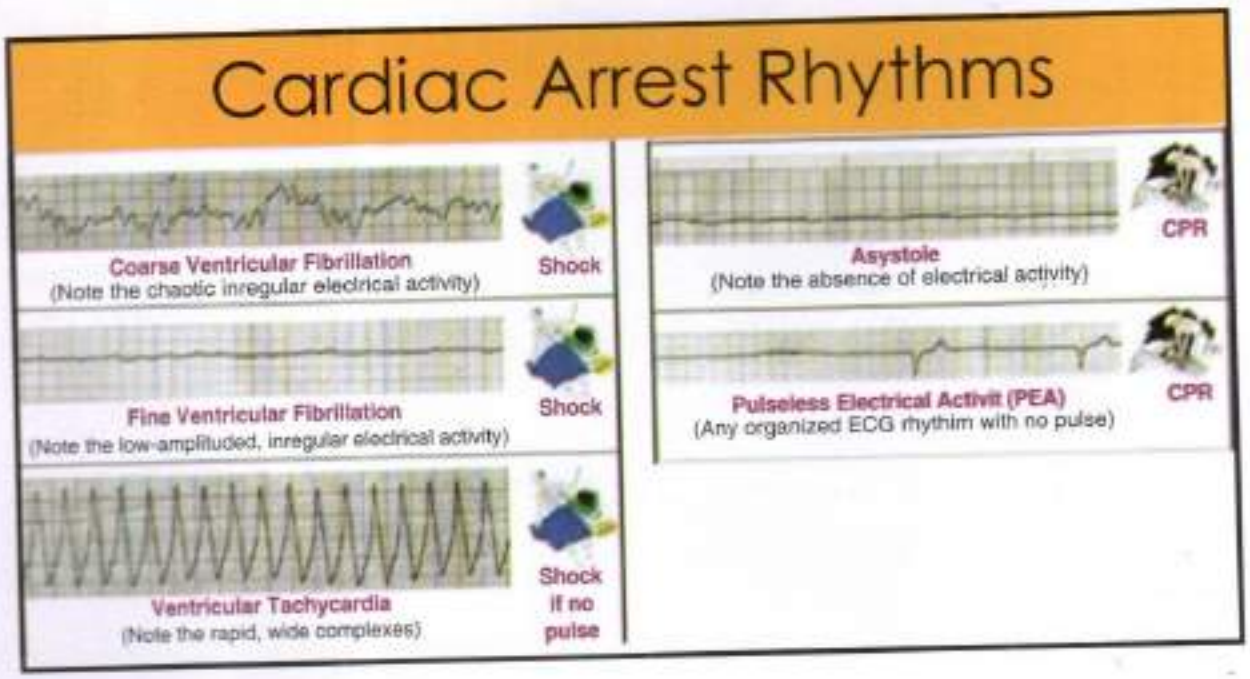


Shockable Rhythms:

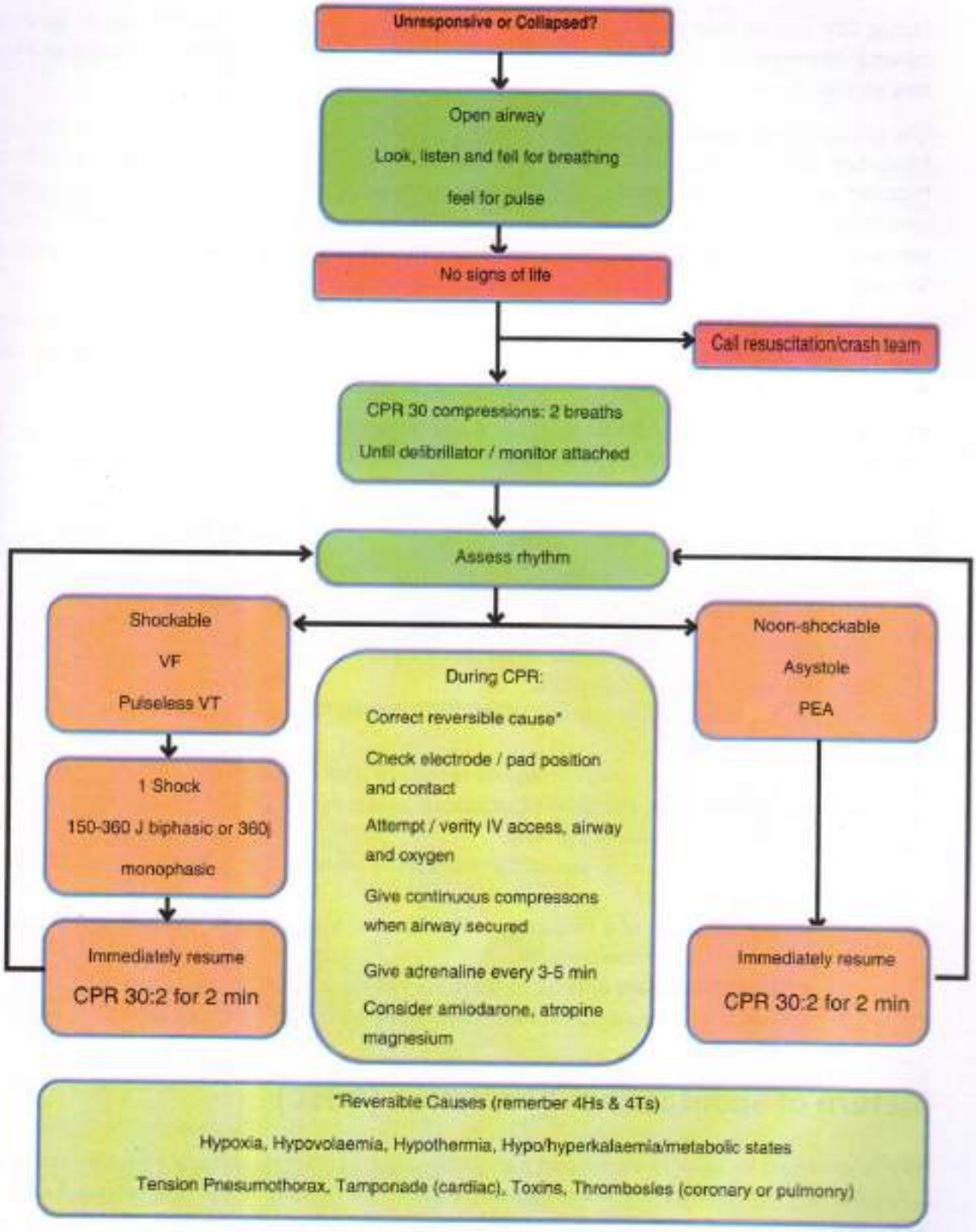
1. Once a shockable rhythm has been identified by attaching pads of the defibrillator, attempt defibrillation with 150-200 J biphasic.
2. Immediately restart chest compressions without checking for breathing or pulse
3. After completing a cycle of CPR for 2 minutes, check the monitor and feel for a pulse for no longer than 10 seconds
4. Give a further shock of 150-360 J biphasic and complete another cycle of CPR if VF/VT persists.
5. If not resolved, administer 1 mg IV adrenaline followed immediately by third shock (150-369 J). Continue another cycle of CPR.
6. If still persistent, give 300mg IV amiodarone followed immediately by 4th shock. Following this, perform CPR, administering adrenaline (1 mg IV) on every alternate cycle.
7. If organised electrical activity or signs of life are seen, stop CPR and start post-resuscitation care.
8. If PEA or asystole occur, switch to Non-shockable algorithm.

Non-shockable Rhythms:

1. Once non-shockable rhythm is identified administer 1 mg IV adrenaline as soon as IV access is established with ongoing CPR.
2. Recheck rhythm every 2 minutes cycle and administer adrenaline every alternate cycle.
3. Consider single dose of atropine 3mg IV in asystole and PEA less than 60/min.
4. Switch to shockable algorithm if VT/VF occur.



Adult Advanced Life Support Algorithm



From Resuscitation Council (UK) 2015 Guidelines

Cardiopulmonary Resuscitation

During CPR ensure that good quality chest compressions are performed at a rate of 30:2 with minimal interruptions. This is tiring, so ensure that people undertaking CPR are changed before fatigue sets in.

The airway should ideally be secured by endo-tracheal intubation if the expertise is available. Intubation attempts should be kept to less than 30 seconds to avoid interruption to CPR and hypoxia. Once intubated, continuous chest compressions can be performed independent of ventilation. If unavailable, bag-valve-mask ventilation should be performed with suitable adjuncts, and ideally by two people. Laryngeal mask airways, although not definitive airways, can be used.

Intravenous access should be obtained immediately if not already done so. Peripheral access is usually quick and easy, but central access allows for higher drug concentrations. Intraosseous access and tracheal routes can also be utilised.

As CPR is ongoing, it is beneficial to reverse any potential causes of cardiac arrest. These are conventionally referred to as the 4Hs and 4Ts.

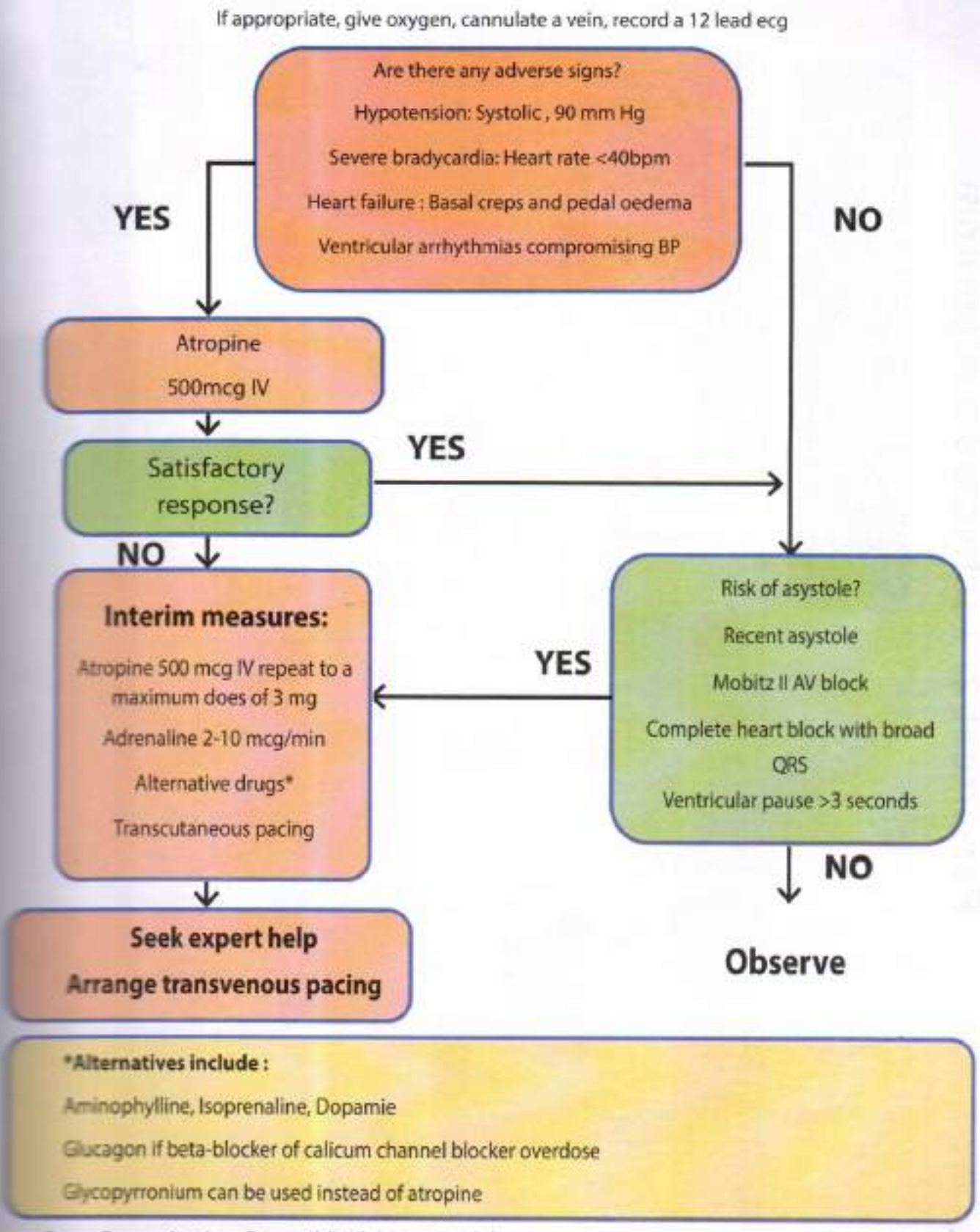
4H's	4T's
Hypoxia Hypovolaemia Hypothermia Hypo- Hyper-metabolic states	Tension Pneumothorax Tamponade Thromboembolisms Toxins

- The risk of hypoxia is minimised by ventilating with 100% oxygen. Ensure bilateral breath sounds and equal chest rise.
- Hypovolaemic states should be corrected with rapid infusion of fluid.
- Hypothermia, because of exposure or drowning, should be reversed by either passive or active rewarming.
- Altered metabolic states can be quickly identified if a blood gas analyser is at hand.
- The diagnosis of a tension pneumothorax should be made clinically and treated by immediate decompression.
- Tamponades are difficult to diagnose but focussed echo can help if available.
- Toxins and thrombo-embolic events can be considered if an effective history has been taken.

Return of Spontaneous Circulation (ROSC)

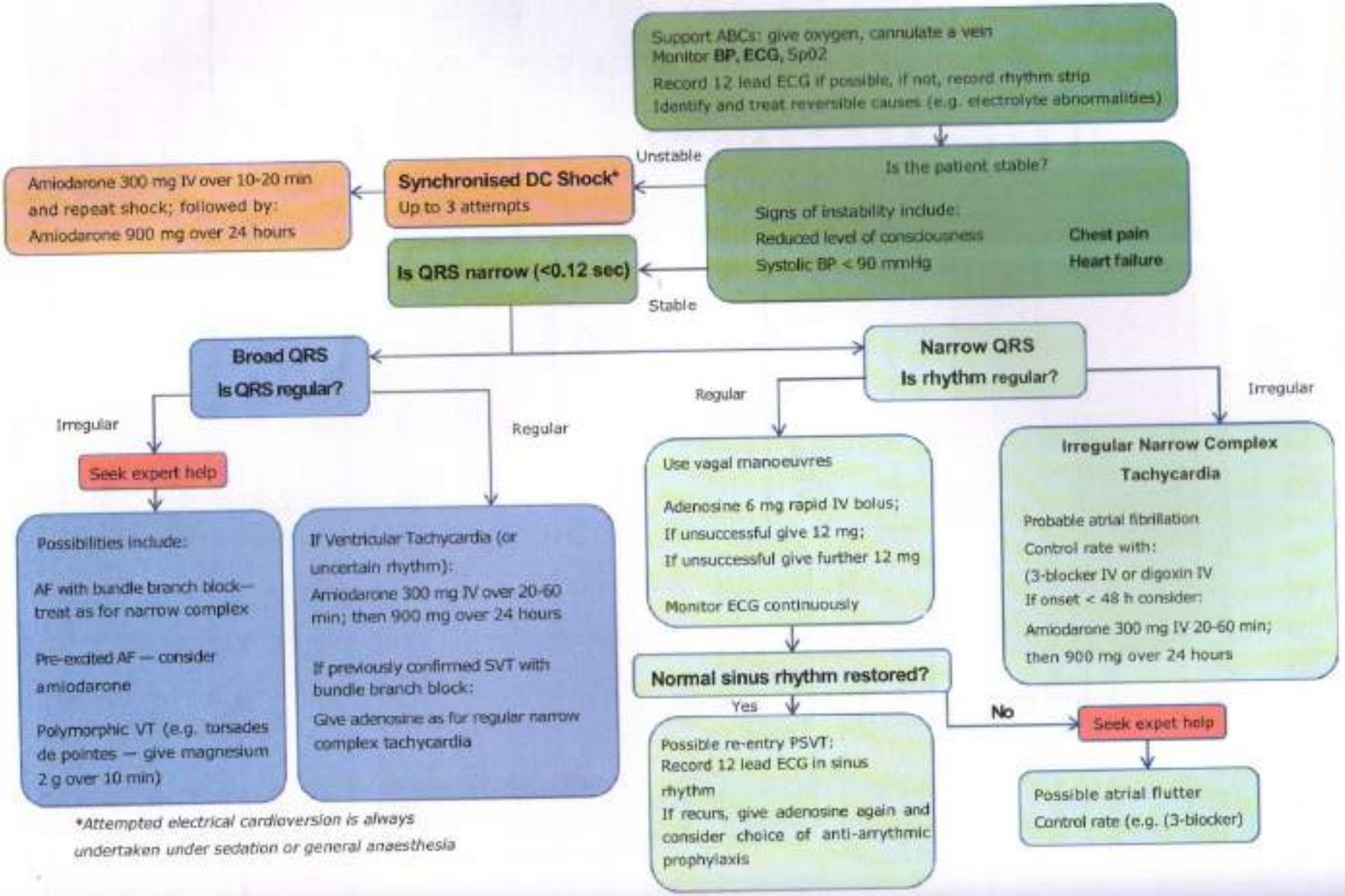
This is identified by signs of life such as a palpable pulse, regular respiratory effort or movement. Effective CPR can perfuse the brain enough to cause movement. If ROSC is achieved continue with post-resuscitative care. If no pulse is palpable, continue CPR.

Peri-attest 1 : Brdycardia Algorithm



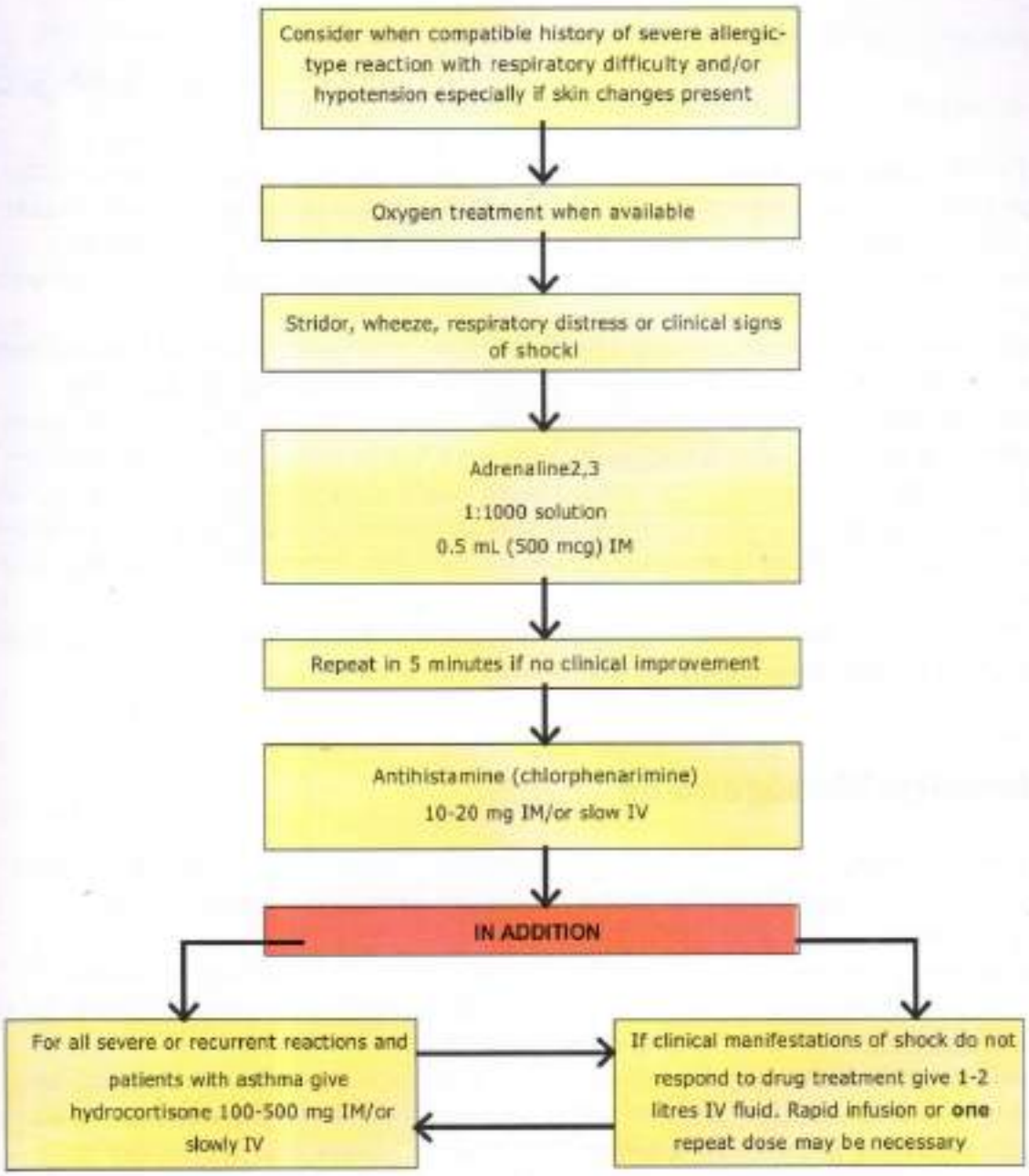
From Resuscitation Council (UK) 2015 Guidelines

Per-arrest 2: Tachycardia Algorithm



Attempted electrical cardioversion is always undertaken under sedation or general anaesthesia

Peri-arrest 3 : Anaphylaxis Algorithm



1. An inhaled beta2-agonist such as salbutamol may be used as an adjunctive measure if bronchospasm is severe and does not respond rapidly to other treatment

2. If profound shock judged **immediately** life threatening give CPR/ALS if necessary. Consider **slow** IV adrenaline **1:** 10,000 solution. This is **hazardous** and is recommended only for an experienced practitioner who can also obtain IV access without delay. Note the different strength of adrenaline that may be required for IV use.

3. If adults are treated with an adrenaline auto-injector, the 300 micrograms will usually be sufficient. A second dose may be required. Half doses of adrenaline may be safer for patients on amitryptiline, imipraminie or beta blacker.

From Resusitation Council (UK) 2015 Guidelines

3. Advanced Trauma Life Support

S Islam, M Islam, SK Sarker

Trauma is the commonest cause of death of people in their first four decades throughout the developed world; the largest proportion of deaths results from road accidents. WHO predicts that by 2020 road traffic injuries will rank third in causes of death worldwide. In a densely populated nation like ours, with a developing road and traffic system, the incidence is likely to be far greater.

The ATLS course is based on validated teaching techniques, and uses a system of core contents, lectures and practical skill stations to develop skill that are practiced and finally tested in simulated trauma scenarios. It originated in 1976 when James Styner, an Orthopedic Surgeon, crashed his light aircraft in rural Nebraska. His wife was killed instantly, and three of his four children sustained critical injuries. The care delivered locally was inadequate and inappropriate and this led him to develop a trauma care training programme that became ATLS. The course has since become an internationally recognized standard and is currently taught in over 90 countries worldwide.

The treatment of the trauma patient begins at the scene of the injury, continues through to the hospital and ends with the successful rehabilitation of the patient.

Pre-hospital Management

1. Organization - Various voluntary organizations involving dependable manpower should be developed is possible areas such as school / college students and organizations like *Jonoprotinidhi*
2. Safety on scene - All members of pre-hospital medical teams should be equipped with personal protective equipment (PPE) and clothing appropriate to the incident e.g. Firefighting rescue equipment in different natural disaster injuries.
3. Immediate action and triage - The initial action of a doctor or health personal arriving on sense is to established safety personal safety, scene safety and casualty safety. In the event of multiple casualties, priorities are established by triage.
4. Assessment and initial management - once safety, command, communications and priorities have been established, patients can be given individual attention. This calls for organized approach involving awareness, recognition and management (ARM) traditionally following by the ACBDE sequence.
5. Extrication and immobilization - The initial maneuvers in the extrication process is manual immobilization by rigid immobilization device in orders to spinal protections and limbs protection e.g., cervical collar for cervical spine, Splint for limbs
6. Transfer to hospital: Delayed transfer to hospital is associated with poor outcomes. There is a balance between "Scoop and run" and "Stay and play" management. The appropriate method of transport should be chosen with appropriate equipment as much as possible.

Hospital Management

1. Organization - Three levels of hospitals have been designated as able to management differing levels of trauma-

   Level-I: Centers capable of treating, resuscitating and stabilizing trauma patients and arrange transfer to specialist centers if needed.

   Level-II: Centers - capable to managing all critically ill patients but not offering all trauma sub-specialties.

   Level-III: Centers able to manage all trauma patients with all specialist needs provided on site 24/7.

2. Trauma teams - team member would normally include the following personnel:

First tier response:	Second tier response:
Emergency medicine physician	Surgeons
Anesthesiologist	Intensive care specialist
Radiographers	Specific specialists e.g., Max Facs,
Emergency department nurses	Orthopaedics, ENT, Paediatrics, etc.

3. Assessment and management by ATLS:

   The system taught is based on a three-stage approach -

   I. Primary survey and simultaneous resuscitation - a rapid assessment and treatment of life-threatening injuring.

   II. Secondary surrey - a detailed head-to-toe evaluation to identify all other injuries.

   III. Definitive care - Specialist treatment of identified injuries.

4. Rehabilitation

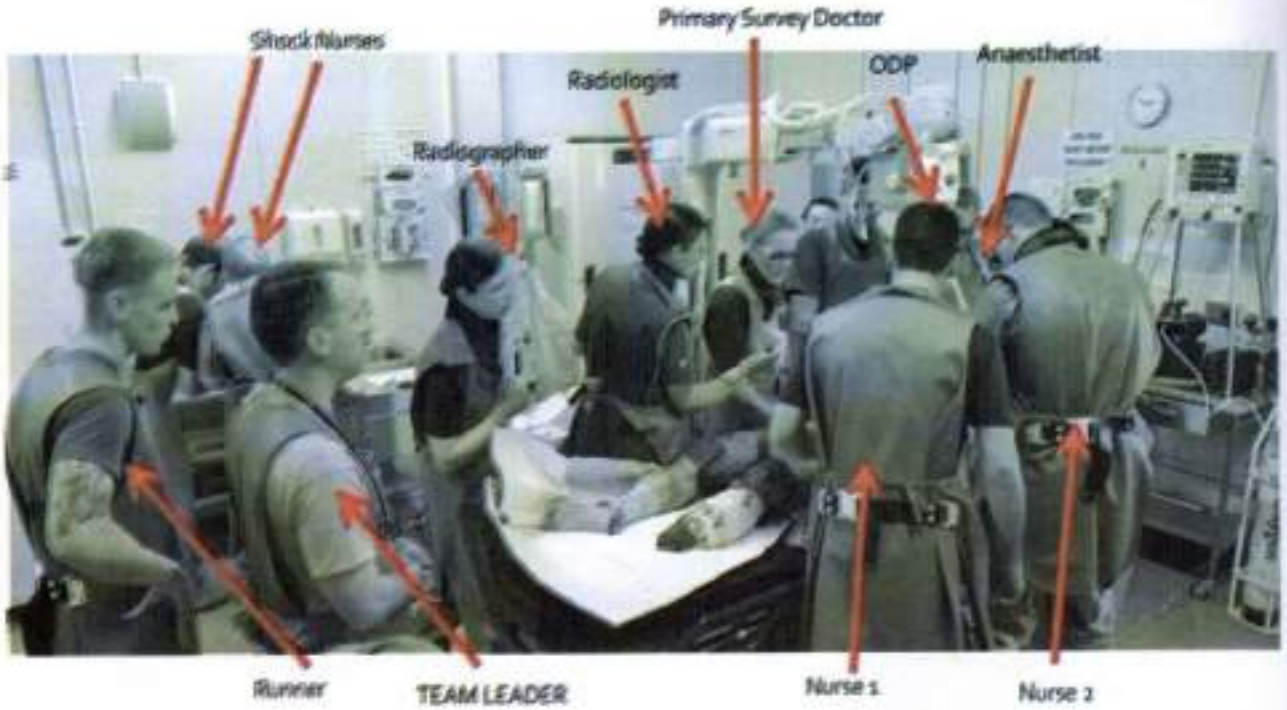
   Once the critical stage is over, patients undergo rehabilitation in the aim to regain full working function.

IN HOSPITAL PHASE -

- Advanced planning for the trauma patient.
- Mobilization of the trauma team members.
- Air way equipment
- Necessary medical equipment
- Protection equipment
- Crystalloid solution, blood substitute, available ready to infuse.
- Monitoring of vital parameters.
- Self-protection from communicable disease - HIV, hepatitis.
- Transfer to visited trauma management place. Necessary common medical equipment and protection equipment-

Cap. Gown, Gloves, Mask, Shoe Covers goggles, shield Catheters etc.

Gauze, Bandage, IV Cannula, Infusion set, Transfusion set



Quick simple way to assess the patient in 10 seconds:

Figure showing a well-functioning Trauma Team at work

1. Introduce yourself 2. Ask the patient their name
3. Ask the patient what happened 4. If unconscious, then ask their attendants.

Concepts of initial assessment:

1. Primary Survey
2. Resuscitation
3. Reevaluation
4. Detailed secondary survey
5. Re-evaluation
6. Definitive care

Primary survey:

ABCDE of trauma care

1. Airway and cervical spine protection
2. Breathing and ventilation
3. Circulation with hemorrhage control
4. Disability Neurological status
5. Exposure / Environment.

Special Considerations

1. Trauma in the elderly
2. Pediatric trauma
3. Trauma in pregnant women

A. Airway and cervical spine protection -

Pitfalls?

1. Equipment failure
2. Inability to intubate
3. Occult airway injury
4. Progressive loss of airway

Airway Obstruction

1. Coma
2. Aspiration
3. Maxillofacial
4. Trauma
5. Neck trauma

Picture showing difficult airway requiring nasal endotracheal intubation

Airway Obstruction Recognition

1. **Look**
   a. Agitation / obtunded
   b. Air movement
   c. Retraction / "rocking"
   d. Respirations
   e. Deformity
   f. Airway debris
2. **Listen**
   a. Normal speech = No obstruction
   b. Noisy breathing = Obstruction
   1) Gurgle
   2) Stridor
   3) Hoarseness
   4) Hyperresonance
3. **Feel**
   a. Tracheal deviation
   b. Auscultation

The cervical spine is stabilized immediately by -

I) Manual in-line stabilization (MILS), or

II) Triple Immobilization: Cervical collar, head blocks and strapping.

Picture shows a shotgun injury to the face. Normal airway anatomy is completely obliterated but the individual is still able to maintain his airway

(Image courtesy ATLS®)

B. Breathing:

1. Assess and ensure adequate Oxygenation and ventilation
2. Pitfalls?
   a) Airway vs ventilation problem?
   b) Iatrogenic pneumothorax or tension pneumothorax

Life-threatening Chest Trauma conditions:

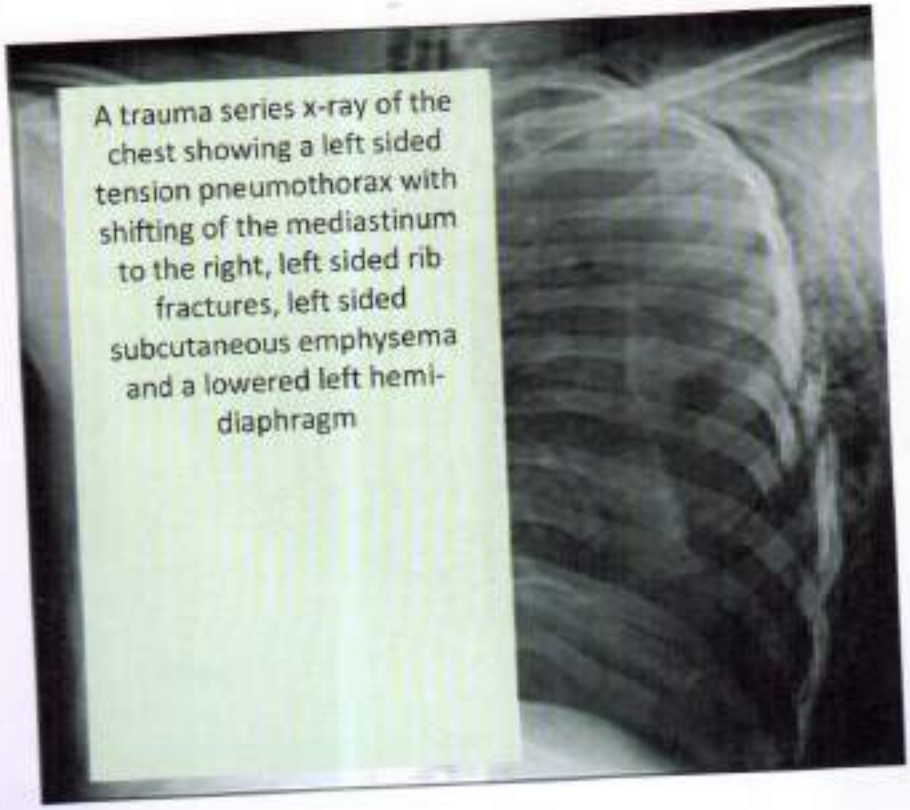
1. Airway obstruction
2. Tension pneumothorax
3. Open pneumothorax
4. Massive hemothorax
5. Flail chest
6. Cardiac tamponade

Tension pneumothorax must be treated immediately if diagnostic signs of absent breath sound, hyper-resonance, deviated trachea and engorged neck veins are found.

Management

I) Initial management is decompression with a 14-G cannula placed in the 2nd intercostal space in mid clavicular line followed by chest drain placement.
II) 100% oxygen of high flow should be given.

Any trauma casualty who has required intubation must be ventilated



A trauma series x-ray of the chest showing a left sided tension pneumothorax with shifting of the mediastinum to the right, left sided rib fractures, left sided subcutaneous emphysema and a lowered left hemi-diaphragm

C. Circulation:

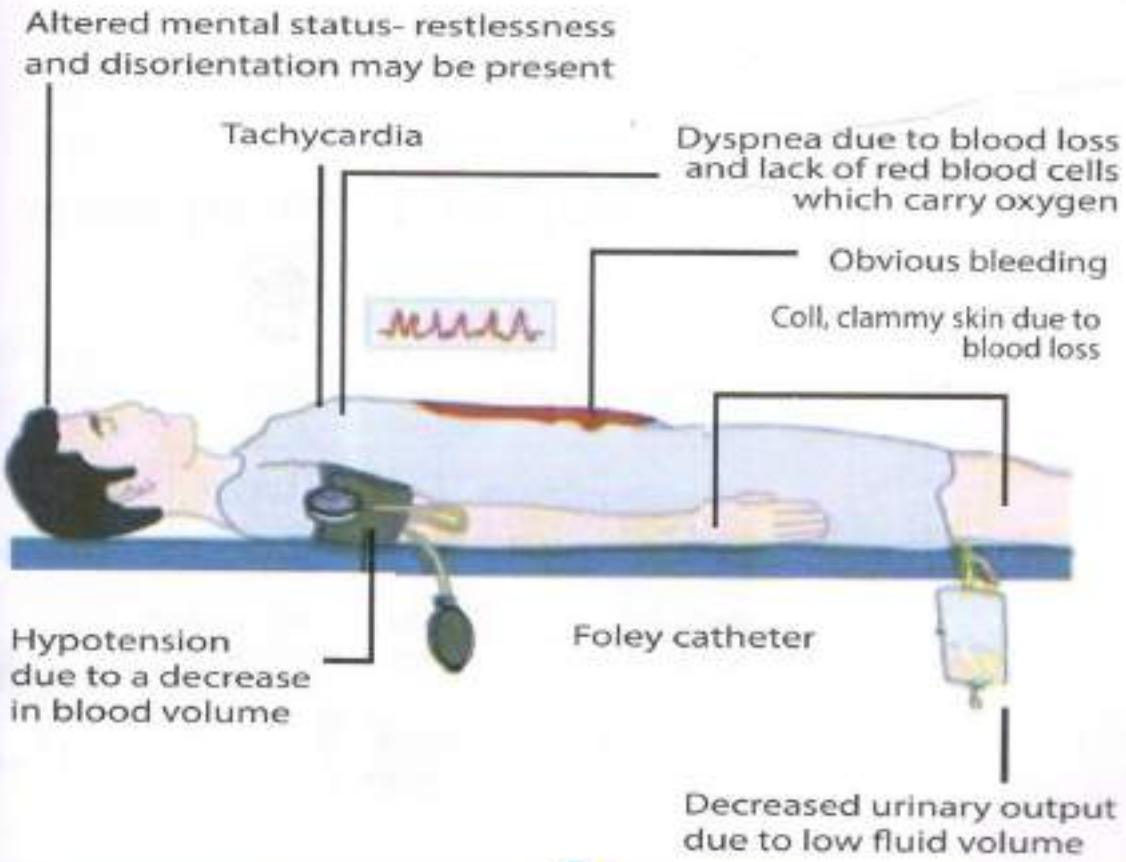
1. Level of consciousness
2. Skin color and temperature
3. Pulse rate and character

Causes of shock

I) Hemorrhagic	II) Non-Hemorrhagic
Acute blood loss	Tension Pneumothorax
Concealed	Cardiac Tamponade
Revealed	Neurogenic

How do I locate the bleeding?

1. Physical examination (one on the floor, and four more – chest, abdomen, pelvis and long bones)
2. Diagnostic adjuncts to primary survey
   - I. Chest x-ray
   - II. eFAST / DPL
   - III. AP x-ray of pelvis
   - IV. X-ray extremities (as part of secondary survey)

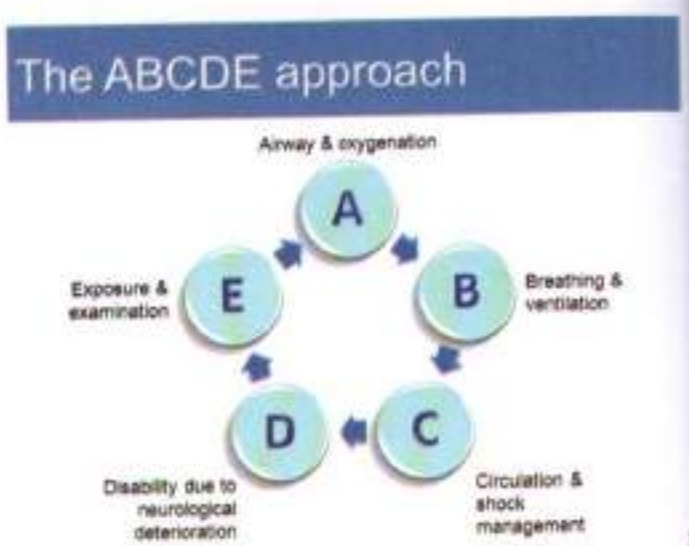


Initial Management

1. Circulatory management
2. Secure two large bore canulae
3. Control haemorrhage (in case of massive external haemorrhage, compression of wound site may take priority over everything else – C-ABCDE approach)
4. Pressure and pack
5. Restore volume
6. By fluid, blood
7. Reassess parameters

Pitfalls?

1. Elderly
2. Children
3. Medications
4. Athletes



D. Disability:

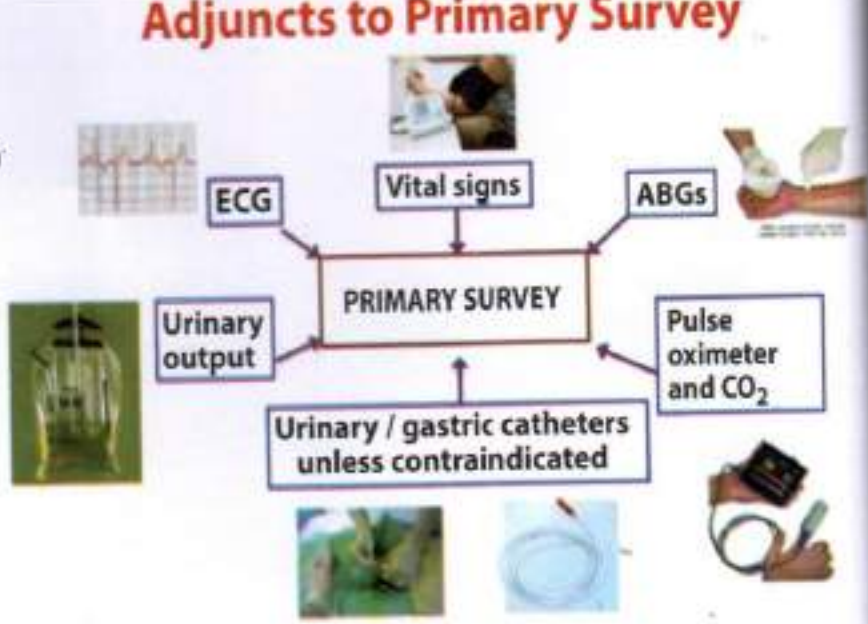
1. Baseline neurologic evaluation
2. GCS scoring
3. Pupillary size and reaction
4. Spinal cord injury level
5. Observe for neurologic deterioration

E. Exposure:

1. Exposure / Environment
2. Completely undress the patient
3. Prevent hypothermia

Resuscitation

1. Protect and secure airway
2. Ventilate and oxygenate
3. Stop the bleeding!
4. Vigorous shock managemen
5. Protect from hypothermia



When do I start the secondary survey?

After

- Primary survey is completed
- ABCDEs are reassessed
- Vital functions are returning to normal

What are the components?

- History
- Physical exam: Head-to-toe
- Tubes and fingers in every orifice
- Complete neurological exam
- Special diagnostic tests
- Reevaluation

Mnemonic	Secondary survey
Has	Head/skull
My	Maxillofacial
Critical	Cervical Spine
Care	Chest
Assessed	Abdomen
Patient's	Pelvis
Priorities	Perineum
Or	Orifices (PR/PV)*
Next	Neurological
Management	Musculoskeletal
Decision?	Diagnostic tests/ definitive care

*Tubes and fingers in every orifice. Include "AMPLE" history.

Secondary Survey

History

- A - Allergies
- M - Medications, including tetanus status
- P - Past illnesses/Pregnancy
- L - Last meal
- E - Events / Environment

Secondary Survey - (physical examination)

Head

1. GCS Score
2. Neurological exam
3. Comprehensive eye and ear exam
4. Penetrating skull injury or depressed fracture.

Pitfalls?

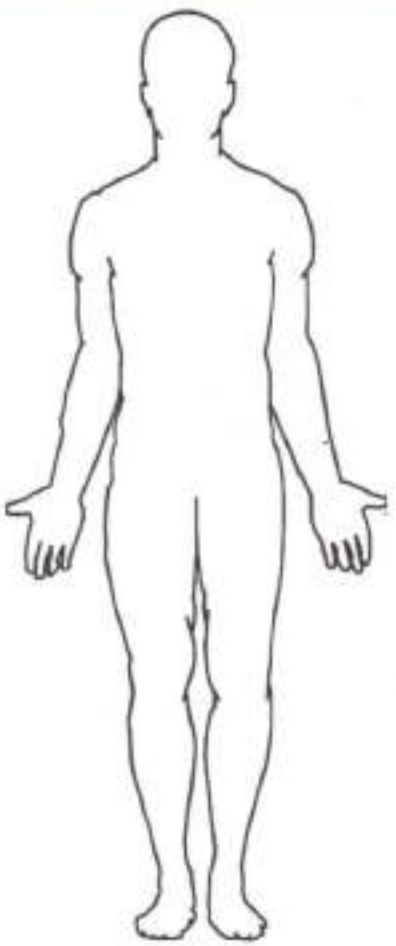
- Unconsciousness
- Periorbital edema
- Occluded auditory canal

Cervical Spine

1. Tenderness
2. Complete motor/ sensory exams
3. Reflexes

Neck (soft tissues)

1. Mechanism: Blunt vs penetrating
2. Symptoms: Airway obstruction, hoarseness
3. Findings: Crepitus, hematoma, stridor, bruit



Body Map used to document secondary survey

Chest

- Inspect
- Palpate
- Percuss
- Auscultate
- Obtain X-ray

Abdomen -

- Inspect
- Palpate
- Percuss
- Auscultate
- Reevaluate
- Special studies

Perineum:
Contusions, hematomas, lacerations, urethral blood
Rectum:
Sphincter tone, high-riding prostate, pelvic fracture, rectal wall integrity, blood
Vagina:
Blood, lacerations

MUSCULOSKELETAL:

Extremities

1. Contusion, deformity
2. Pain
3. Perfusion
4. Peripheral
5. Neurovascular status
6. X-rays as needed

Pelvis

1. Pain on palpation
2. Symphysis width
3. Leg length unequal
4. Instability
5. X-rays as needed

Pitfalls

- Potential blood loss
- Missed fractures
- Soft-tissue or ligamentous injury
- Compartment syndrome (especially with altered sensorium / hypotension)

Neurologic:

1. GCS Score
2. Frequent reevaluation
3. Prevent secondary brain injury
4. Early neurosurgical consult
5. Neurologic: Spine and Cord
6. Complete motor and sensory exams
7. Imaging as indicated
8. Reflexes
9. Early neurosurgical /orthopaedic consult

Pain Management

1. Relief of pain / anxiety as appropriate
2. Administer intravenously
3. Careful monitoring is essential

Which patients do I transfer?

Those whose injuries exceed institutional capabilities

i) Multisystem or complex injuries
ii) Patients with comorbidity or age extremes

When do I transfer the patient?

1. As soon as possible after stabilizing measures are completed
2. Airway and ventilatory control
3. Hemorrhage control (operation)
4. Avoid needless delay

Records, Legal Considerations

1. Concise, chronologic documentation
2. Consent for treatment
3. Forensic evidence

4. Advanced Paediatric Life Support and Neonatal Life Support

S Roy, A Tayeb

The treatment of the acutely ill child can be a very stressful and harrowing experience for all involved, doctors, nurses and parents alike. It is necessary to get experienced help immediately to ensure optimal treatment. However, before help arrives, the basic tenets of resuscitation still apply to identify and manage life-threatening situations in a systematic approach.

Airway:

Look, listen and feel for patency of the airway. If snoring attempt head-tilt and chin lift or a jaw thrust manoeuvre. If gurgling, use suction. If stridorous, look for recessions. If there is no sign of air moving, give effective and appropriate rescue breaths.

Breathing:

- Effort of breathing – use of respiratory and accessory muscles, respiratory rate and head bobbing are good indicators. Wheeze, stridor, grunting and gasping also indicate increased effort.
- Efficacy of breathing – air entry to the lung fields, chest expansion and saturation levels are good indicators.

Respiratory failure can be evidenced by assessing the mental status, heart rate and skin colour. Provide high flow oxygen via a non-rebreathe bag and be prepared to provide assisted ventilation.

Circulation:

Pulse rate and volume, capillary refill, blood pressure and skin temperature are all effective signs to assess circulation. Bradycardia is a late sign of cardiovascular failure, so be prepared to commence CPR in a child whose pulse rate falls below 60 beats per minute. Mottled skin, poor urine output and drowsiness can all be evidence of circulatory compromise. Obtain intra venous or intra osseous access and give bolus of 20 mL/kg of crystalloid. This may be repeated if necessary.

Disability:

Quickly assess the consciousness level on the AVPU (alert; responds to voice; responds to pain; does not respond). Check pupil size and blood sugar levels.

Always remember to reassess ABCD to gauge progress or detect deterioration.

Neonatal Resuscitation

The resuscitation of the newborn should be undertaken by experienced paediatricians, however, unexpected deliveries in the Emergency Department mandate that emergency physician should be able start resuscitation.

Approach:

1. Secure and clamp the cord.
2. Dry the baby with towel and then wrap in a dry towel.
3. Assess the baby using APGAR scoring, at 1 and 5 minutes. Do not delay resuscitation to calculate score.
4. Healthy babies have good tone, will cry and pinken up with seconds of delivery. They have a heart rate ranging from 120 to 150 beats per minute.
5. Less healthy babies have poor tone, will be floppy, apnoeic and bradycardic. They may not have established respiration by two minutes.
6. Airway: Place head in neutral position and avoid extending the neck, as it may occlude the airway. Use paediatric suction device to remove secretions or meconium present in the mouth.
7. Breathing: If not breathing effectively by 90 seconds give 5 effective inflation breaths with air. Premature babies will benefit from oxygen. An increase in heart rate indicates effective ventilation. If apnoea continues, ventilate at 30 to 40 breaths per minute. If heart rate remains below 60 beats per minute, commence CPR.

CPR of new born:

Chest compressions are only to be started after successful inflation of the lungs. Place two fingers or two thumbs on the lower third of the sternum and compress the chest wall to a third of its depth at a rate of 100 compressions per minute. Chest compression to inflation ratio should be 3:1.

Tracheal intubation should be done with a size 3mm tube in term and size 2.5mm tube in preterm babies.

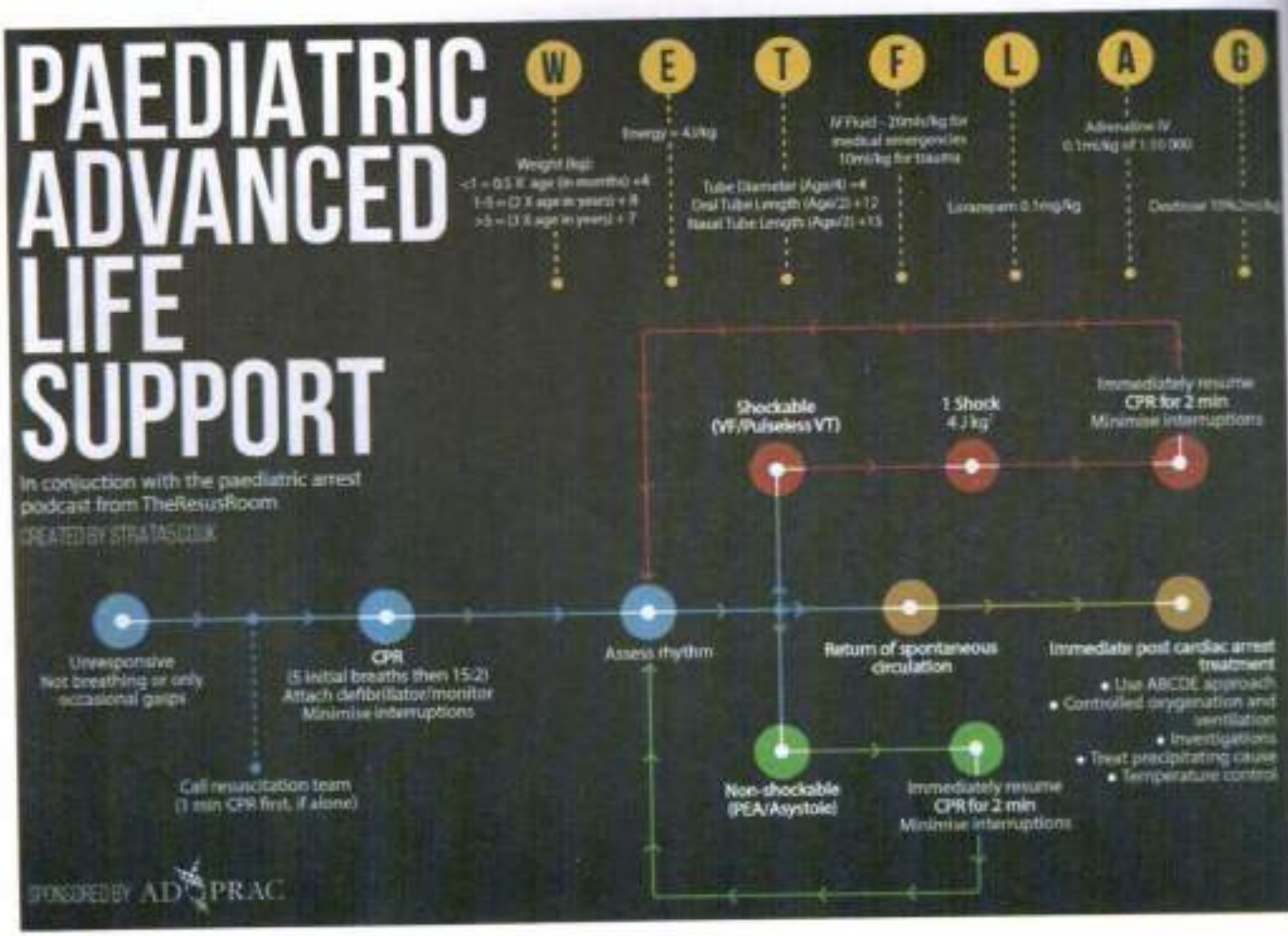
Venous access can be achieved through the large single umbilical vein in the freshly cut cord. Adrenaline should be administered every alternate cycle at a dose of 10 mcg/kg. This works out to 0.1 ml/kg of 1 in 10,000 adrenaline.

Advanced Paediatric Life Support

Cardiac arrest in children is predominantly hypoxia driven and has a worse outcome than adults. However, effective and early resuscitation is essential to limit hypoxic organ damage. To combat the effect of hypoxia, compression and ventilation ratios are carried out at 15:2. Ventilate at 10 to 12 breaths per minute and compress at 120/minute.

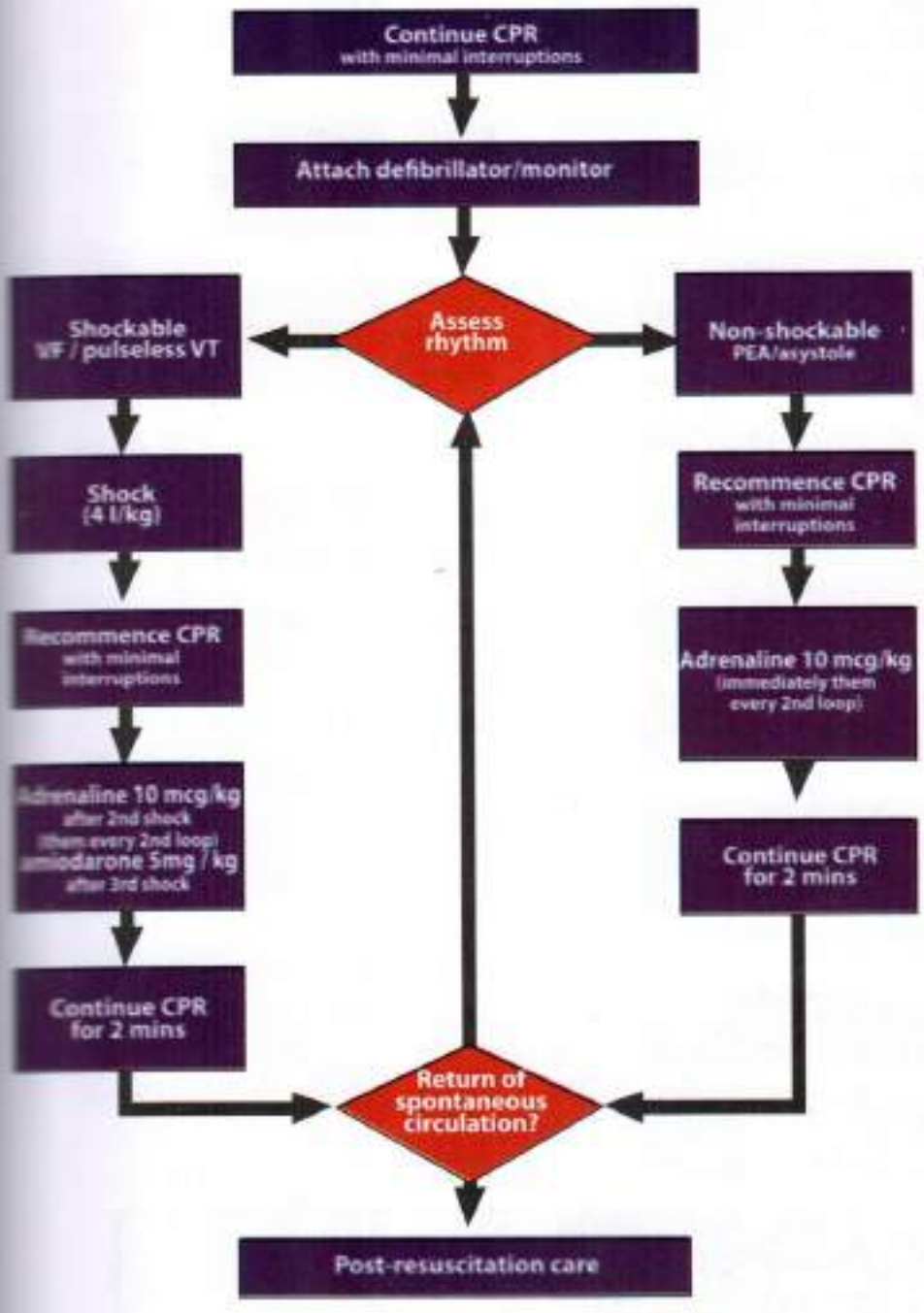
Use the table below to calculate paediatric doses and other interventions. Follow the flow charts for paediatric and neonatal life support.

Parameter		Calculation
W	Weight in kg	(age in years + 4) x 2 (for ages 1 to 10)
E	Energy in joules	4J/kg (round up to the nearest energy level)
T	Tracheal tube internal diameter	(age/4) + 4 (in millimetres)
F	Fluid bolus	20ml/kg of crystalloid (can be repeated)
L	Lorazepam	0.1mg/kg (given IV for seizures)
A	Adrenaline	0.1mL/kg of 1 in 10,000 (given IV in cardiac arrest)
G	Glucose	5mL/kg of 10% in hypoglycaemia (2.5mL for neonates)



apls
Advanced Paediatric Life Support

Paediatric advanced life support

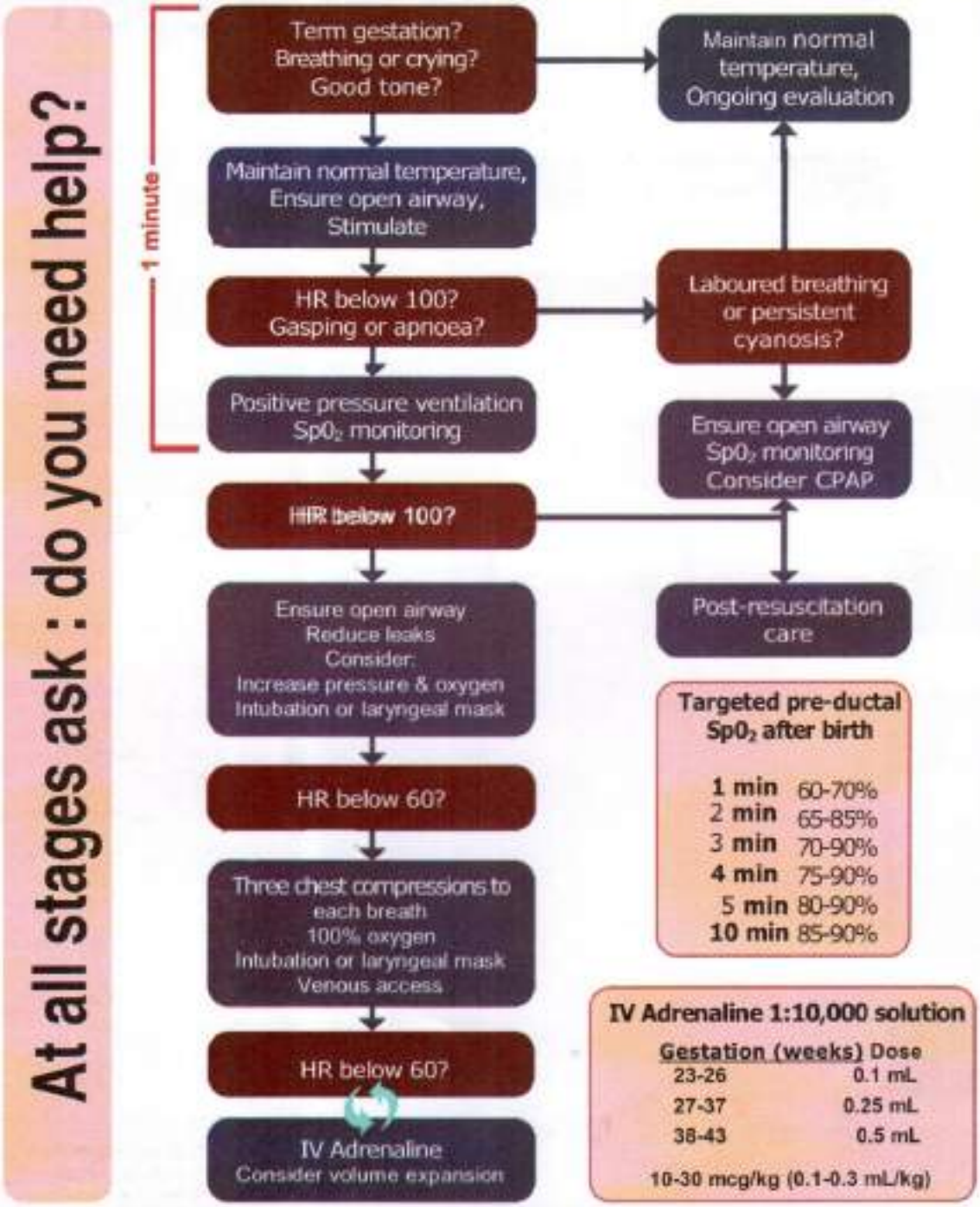


During CPR
Airway adjuncts (LMA/ETT)
Oxygen
waveform capnography
IV/IO access
Minimise interruptions to CPR
Plan actions before interrupting compressions (e.g. charge manual defibrillator to 4 J/kg)

Consider and correct
Hypoxia
Hypovolaemia
Hyper/hypokalaemia / metabolic disorders
Hypothermia/hyperthermia
Tension pneumothorax
Tamponade
Toxins
Thrombosis (pulmonary/coronary)

Post-resuscitation care
Re-evaluate ABCDE
12 lead ECG
Treat precipitating causes
Re-evaluate oxygenation and ventilation
Temperature control (cool)

Newborn Life Support



January 2016

NEW ZEALAND Resuscitation Council

5. COMMUNICATION SKILLS

A RAHMAN

Communication is an art and science to be acquired and practiced by all health care professionals. They must deal with patients, their relatives and friends, their colleagues, superiors and administrators according to their merit. In the Emergency Department, doctors should be familiar in dealing with all kinds of patients having different problem. Quick action to relieve symptoms or proper referral must be done. If an unfavourable outcome is suspected in a patient, prior communication and explanation is mandatory.

In an emergency room most of your patients will have acute problems and severe symptoms that arise without any prior notice. These are a different group of patients in comparison to the routine out patient. Here the expectations of the patients and their relatives are high. You must play a very honest and effective role. You should be active and not unnecessarily delay in seeing the patient and to decide their treatment. You need to be positive and polite irrespective of the outcome of the patient. Communication skills in the Emergency Department are vital in managing patients as the outcome is often fatal despite all your best efforts.

Good communication can bridge the gap between you and your patient. The effort given by doctors and other health care providers to save the patients is not always presented to the patient party, thereby a gap is produced. This can cause a lot of untoward occurrences. It is better that you call the patient party and inform them of the condition of the patient before they come to you. This is how you will present yourself as a caring doctor.

If the patient cannot be treated in your hospital, you can do primary management and call the party explain them that further treatment is not possible here and you should refer the patient to another hospital. The referral should be made, and all relevant information should be handed to the patient's party to allow for a quick, smooth and safe transfer.

You need specific scientific knowledge and it has to be applied ethically in an adverse situation. You need this skill because medicine is a science of probability and practiced on precious living human beings. You should always try to stay in contact with the patient/party which will keep them informed and they will gradually gain confidence in you. There will be less agitation, rather they will be more likely to accept adverse outcomes.

Doctors need to learn the essentials of good communication more than any other professionals because patients are humans with sensitive needs. Poor communication causes a lot of ethical and medico-legal problems.

The following groups are the most likely ones you will have to deal with daily: patients, patients relatives and friends, police, paramedics and supporting staff, your colleagues from other specialties, superiors and administrators.

There are several types of communication:

1) Linguistic
- a) Written
- b) Oral

2) Paralinguistic
- a) Accent
- b) Tone

3) Non-Verbal (Body Language)
- a) Appearance
- b) Posture
- c) eye contact
- d) emotion

While you are communicating with people, they will read 56% from your body language, 36% from your tone and 8% from your words. So, no matter what you say, you should do that with empathy.

While communicating you should listen carefully to what other people want to tell you. You should look at the person speaking to you. Lean forward, make eye contact and do not interrupt them if possible. While responding you should be polite and can start by saying, *"I have seen your patient and I think your patient has got a treatable condition"*. Pause and continue by saying, *"but the patient has lost lot of blood (for e.g.) from the injury ....."*. The negative portion of the event is to be described later.

If bad news needs to be broken, ideally take the relatives to a quiet area and ensure that you are not interrupted by phones, pagers or bleeps. Take a second person in with you, ideally the nurse looking after the patient. It is always best to ascertain what information the patient party already knows. Let them speak without interruption. Once they have completed, you can begin by saying the chronology of events that have occurred after the patient was brought into the department. Avoid using medical jargon and keep the language clear and simple. In the unfortunate event of a patient having died, state this fact clearly and plainly without adding unnecessary language. You will fail to communicate with your patient / their relatives if you have lack of knowledge in the subject, lack of time and if you are tired. You must be innovative and take leadership to handle the given situation.

6. Common Medical Emergencies

MS Ahmad

The Unconscious patient

The Septic patient

Pulmonary Disorders

- Respiratory Distress
- Acute Asthma
- Pneumonia
- Pulmonary embolism
- Pneumothorax

Cardiovascular Disorders

- Chest pain and ACS
- Systemic hypertension

Gastrointestinal Disorders

- Acute Abdomen
- GI Bleeding

Renal Disorders

- Acute Kidney Injury
- Rhabdomyolysis

Diabetic Emergencies

The Unconscious Patient

Patients may present to the Emergency Department in a variety of ways but the most difficult to manage is the unconscious patient. Common issues with this cohort of patients are the uncertainty of the primary presenting pathology, the lack of corroborating history from the patient and inability to assess relevant symptoms and signs from examination. In such situations a structured and systematic approach allow for a rapid screening of life-threatening pathologies and the opportunities for timely interventions. The preferred method is the universally accepted ABCDE approach which works through the Airway, Breathing, Circulation, Disability and Environmental factors in the order of priority.

The Assessment

Approach:

Always ensure your own personal safety. Wear personal protective equipment (gloves, aprons, etc.) and ensure you only examine the patient once it is safe to do so.

History:

Although obtaining a concise history from the patient may not be possible, relevant information can be sourced from the people attending with the patient whether they are relatives, friends or have only provided a means of transport. Any information may help with ascertaining a differential diagnosis.

Evaluation:

Airway: Look for signs that tell you the airway is patent. These include talking, mumbling and moaning. Snoring or gurgling suggest that the airway may be at risk of occlusion by either a solid or a liquid respectively. Look into the airway to see if any foreign body may be removed by forceps or if any liquid is present that would require suctioning. If snoring, attempt a head tilt and chin lift manoeuvre or a jaw thrust as appropriate. If the signs of obstruction are alleviated, an airway adjunct may be indicated.

Breathing: Assess the patient's capacity to breath by looking for a rise in the chest, listening for breath sounds and feeling for breath from an open mouth for up to 10 seconds. If the patient is not breathing, proceed to the Advanced Life Support Algorithm. If breathing, note the patient respiratory rate and oxygen saturation. Now would be a good time to provide the patient with high flow oxygen.

Circulation: If able to do so, assess the circulation at the same time as assessing the breathing from a central pulse. If no pulse is palpable, proceed to the Advanced Life Support Algorithm. If palpable, note the rate and rhythm of the pulse, measure the blood pressure and obtain a 12 lead ECG. At this stage, peripheral intravascular access can be obtained, and relevant blood tests can be sent. If required, drugs can also be administered by this route.

Disability: The patient's consciousness level can be checked either on the AVPU scale (is alert, responds to voice, responds to pain, is unresponsive) of by means of the Glasgow Coma Scale (from a range of 15 being fully responsive to 3 being completely unresponsive). Pupil sizes and reactivity to light should be documented as well as any lateralising signs. Remember to check the blood glucose level by a bedside device. If an intracranial bleed is being considered, treat the patient in a 30° head up position.

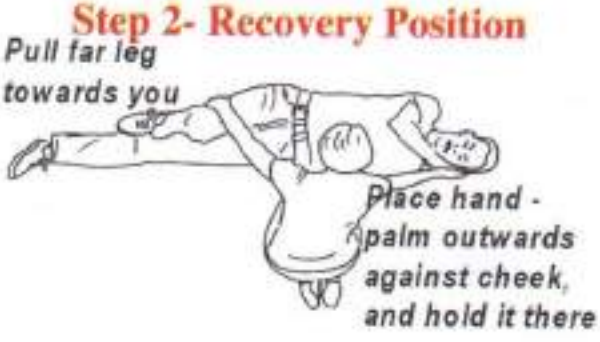
Environmental Factors: Expose the patient completely to look for signs of infection (e.g., rashes) or trauma. Check the patient's temperature to assess pyrexia or hypothermia. Remember always to maintain the patient's dignity.

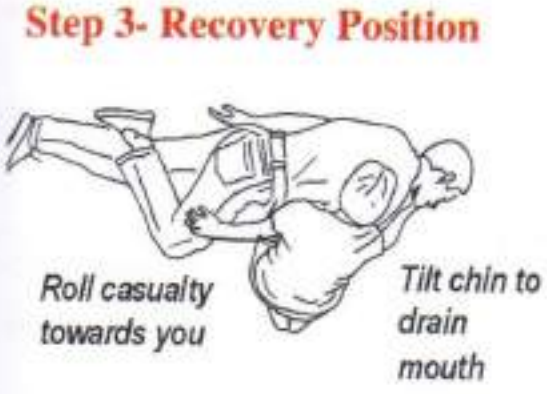
Treatment:

Treatment options will be dictated by the underlying pathology.

For hypoxia, treat with high flow oxygen via a non-rebreathe mask. If respiratory rate is sub-optimal, support may be provided by means of bag-valve-mask ventilation. In certain situations, non-invasive ventilation may be of use.

For hypotension, IV fluid boluses can be administered with 0.9% sodium chloride solution. Antibiotics can be given if signs of severe infection are present.





The Septic Patient

The aetiology of sepsis in a patient can be of medical, surgical or obstetric and gynaecological origin. Here, we will deal with the general approach to a septic patient.

Systemic Inflammatory Response Syndrome (SIRS) is a physiological process affecting the whole body in response to an infectious or non-infectious insult. Two or more SIRS criteria in the presence of proven or even suspected infection is called sepsis. Common SIRS criteria are listed below:

- Respiratory rate of more than 20 breaths per minute
- Arterial partial pressure of carbon dioxide of less than 4.3 kPa
- Heart rate of more than 90 beats per minute
- White blood cells of less than 4000 cells/mm^3 or more than 12000 cells/mm^3
- Immature neutrophils of more than 10%
- Body temperature of less than 36°C or more than 38°C

Severe Sepsis is sepsis in the presence of end organ dysfunction.

Septic shock is the presence of hypotension in sepsis.

The qSOFA score allows for identification of septic patients with increased morbidity and mortality. The following criteria each score 1 point:

- Low blood pressure (systolic of 100 mmHg or less)
- High respiratory rate (22 breaths per minute or more)
- Altered mental state (GCS of less than 15)

A score of 2 or more can identify patients outside the ICU setting who are likely to be septic.

Once a septic patient has been identified, the Sepsis Six bundle must be initiated within one hour. This consists of three diagnostic steps and three therapeutic steps:

Take blood cultures
Measure serum lactate and send complete blood count
Measure accurate urine output
Give oxygen aiming for target saturations of at least 94%
Give empirical intravenous antibiotics (according to local policy)
Give intravenous fluids for resuscitation

Pulmonary Disorders

Respiratory Distress

The feeling of difficulty in breathing or shortness of breath is termed dyspnoea and is a sign of respiratory distress. Other signs and symptoms include tachypnoea, orthopnoea and paroxysmal nocturnal dyspnoea. Causes of respiratory distress that may present to the Emergency Department are tabulated below.

Common Causes of Dyspnoea in the ED	Life threatening causes of Dyspnoea
Obstructive airway disease: asthma, COPD	Upper airway obstruction: foreign body, angioedema
Pulmonary oedema	Tension pneumothorax
Pneumonia	Pulmonary embolism
Ischaemic heart disease	Neuromuscular weakness: myasthenia gravis, GBS
Psychogenic	Fat embolism

The treatment of respiratory distress generally tends to be the treatment of the underlying disorder. These are:

Hypoxia – the insufficient delivery of oxygen to the tissue. This may be caused by hypoventilation, right-to-left shunt, ventilation perfusion mismatch, diffusion impairment or low inspired oxygen. The initial approach to treating hypoxia is by providing enough oxygen to maintain the PaO_2 at 60 mm Hg or 8 kPa.

Hypercapnoea – a rise in PaCO2 above 45 mm Hg or 6 kPa because of alveolar hypoventilation. This could be due to a decrease in the central respiratory drive, structural abnormalities to the thorax, neuromuscular impairment or chronic obstructive pulmonary disease. Treatment is by increasing either the respiratory rate or the tidal volume or both.

Wheeze – a series of high pitched notes usually produced on expiration in the central and lower airways. The causes of wheeze are multiple, and its treatment will vary according to the cause. Common aetiology are asthma, COPD, bronchiolitis, hyper-reactive airways, cardiogenic pulmonary oedema and ARDS.

Cough – a protective reflex for clearing the tracheobronchial tree of secretions and debris. Acute cough is a self-limiting episode of less than three weeks, usually associated with upper respiratory or bronchial infections. Other causes may be allergic reactions, environmental irritants, foreign body and transient airway hyper-reactivity. Antitussives and demulcents are standard treatment in addition to disease specific therapy.

Hiccups – involuntary spasms of inspiratory muscles. These may be self-limiting or intractable. Attempts can be made to cure hiccups by swallowing a teaspoon of sugar, sipping ice water or drinking water quickly. If treatment needs to be administered, chlorpromazine or metoclopramide can be given.

Cyanosis – bluish tinge to skin and mucous membranes due to increased amounts of deoxygenated haemoglobin. Arterial blood gas assessment is required to assess patients with cyanosis and oxygen is the first mode of treatment.

Pleural effusion – accumulation of fluid in the interpleural space, most commonly due to lower respiratory tract infections, heart failure or malignancy. Treatment is by therapeutic thoracentesis with drainage if there is dyspnoea at rest.

ACUTE ASTHMA

This is a chronic inflammatory disease in which there is increased airway responsiveness to a number of stimuli from infections, allergens, exercise and emotional stress. Acute asthma is clinically classified in to the following based on assessment:

Moderate exacerbation of asthma – increased symptoms; peak flow 50-75% of best or predicted; no features of acute severe asthma

Acute severe asthma – any one of inability to complete sentence in one breath; tachypnoea of 25 breaths per minute or more; tachycardia of 110 beats per minute or more or peak flow of 33-50% of best or predicted.

Life threatening asthma – a patient with severe asthma and any one of cyanosis; exhaustion, confusion, coma; feeble respiratory effort; SpO_2< 92%; silent chest; bradycardia, arrhythmia, hypotension; pO_2< 8kPa; normal pCO_2 (4.6 – 6.0kPa); peak flow <33% of best or predicted.

Near fatal asthma – increased pCO_2 and/or requiring mechanical ventilation with increased inflation pressures.

Investigations

Obtain vital signs of respiratory rate, oxygen saturations, pulse rate, blood pressure and temperature.

Obtain arterial blood gas if SpO2 < 92% or if features of life threatening asthma.

Obtain chest x-ray if suspected pneumothorax; suspected consolidation; life threatening asthma; failure to respond to treatment satisfactorily or a requirement for ventilation.

Treatment

High flow oxygen to maintains SpO2 at 94% or above

Position the patient in an upright position and to enable use of accessory respiratory muscles

If patient cannot talk, consider the need for ICU intervention and intubation

Assess trachea and chest signs for pneumothorax

Administer β_2 agonist by nebuliser or spacer device with mask (salbutamol 5mg or 10 puffs). If response is poor, consider continuous nebulisation.

Give corticosteroid as either oral prednisolone (40-50mg) or intravenous hydrocortisone (100mg).

Add ipratropium bromide (500mcg) to nebulised β_2 agonist if initial response poor.

Consider single dose of smooth muscle relaxant magnesium sulphate (1.2-2g intravenous infusion over 20 minutes) in life-threatening or brittle asthma.

Loading dose of aminophylline 5mg/kg over 20min by intravenous infusion if response is poor.

Alternatively use intravenous salbutamol (5mg in 500ml 5% dextrose) at a rate of 30-60ml/h.

Be vigilant of hypokalaemia as a result of β_2 agonist and/or steroid therapy.

Administer IV fluids (0.9% NaCl) if patient shows signs of dehydration.

Avoid 'routine' antibiotics unless showing signs of infection.

Consider referral to Intensive care unit if patient requires ventilatory support. Also refer patients suffering with acute severe or life-threatening asthma who fail to respond to therapy if they have any of the following:

Drowsiness, confusion

Exhaustion, feeble respiration

Coma or respiratory arrest

Persistent of worsening hypoxia

Hypercapnoea

ABG showing worsening acidosis

Deteriorating peak flow

PNEUMONIA

This is the presence of lower respiratory tract infection, as suggested by its signs and symptoms, associated with radiological evidence of infection on the chest xray. Some atypical pneumonia may present with no CXR findings. Suspect pneumonia in the septicaemic patient and those with acute confusional states. Causative organisms are bacteria in 80-90% of cases with *Streptococcus pneumoniae* being the commonest; Viruses (influenza A&B) account for 10-20% while Rickettsial causes are about 1%.

Assessment

Obtain vital signs including respiratory rate, oxygen saturation, pulse rate, blood pressure and blood glucose.

Auscultate for signs of consolidation such as inspiratory crackles that are present in up to 25% cases.

Assess for signs of SIRS and severe sepsis (*see the septic patient*)

Obtain CXR looking for patchy or lobar opacification, mass lesions or air bronchogram.

Obtain blood and sputum cultures. Consider urinary antigen for *pneumococcus or Legionella.*

Risk stratify the patient for admission or discharge by using the CURB-65 score. Scores of 2 or more are likely to need admission.

CURB-65 score for pneumonia	Score
Confusion	1
Urea > 7mmol/L	1
Respiratory rate ≥30/min	1
Blood pressure <90mmHg systolic or ≤60mmHg diastolic	1
Age ≥ **65** years	1

Treatment

CURB-65 score 0-1: Simple analgesia, oral antibiotics as per local policy, discharge home.

CURB-65 score 2: Oral antibiotics as per local policy (e.g., amoxicillin 1g orally tds with clarithromycin 500mg orally bd). May need admission.

CURB-65 score 3-5: Intravenous antibiotics as per local policy. Monitor SpO_2 and provide oxygen accordingly along with analgesia.

If signs of severe sepsis, initiate Sepsis Six bundle and liaise with intensive care early.

PULMONARY EMBOLISM

Very often misdiagnosed for other pathology (asthma, ACS, etc.) PE leads to many deaths. Even in the appropriately diagnosed and treated patients, mortality reaches 7%. Risk factors include sepsis, malignancy, COPD, surgery, joint replacement and patients recovering from infarction. Signs and symptoms include dyspnoea, pleuritic chest pain and haemoptysis. Suspicions should be raised in patients with unexplained hypoxia.

Assessment

Obtain vital signs as tachypnoea and tachycardia are common. Temperature may be raised as a result of lung infarction.

SpO_2 may be normal in about a third of patients.

Low blood pressure may indicate massive PE.

Calf examination may reveal signs of deep vein thrombosis.

Obtain 12 lead ECG and CXR.

The possibility of PE can be calculated by means of the Modified Wells Score for PE. A low clinical probability paired with a normal D-dimer can safely exclude PE.

Clinical feature for Modified Wells Score	Score
Signs of Deep Vein Thrombosis (minimum of objective leg swelling and tenderness)	3.0

Intravenous drug misuse	3.0
Pulmonary embolism is the most likely diagnosis	3.0
Heart rate of more than 100 beats per minute	1.5
History of previous PE or DVT diagnosis	1.5
Bed ridden for >3 days or surgery, within the past 4 weeks	1.5
Cancer (treated actively or with palliation with in last 6 months)	1.0
Haemoptysis	1.0
Total score <2.0 = low risk PE, 2.0-6.0 =moderate risk PE, >6.0 = high risk PE	

Diagnostic imaging for PE consists of CT pulmonary angiography which is highly sensitive and specific but uses a high dose of radiation so is not suitable for young or pregnant patients. Ventilation-perfusion (V/Q) scanning can also be done with a low dose of radiation, but this may not provide a definitive answer.

Treatment

Definitive treatment is warfarin therapy. Anticoagulation with low molecular weight heparin can be initiated while this is being arranged.

Admit patients with adverse signs.

Involve ICU early in suspected cases of massive PE that display marked hypoxia and/or cardiovascular compromise.

Unstable patients should not be taken for scan; an emergency bed side echo, if available, may show signs of right heart failure with a dilated right ventricle.

In case of haemodynamic instability do not delay in administering thrombolytic therapy (e.g., intravenous infusion of streptokinase 250,000 units over 30 min followed by 100,000 units/h for 24 hours).

PNEUMOTHORAX

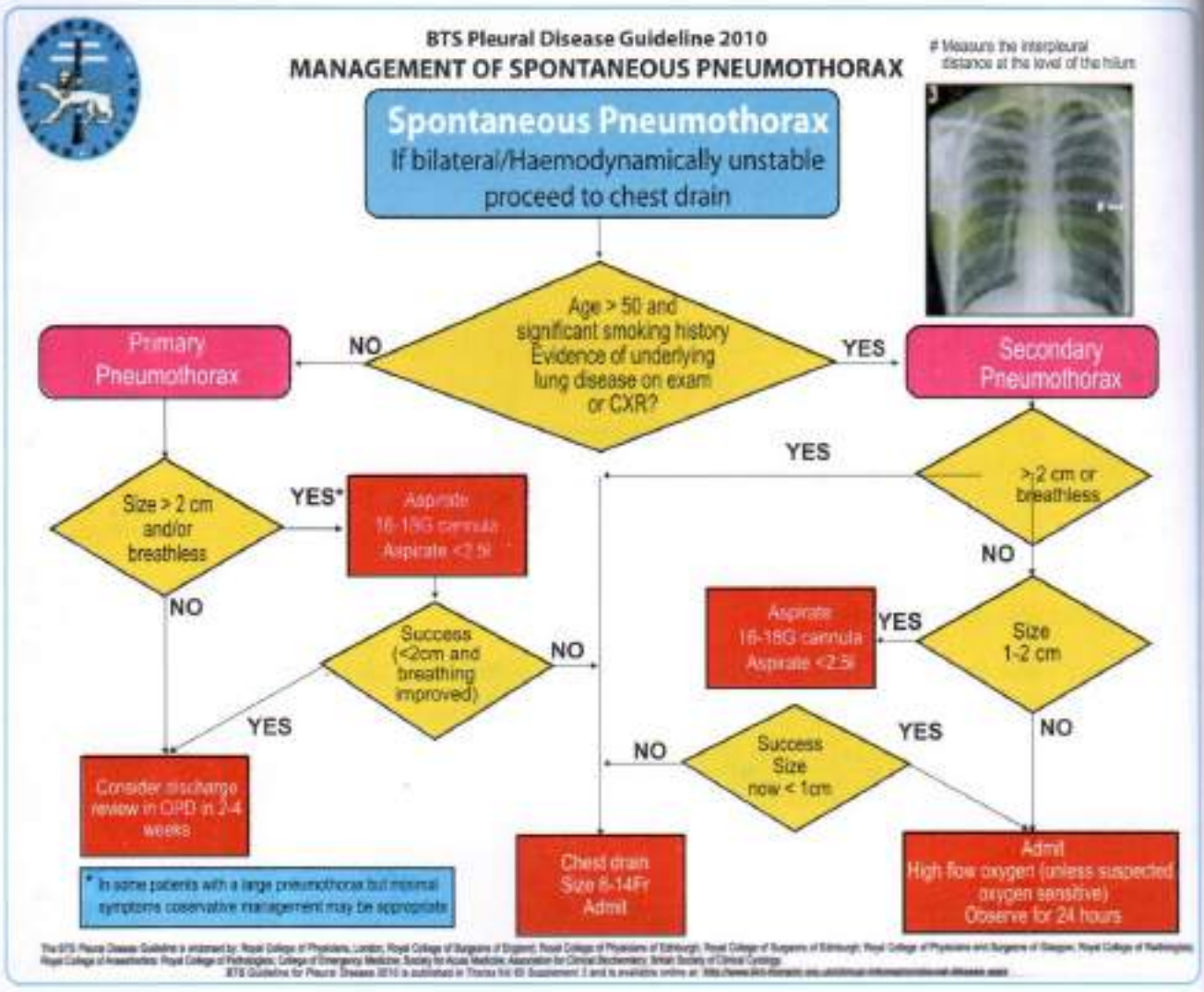
Air in the interpleural space may develop spontaneously or as a result of trauma. Spontaneous pneumothorax can present as a medical emergency in the form of a tension pneumothorax. It is otherwise classified as primary spontaneous pneumothorax (occurring in healthy individuals) or secondary spontaneous pneumothorax (occurring in older people with pre-existing lung pathology).

Assessment

Classical signs include tachypnoea, tachycardia, hyper-resonant percussion with reduced air entry on the affected side. Symptoms include pleuritic chest pain and dyspnoea.

Severe symptoms including tracheal deviation, tachypnoea, tachycardia and hypotension suggest tension pneumothorax. If suspected, immediate decompression by needle thoracentesis in the second intercostal space along the midclavicular line by a wide-bore needle should be done.

The management of spontaneous pneumothoraces can be summarised as below:



Chest Pain and ACS

Chest pain is probably the commonest cause of presentation to an emergency department worldwide. For the emergency physician, Acute Coronary Syndromes will probably rank as the first diagnosis in the middle aged and elderly, but one must remember that ACS can also occur in the very young and that there are equally dangerous and potentially life-threatening differential diagnoses that can present as the same. The table below outlines some of these, potentially rapidly fatal diagnoses in bold.

Common causes of chest pain	Less common causes of chest pain
Musculoskeletal (e.g., costochondritis)	**Aortic dissection**
Acute Coronary Syndrome	Cholecystitis
Pneumothorax	Herpes zoster
Oesophagitis	**Oesophageal rupture**
Pneumonia	**Pancreatitis**
Pulmonary embolism	Vertebral collapse

Acute Coronary Syndromes encompass a broad spectrum of ischaemic heart conditions ranging from unstable angina, non-ST segment elevation MI (NSTEMI) and ST segment elevation MI (STEMI). Presentation may be as discomfort to any of the chest, arm, neck or adjacent areas brought on by exertion, emotion or even cold weather. In atypical cardiac chest pain, the discomfort may be poorly localised, so it is prudent to exclude ACS in patients where the pain has lasted more than 15 minutes.

The trio of clinical gestalt, ECG changes and raised troponin can help with the diagnosis of ACS. Positive findings in any two of the three should strongly raise the suspicion of ongoing ischaemic processes.

Early ECG changes include ST segment elevation, ST segment depression and T wave inversion. In chest leads (V_1-V_6) ST segment rise of 2mm (2 small squares) is significant. In limb leads (I, II, III, aVL and aVF) ST segment rise of 1mm (1 small square) is significant. Ischaemia of cardiac tissue may manifest itself by ST depression or T wave inversion. New onset left bundle branch block (LBBB) should also raise concern.

Leads will show changes that reflect which part of the myocardium has been affected, as seen in the table below.

ECG Leads	Location of Myocardial Infarction
V_{1-3}	Anteroseptal – left anterior descending artery
V_{5-6}, aV_L	Anterlolateral – circumflex coronary artery
V_{2-4}	Anterior – left anterior descending artery

V_{1-6}	Extensive anterior – left anterior descending and right coronary artery
I, II, aV_L, V_6	Lateral – circumflex coronary artery
II, III, aV_F	Inferior – right coronary artery
V_1, V_4R	Right ventricle – right coronary artery

Treatment

Time is of the essence and early recognition is crucial for a positive outcome. Ensure that the patient remains as comfortable as possible. Early transfer to a facility that can provide Primary percutaneous coronary intervention should be considered if locally available. If not consider thrombolysis.

Provide oxygen to maintain saturation between 94-98%.

Obtain vital signs and attach to cardiac monitor.

Obtain IV access and take samples for CBC, urea and electrolytes, lipid profile, glucose and troponin.

Titrate intravenous opioid analgesia to effect. Sublingual GTN may also be given.

Administer 300mg aspirin and 300mg clopidogrel orally.

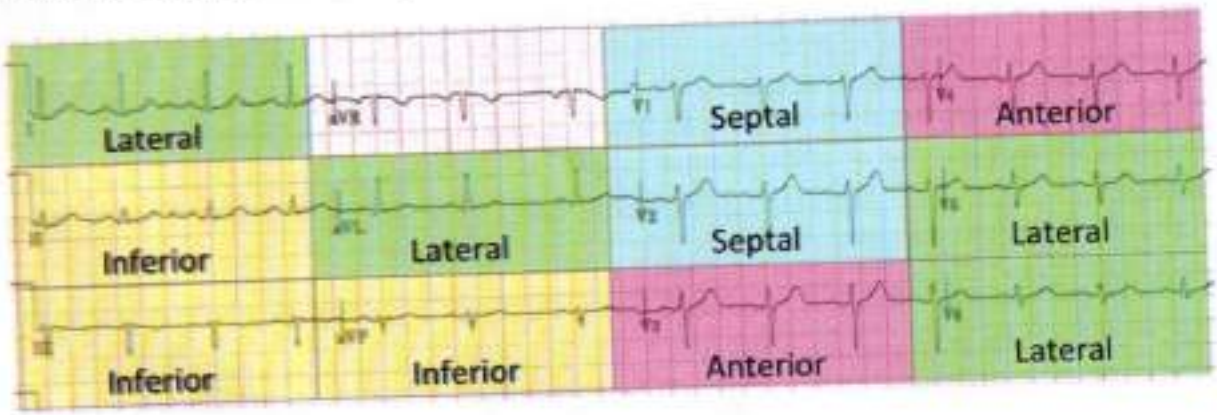
If possible, arrange safe transfer to a facility with primary PCI capabilities.

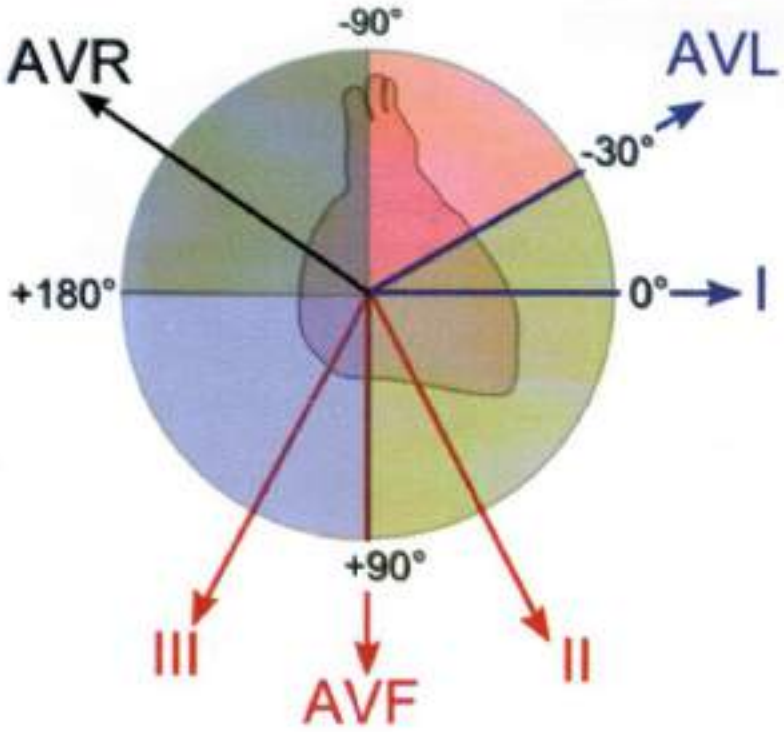
If transfer not possible, consider thrombolysis (e.g., with streptokinase) and administer anticoagulation in accordance with local protocols.

If pain persists, consider intravenous infusion of GTN if systolic is above 90mmHg.

Consider atenolol unless contraindicated (e.g., uncontrolled heart failure, hypotension, brady-arrhythmias, COPD).

Involve cardiology and coronary care early.

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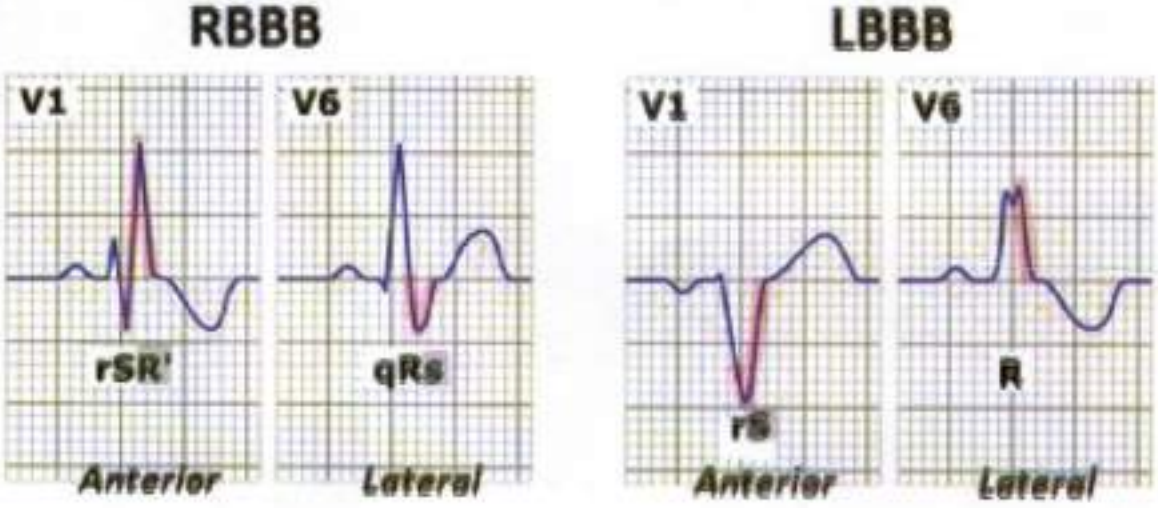
AVR
AVL
-30°
+180°
0°
I
+90°
III
AVF
II


RBBB
V1
V6
rSR'
qRs
Anterior
Lateral
LBBB
V1
V6
rS
R
Anterior
Lateral

SYSTEMIC HYPERTENSION

Many patients may present with hypertension as an incidental finding. It is usually asymptomatic, and treatment should not be started based on an isolated reading in the absence of signs and symptoms. It is a risk factor for both cardiovascular and cerebrovascular diseases and consequently, may lead to aortic dissections and haemorrhagic strokes. Hypertension may also be a manifestation of pre-eclampsia or eclampsia. Malignant hypertension occurs when there is a rapid rise in blood pressure on a background of chronic hypertension and clinically presents with retinopathy, nephropathy, microangiopathic haemolytic anaemia and encephalopathy.

Assessment

Obtain IV access and bloods for CBC, U&E, creatinine, clotting profile and glucose.

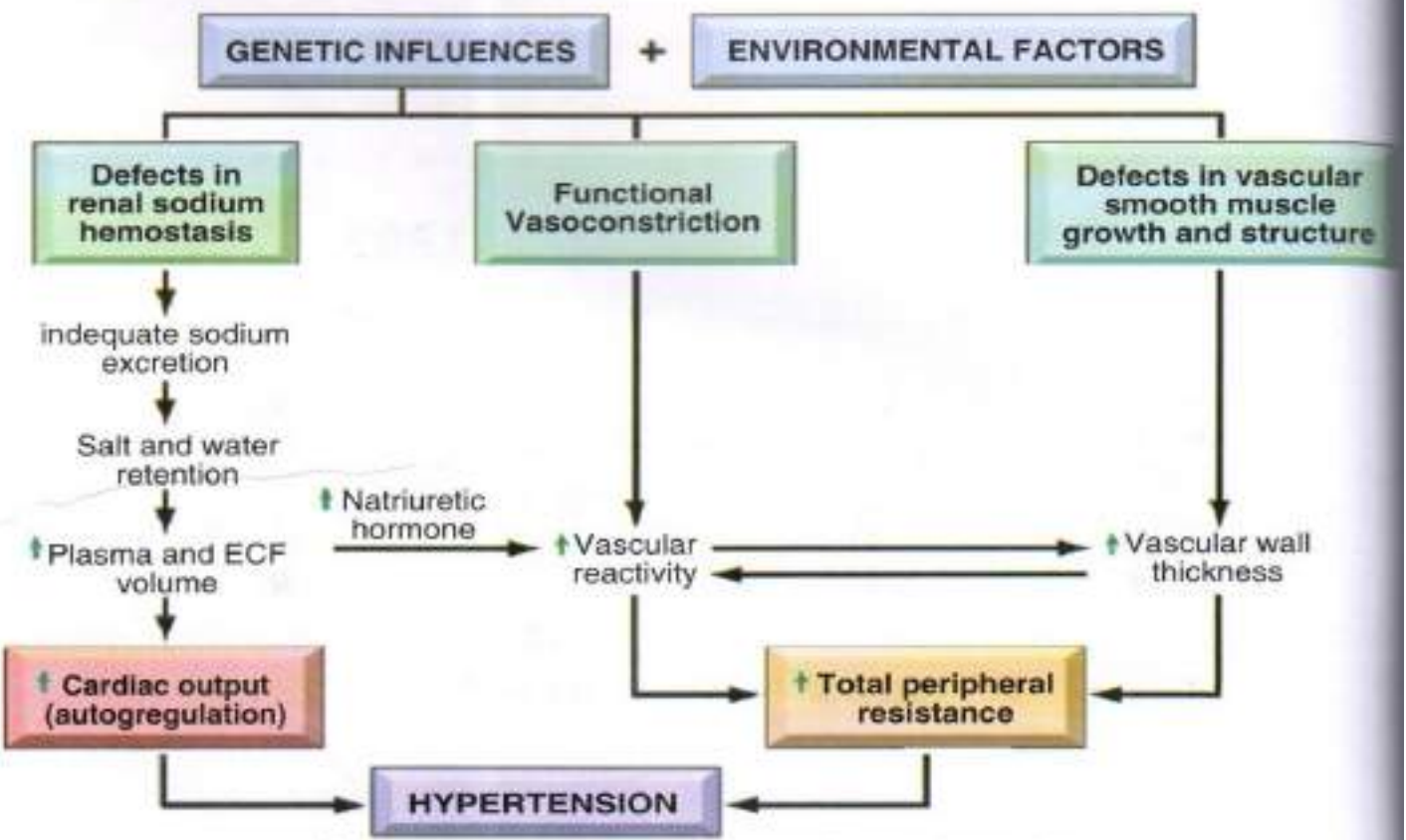
Obtain CXR and ECG

Obtain CT head if altered level of consciousness or focal neurology.

Arrange for continuous monitoring of blood pressure (by arterial line in ICU setting if required).

Intravenous sodium nitroprusside, labetalol or GTN may be used.

The initial goal of therapy is to reduce mean arterial blood pressure by no more than 25% within minutes to 2 h or to a blood pressure in the range of 160/100–110 mmHg.



Gastrointestinal Disorders

Acute Abdominal Pain

New onset abdominal pain with in the last seven days of various aetiology. In up to 42% of cases, the aetiology may remain unknown.

Medical causes	Surgical causes	Obstetric and gynae causes
Myocardial infarction	Peritonitis	Ruptured ovarian cyst
Lower lobe pneumonia	Organ rupture	Ovarian torsion
Sickle cell crisis	Intestinal obstruction	Ectopic pregnancy
Diabetic ketoacidosis	Appendicitis	Acute salphingitis
Addisonian crisis	Cholecystitis	Pyosalphinx
Acute drug withdrawal	Diverticulitis	Endometritis
Inflammatory bowel disease	Mesenteric ischaemia	Uterine rupture

Assessment

Obtain relevant history of pain (SOCRATES – site, onset, character, radiation, associations, time course, exacerbating/relieving factors, severity)
Obtain IV access and send blood for CBC, U&E, LFT, Amylase/Lipase, CRP, Lactate, arterial blood gas.
Early administration of adequate analgesia. Do not worry about 'masking' the pain.
IV fluids especially if considering nil by mouth
CXR (erect) looking to exclude perforation.
Abdominal x-ray has minimal role – only obtain if clinical signs of obstruction.
Consider naso-gastric tube and urinary catheter for intake output chart.
Consider Sepsis Six if signs of infection.
Definitive treatment will vary according to diagnosis.

GASTROINTESTINAL BLEEDING

GI bleeds may present in one of the five following ways:

1. Haematemesis – vomiting of blood, either fresh/clotted, or altered coffee-ground appearance
2. Haematochezia – passing of fresh blood per rectally.
3. Melena – passing of black, tarry, foul-smelling stool.
4. Occult GI bleed – absence of overt PR bleed but identified by faecal occult blood test.
5. May present only with symptoms of blood loss such as dizziness, syncope, angina, or dyspnoea.

Common causes of Upper GI bleed	Rare causes of Upper GI bleed
Peptic ulceration	Aorto-enteric fistula
Mucosal inflammation e.g., gastritis, oesophagitis	Benign tumours e.g., carcinoids, angiomas
Oesophageal varices	Congenital e.g., Ehlers-Danlos, Osler-Weber-Rendu, pseudoxanthomaelasticum
Mallory-Weiss tear	
Gastric carcinoma	
Coagulation disorders e.g., warfarin, thrombocytopenia	

The commonest cause for apparent lower GI bleed is due to upper GI bleed, with only about 20% originating from the colon and rectum. Lowe GI bleeds will be dealt with in surgical emergencies.

Assessment

Obtain detailed history including full drug history and alcohol consumption.
Use ABCDE approach in the ill patient.
Obtain IV access and send bloods for CBC, U&E, clotting screen and cross-match.
Consider CXR and ECG.
Use Blatchford score to assess whether patient will need medical intervention. Scores of 0-2 are considered low risk.
Endoscopy is the investigation of choice.
In case of massive haemorrhage:
Commence IV fluid resuscitation. Ideally replace blood with blood.
Administer terlipressin (2mg IV repeated 4-6 hourly)
If INR prolonged give IV Vitamin K.
Consider IV Tranexamic acid.
If experienced, insert a 4 lumen Sengstaken tube and regularly aspirate both ports.
Involve ICU early.

Renal Disorders

Acute Kidney Injury

This is the worsening of renal function over the course of hours or days resulting in the accumulation of toxins in the blood and the loss of internal homeostasis as a result of an insult to the kidneys.

Renal insult may be:

1. Prerenal – decreased perfusion of a normal kidney
2. Intrinsic – pathological changes within the kidney
3. Post-obstructive – obstruction to the urine outflow tract

Assessment:

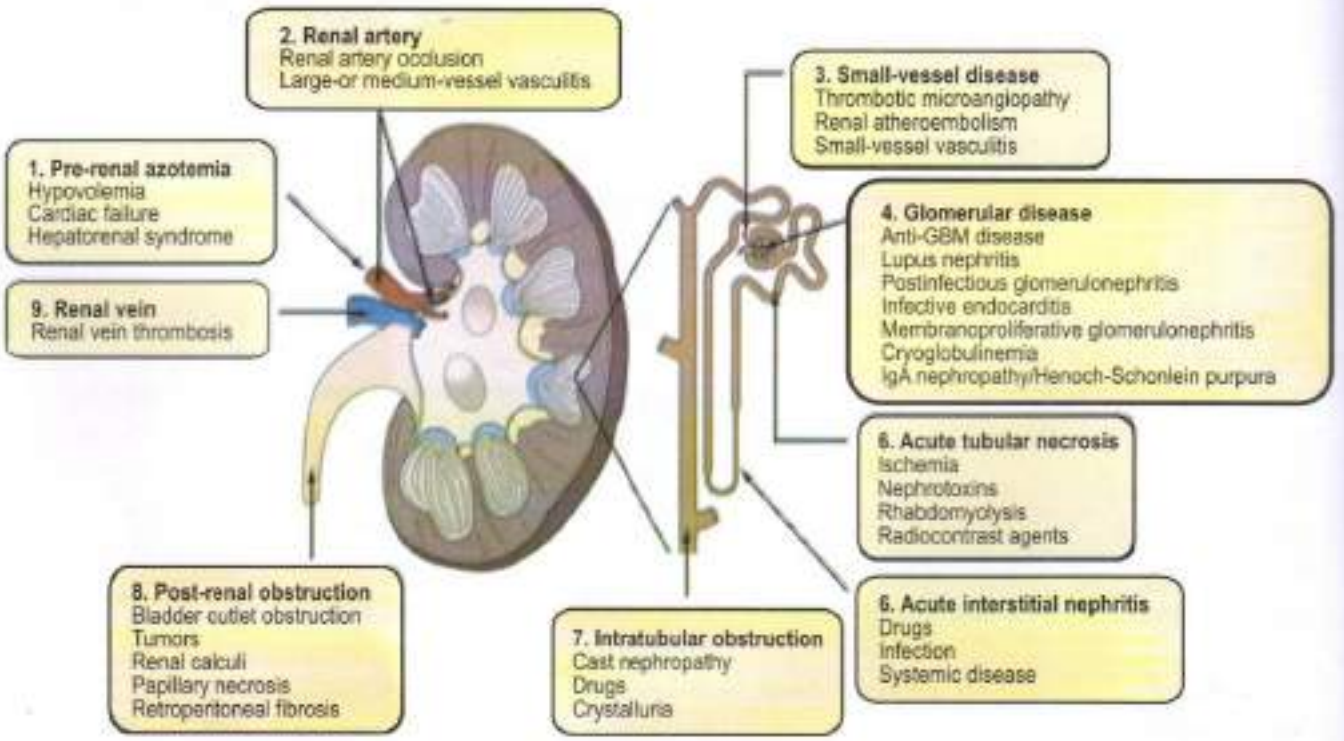
- Features of nausea, vomiting, fatigue, confusion or coma may be present.
- Assess for rashes, signs of vasculitis, jaundice, abdominal or pelvic mass or palpable urinary bladder.
- Assess and correct volume status with IV fluid infusion.
- If unwell, resuscitate effectively using ABCDE approach.
- Obtain CBC, U&E, LFT, magnesium and phosphorus levels.
- Obtain urinalysis, urine osmolality and urine culture.
- Obtain ECG, CXR and bladder scan.
- Make sure renal dose adjustments are made before drug administration.
- If IV contrast scans are required, ensure that renal function has been assessed.
- Definitive treatment will depend on the original aetiology. Most ED presentations are due to pre-renal causes.

Causes of Prerenal Failure			
Hypovolaemia	**Decreased cardiac output**	**Miscellaneous**	
GI: ↓ intake; D&V	MI, tamponade	Renal artery disease	Drugs: NSAIDs, ARB, ACE-inhibitors
Drugs: diuretics	B-blockers, Ca channel blockers	Emboli: thrombotic, septic, cholesterol	Cyclosporine and tacrolimus
Third spacing		Thrombosis: vasculitis, atherosclerosis	Microvascular thrombosis: HUS, DIC, pre-eclampsia, vasculitis
Skin loss: fever; burns			
Hypotension	**High output failure**		
Septic Vasodilation	Thyrotoxicosis	Dissection	
Haemorrhage	AV fistula	Hypercalcaemia	

Involve renal team early for decision on urgent or emergency dialysis. Indications for emergent dialysis are listed below:

1. Uncontrolled hyperkalaemia (K^+>6.5 mmol/L or rising)
2. Intractable fluid overload in association with persistent hypoxia, or lack of response to conservative measures
3. Uraemic pericarditis
4. Progressive uraemic/metabolic encephalopathy; asterixis, seizures
5. Serum sodium level <115 or >165 mEq/L
6. Severe metabolic acidosis with concomitant acute kidney injury; treat underlying source of lactic acidosis and tolerate pH > 7.2 in setting of permissive hypercapnia
7. Life threatening poisoning with a dialyzable drug, such as lithium, aspirin, methanol, ethylene glycol or theophylline
8. Bleeding dyscrasia secondary to uraemia
9. Excessive BUN and creatinine levels: trigger levels are arbitrary; it is generally advisable to keep BUN level < 100mg/dL, but each patient should be evaluated individually.

Causes of AKI



RHABDOMYOLYSIS

The destruction of skeletal muscles due to injury to myocytes and their membranes. Common causes of rhabdomyolysis in adults are tabled below:

<table>
<tr><th colspan="3">Common conditions associated with Rhabdomyolysis in Adults</th></tr>
<tr><td>Trauma</td><td>Environment and musc activity</td><td>Immunological diseases</td></tr>
<tr><td>Crush injury, Electrical or lightning injury</td><td rowspan="3">Contact sports, del. Tremens, Dystonia, seizures, marathons, psychosis, heat stroke</td><td>Dermatomyositis, Polymyositis</td></tr>
<tr><td>Drugs of abuse</td><td>Bacterial Infection</td></tr>
<tr><td rowspan="2">Amphetamines (including ecstacy), Caffeine, Cocaine, Ethanol, Heroin, Opiates, etc.</td><td rowspan="2">Clostridium, Group A ß-haemolytic strep, legionella, salmonella, shigella, S aureus</td></tr>
<tr><td>Genetic Disorders</td></tr>
<tr><td>Viral Infections</td><td>Medications</td><td>Ischaemic injury</td></tr>
<tr><td></td><td>Glycolysis disorders, fatty acid oxidation disorders</td><td>Compartment syn., compression</td></tr>
</table>

Assessment

- History and symptoms consistent with causation.
- Elevated serum creatine kinase of fivefold or greater (in the absence of cardiac or brain injury).
- Dark coloured urine, positive for blood on urine dipstick test (as orthotoluidine reaction does not differentiate between myoglobin, haemoglobin and red blood cells).
- Aggressive IV fluid resuscitation typically over 24 to 72 hours.
- No solid evidence exists for the benefit of urinary alkalinisation by sodium bicarbonate or forced diuresis with mannitol or loop diuretics.
- Urinary catheter for critical patients to monitor fluid balance.
- Hypocalcaemia usually requires no treatment if observed early.
- Hyperkalaemia may be significant and prolonged. Standard insulin glucose therapy may not be as effective in rhabdomyolysis induced hyperkalaemia.
- Treat hyperphosphatemia with oral phosphate binders and hypophosphatemia with oral supplements.
- Dialysis may be indicated.

Diabetic Emergencies

HYPOGLYCAEMIA

This may be confused with any neurological presentation including acute confusion, seizures, isolated hemiparesis and coma. Normal plasma glucose ranges between 3.6-5.8 mmol/L and cognitive function deteriorates when less than 3.0 mmol/L. This level may be higher in patients with long-standing diabetes. The most common causes are due to insufficient or delayed food intake, undue exertion and excessive insulin administration.

Assessment

Common features are sweats, pallor, tachycardia, irritability, aggression, fits or focal neurology.

Check capillary or venous glucose with bed-side kit, and commence treatment if below 3.0 mmol/L.

If awake and able to do so, encourage to take fast acting oral carbohydrates (5-15g) as raw sugar, lozenges followed by biscuits and milk.

Glucagon 1mg s.c., i.m., i.v. (not suitable in liver failure, chronic alcoholism or hypoglycaemia due to sulphonylurea drugs).

Administer 25g of glucose by intravenous means. Avoid 50% glucose solution as hypertonic and thrombosclerotic. Combinations of 500ml of 5% or 250ml of 10% glucose solution may be given.

If altered level of consciousness persists, consider other underlying pathologies. Arrange urgent investigations (e.g., CT scans) and contact ICU.

90% of patients usually make full recovery in 20min and may be appropriate for discharge.

HYPERGLYCAEMIC CRISES

Diabetic keto-acidosis (DKA) is caused by absolute or relative decrease in insulin levels. This commonly develops over a course of 1-3 days in the undiagnosed younger diabetic patients. It is characterised by high sugar levels, metabolic acidosis and urinary ketones.

Hyperosmolar hyperglycaemic state (HHS) is triggered by intercurrent illness, inadequate diabetic therapy and dehydration. It is more common in the elderly with extremely high readings of blood sugar, increased blood osmolality and a lack of urinary ketones.

Causes of hyperglycaemic crises can be attributed to the four 'I's either individually or in combination:

1. Infection – UTI, LRTI, skin
2. Infarction – myocardial, stroke, GI
3. Insulin insufficiency – missed doses, poor compliance
4. Intercurrent illness – many underlying conditions precipitate or aggravate DKA and HHS

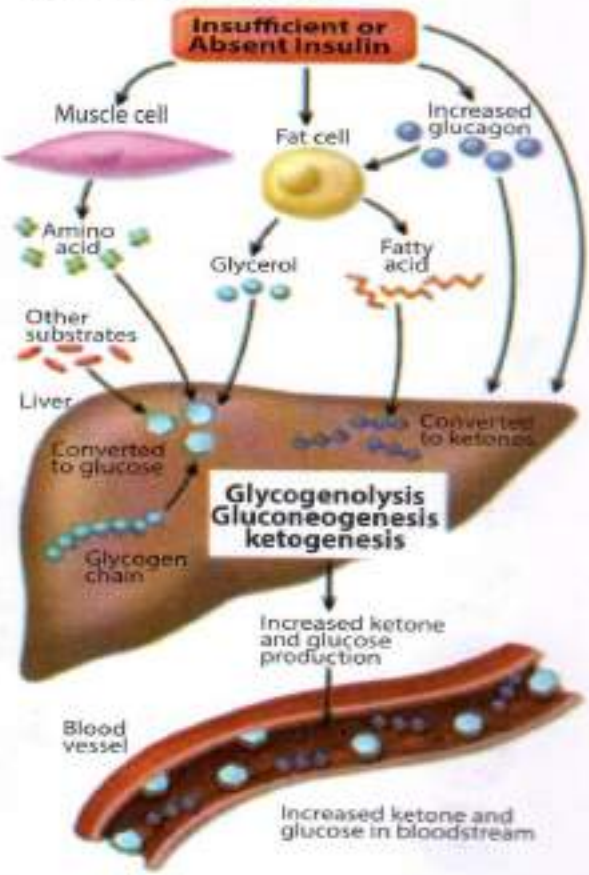
Assessment

- Signs of dehydration – thirst, polydipsia, polyuria, decreased skin turgor, dry mouth, hypotension, tachycardia.
- GI symptoms – nausea, vomiting, abdominal pain
- Hyperventilation – due to respiratory compensation for metabolic acidosis.
- Check bedside blood glucose and urine
- Obtain IV access and send bloods for CBC, U&E, glucose, creatinine and osmolality
- Calculate osmolality using formula: mOsm/Kg = $2(Na^+ + K^+)$mmol/L + glucose mmol/L + urea mmol/L (normal range = 275-295 mOsm/Kg)
- Arterial blood gas – looking for metabolic acidosis with or without compensation.
- ECG for evidence of hyperkalaemia.
- Screen for infection – CXR, urinalysis, blood cultures if indicated.
- If altered level of consciousness, use ABCDE approach.

Management

- Give high flow oxygen and consider intubation if GCS is 8/15 or less.
- Rehydrate with IV normal saline – 1000ml over 0.5-1 hour followed by 500ml/h for next 2-3 hours.
- Start insulin infusion using paediatric burette or IV pump at 6units/h. When glucose <14 mmol/L decrease rate to 4 units/h and replace saline solution with 10% dextrose to facilitate ketone clearance and acid-base state.
- Monitor potassium level which may be normal, raised or low and treat accordingly.
- Consider NG tube and urinary catheter to monitor strict fluid balance.
- Administer LMWH in DKA and HHS as both are hypercoagulable states.
- Implement Sepsis Six if signs of severe infection.

Diabetic Ketoacidosis



7. Poisoning and Snake Bites

MA Faiz, MS Ahmad

Snake Bite

INTRODUCTION

Snake bites have been a health hazard in Bangladesh for a very long time. They usually occur as an accidental, unintentional and unprepared interaction between humans and snakes. The incidence of snake bites in Bangladesh is estimated to be 8000 per year with a crude mortality rate of 2.5%, however the true incidence may be much higher. There is a seasonal variance with the incidence of snake bites with an obvious increase in the monsoon and flood seasons. People at risk are usually farmers, housewives, fishermen and planters with a preponderance of young men in rural areas as victims.

APPROACH

Prehospital first aid

At first reassure the patient as agitation and excitation can cause increased blood flow and the rapid spread of the venom. Immobilisation of the bitten part to allow for time to get patient to definitive treatment. This is done to reduce local muscle activity and thus limit the spread of venom through the circulatory system. Immobilisation should be done similar to that applied for a broken bone, involving joint below the bite. A restriction of the joint above and the from 2 inches above the compression bandage can be applied bite. Avoid the use of tourniquets. As opposed to elevation for broken limbs, it is ideal to keep the bite affected area in a dependent position if possible. Avoid any oral intake if difficulty swallowing or nasal voice.

DO'S & DON'T'S

In Hospital

Patients may attend at various stages of snake bite. It is not uncommon for people from rural areas presenting days after the incident, especially after having been to traditional healers. As with all emergency presentations the initial approach should be a systematic 'ABCDE' assessment. The typical effect snake bites in Bangladesh have on a patient are as follows:

1. Prolonged bleeding from bite site or different parts of the body
2. Disability to the nervous system –
    a. Difficulty in talking or swallowing
    b. Nasal or hoarse voice
    c. Drooping eyelids, double vision, difficulty seeing
    d. Weakness of skeletal muscles (including diaphragm)
3. Cardiovascular effects –
    a. Drop in blood pressure
    b. Irregular heart beat
4. Nephrotoxic effects leading to kidney failure

Urgent action should be taken in an intensive care setting if any of the above features are present.

The standard approach is to look for the above signs in anyone presenting with a snake bite. If these signs are not present, the patient must be admitted and observed. There are tests that can identify the type of snake and nature of the bite, but these are not available in Bangladesh. Anti-venom, which is specific to geographical region, is also not produce locally. A limited amount may be facilitated by the assistance of WHO sourced from India. In Bangladesh, mortality is mainly as a result of respiratory muscle paralysis. This can be circumvented by providing artificial respiratory support for a short period of time.

Basic wound care management of the bitten site should be performed which includes cleaning with antiseptic. Antibiotics should be commenced covering for animal bites or for the development of necrosis and gangrene. Consider tetanus prophylaxis. Surgical debridement may be necessary.

Complications:

1. Septic shock – treat with fluid and antibiotics
2. Requirement of blood transfusion
3. Bleeding into the muscle at the bite site may also lead to compartment syndrome and may necessitate fasciotomy.
4. Acute renal failure
5. Respiratory support
6. Anaphylaxis to venom – treat as standard anaphylaxis

Poisoning

The Emergency treatment of poisoning of any sort can be handled effectively by using the standard 'ABCDE' approach.

A. Airway: corrosive agents can compromise the airway by causing inflammation and bleeding. Early intubation may be indicated.

B. Breathing: Many poisons can depress the ventilatory function and require the use of bag valve mask ventilation and high flow oxygen.

C. Circulation: Similarly, many poisons can depress the cardiovascular system resulting in hypotension and bradycardia. If patient is unconscious and pulseless, start CPR immediately.

D. Disability: CNS depression will lead to altered levels of consciousness that can be assessed by AVPU scale or GCS. Convulsions may occur as a result of hypoxia or acidosis.

E. Exposure: Both hypothermia and hyperthermia can be triggered by different toxic drug doses. Consider catheterisation if signs of retention.

Types of poisoning

Unintentional poisonings or accidental overdoses: Common in inquisitive young children or in the elderly with varying levels of mental impairment. Can also be caused when confusion arises between two drugs of similar sounding names. One also needs to remember that this can result from drug smuggling when the drugs are hidden within the body and accidentally tear.

Deliberate self-poisoning: typically occur in adults with poor mental health. Concerns should be raised of the amount of drugs taken if an organised effort was made by the patient or if a suicide note was left behind.

Non-accidental poisonings can occur as a result of homicide or in industrial sectors with poor regulation. Terrorism can also be a cause of large-scale poisoning.

Diagnosing Poisons

In some instances, there may be clear history about the amount and type of medication taken that can be corroborated by reliable patient attendants. However, in patients who are not willing to communicate or those that are unconscious, it can be difficult to identify the toxic drug. Furthermore, in Bangladesh, where all drugs are widely available over the counter, any combination of drugs may be taken. There are however some features, when present together, suggest the toxidrome of a particular drug:

Tricyclic antidepressant or orphenadine poisoning – coma with dilated pupils and divergent squint. Tachycardia. Hypertonicity and hyper-reflexia with extensor plantars.

Barbiturates, Benzodiazepines with alcohol or severe TCA poisoning – coma with hypotension and respiratory depression. Decreased muscle tone.

Aspirin poisoning – Tinnintus, deafness, hyperventilation, tachycardia, nausea and sweating.

Amphetamine, Cocaine, sympathomimetics – agitation, tremors, dilated pupils and tachycardia.

Assessment

After completing ABCDE approach:

i. Monitor respiratory rate and saturations.

ii. Record consciousness levels and frequently reassess.

iii. Check blood glucose levels.

iv. Record ECG

v. Check arterial blood gas

vi. Record blood pressure and temperature.

vii. Check renal and liver functions. Measure drug levels if facilities available.

Methods of reducing the systemic absorption of poisons

Gastric lavage

In general, this method should be avoided. Unless a large amount of poison has been taken within the last hour this is ineffective in decreasing the absorption of poisons. It does not empty the stomach of solid poisons and may actually speed up absorption by forcing gastric contents through to the small gut. Studies have shown that there is no decrease in mortality from the effects of poisons by using gastric lavage. If used for corrosive poisons, it may actually increase morbidity and mortality. If lavage is to be used, a step wise approach needs to be adopted:

i) Ensure powerful suction device is available

ii) Have patient lying in left lateral position with head end down and foot end up

iii) Provide oxygen via nasal canula and monitor ECG

iv) Measure and lubricate wide bore gastric tube and insert through mouth into stomach.

v) Confirm position by aspirating stomach contents, and label sample for analysis.

vi) Pour 300ml of water down tube, siphon back while massaging over stomach to dislodge debris.

vii) Continue until aspirate is clear, consider leaving activated charcoal in stomach

viii) Occlude tube on removal to prevent aspiration.

Activated Charcoal

Ideally to be given within one hour of ingestion of most poisons. However, avoid in poisoning by organophosphates, heavy metals, ethanol, alkalis, boric acid and cyanide. Aspiration into the lungs can be fatal.

Induced vomiting

This must be avoided as it can considerably increase mortality

Common antidotes for some common poisons

Poison	Antidote	Poison	Antidote	Poison	Antidote
β-blockers	Glucagon	Methanol	Fomepazole	Warfarin	Vitamin K
CO	O_2	Opioids	Naloxone	Snake bites	Antivenom
Digoxin	Digibind	OPCs	Atropine	TCAs	$NaHCO_3$
Ethylene glycol	Ethanol	Paracetamol	Acetylcysteine	Local Anaesthetics	Lipid emulsion (Intralipid)
Iron salts	Desferrioxamine	Sulphonylureas	Glucose		

8. Musculoskeletal Trauma

S Islam, M Islam, SK Sarker

Musculoskeletal injury refers to the damage of muscular or skeletal systems.

The musculoskeletal system is composed of four main structures:

1. Bones
2. Muscles
3. Tendons - connect muscle to bone
4. Ligaments - connect bone to bone

Musculoskeletal injuries are rarely life threatening but if not recognized and cared for properly, they may lead to permanent disability.

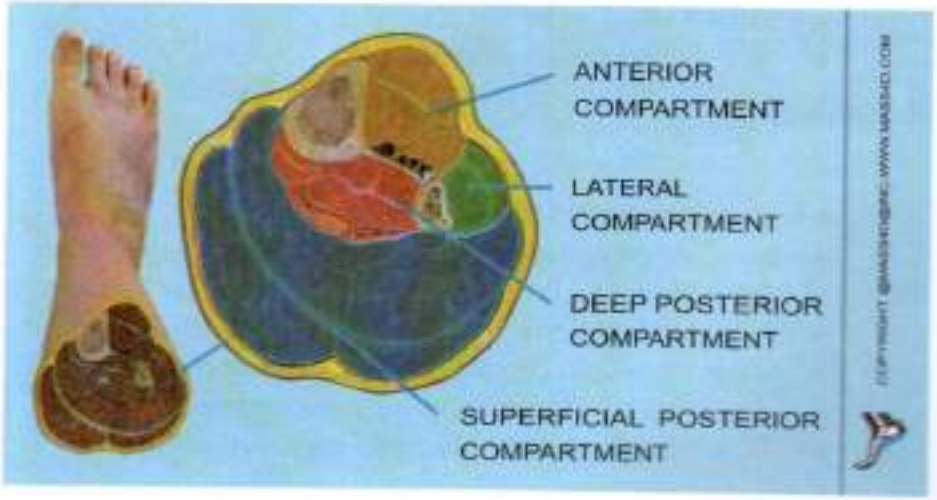
Injuries to the Musculoskeletal System

Four basic types of musculoskeletal injuries are:

1. Fracture - a break or disruption in bone
   - open - the skin is pierced by broken bone fragments
   - closed - the broken bones do not penetrate the skin
2. Dislocation - displacement or separation of a bone from its normal position at the joint.
3. Sprain - partial or complete tearing of ligaments and tissues at the joint.
4. Strain - An extreme stretching or tearing of muscle and tendons.

The 6 P's of Musculoskeletal Injury Compartment Syndrome

1. **Pain** - disproportionate, tenderness
2. **Pallor** of distal skin (poor capillary refill)
3. **Paralysis**
4. **Paraesthesia** (burning, tingling feeling)
5. **Pressure**
6. **Pulseless** extremity



Signs and Symptoms of Serious Injury

- Significant deformity
- Moderate or severe swelling and discoloration
- Inability to move or use the affected part.
- Bone fragments protruding from the wound
- Bones grating, or a pop or snap heard by the victim
- Loss of circulation in an extremity.
- A cause of injury that suggests the injury may be severe.

Care for Musculoskeletal Injuries:

- Check first for life-threatening conditions and give appropriate care for them.
- Treat according to ATLS protocol
- Injury involving the head, neck or back can easily be worsened by poor handling
- The injury impairs walking or breathing. --broken leg bones bleed internally; breathing impairments are life-threatening
- You see or suspect a fracture - Pain and blood loss could lead to shock.
- You see or suspect multiple musculoskeletal injuries -same as previous

General Care

- Rest the injured part - avoid painful movements. Find a comfortable position.
- Immobilize injuries that appear serious.
- Apply source of cold (put dry cloth or bandages between ice and bare skin)
- Elevate injured part if it doesn't cause pain (fractured bones must first be splinted)

Immobilization

- Lessens pain
- Prevents further damage
- Reduces the risk of serious bleeding
- Reduces the possibility of circulation loss in the affected part

Types of splints:

- Rigid --A board or folded magazine
- Soft --A pillow or folded blanket
- Sling and binder --A sling secured to the body
- Anatomical --Bind injured body part to another body part (ex. taping two fingers together)

Four basic principles of Splinting:

- Splint only if you will not cause further pain to the victim
- Splint the injury in the position you find it. (don't try to straighten broken bones)
- Splint the injury site and the joints above and below the injury.
- Check for proper circulation before and after splinting:
    - No numbness / tingling in the extremities
    - Capillary refill in fingers / toes

9. Chest Trauma

MMR Mia, NK Sarker

Introduction

- Chest trauma is the principal cause of death during 1st half of life.
- It ranks behind Cardiovascular disease and cancer as a cause of death in all age group.
- 25% of trauma deaths are solely due to chest trauma and 50% of patients who die from multiple injuries have significant chest injury.
- "Deadly dozen" of chest trauma are very crucial in trauma care.

Immediately life-threatening chest trauma (first half of the deadly dozen)

They should be detected and simultaneously managed in the primary survey.

- Airway obstruction
- Tension Pneumothorax
- Sucking chest wound
- Massive haemothorax
- Flail Chest
- Cardiac Tamponade

Potentially life-threatening chest trauma (second half of deadly dozen)

These are detected in the secondary survey:

- Pulmonary Contusion
- Aortic Disruption
- Tracheobronchial Disruption
- Diaphragmatic rupture
- Myocardial Contusion
- Oesophageal Perforation

Management

95-99% of blunt trauma & 85-90% of penetrating trauma are successfully managed non-operatively. The only surgical procedure which may be required for these patients is ICT or tube-thoracostomy. On the other hand, only around 10% of chest trauma patients need major thoracic surgical intervention. However, impact of injury on two extremes of age must be carefully emphasized:

1. In paediatric patient chest wall is elastic and flexible so even without fracture there may be significant intrathoracic injury.

2. In the elderly patient the bony thorax is fragile, so mortality and morbidity are high even with minor trauma.

Management outline:

- ABCDE systematic approach
- Analgesic: adequate analgesia is very important for chest trauma patients as there is no scope of absolute rest for chest.
- Antibiotic
- Breathing exercise and chest physiotherapy
- Tube-thoracostomy if indicated
- Use of steroid
- Use of ICU care & ventilator in selected cases: for this SPO_2 and ABG monitoring is important.
- Emergency thoracotomy in selected case.

Tension pneumothorax:

It is surgical emergency. Needle decompression in the second intercostal space along the mid-clavicular line should be done immediately in an emergency condition. This should be followed by formal tube-thoracostomy when the situation permits.

Open sucking chest wound:

It is very serious condition as if it remains untreated, respiratory mechanics will be hampered, and effective ventilation will not occur through tracheobronchial tree. It may lead to a tension pneumothorax. Immediately cover the wound by means of a three-way occlusive dressing to prevent tension pneumothorax. This can be achieved with a damp pad of gauze over the wound that is taped on three sides. Subsequently tube-thoracostomy and closure of the wound.

Flail Chest:

It is usually associated with pulmonary contusion, so treatment of the contusion is essential. Analgesia, antibiotics, and supported ventilation as indicated by blood gas report. Tube-thoracostomy when indicated. Stabilization by external or internal means or by mechanical ventilation is not usually indicated.

Massive haemothorax:

Tube-thoracostomy. Consider referral to cardiothoracic surgeon if available or thoracotomy if:

- Initial blood loss >1500 ml with nonresponsive hypotension
- Blood loss>200-300/hour for consecutive 3-4 hrs

Cardiac tamponade:

Tube pericardiostomy with the preparation of thoracotomy because Tube pericardiostomy may lead to exsanguinating hypovolaemic shock.

Thoracotomy in chest trauma

Massive haemothorax	Tracheobronchial injury
Ruptured diaphragm	Oesophageal injury
Cardiac tamponade and injury	Retained FB
Clotted haemothorax	Extensive pulmonary laceration

Emergency department (ED) Thoracotomy

Indication:

- Traumatic arrest with or without previously witnessed cardiac activity in penetrating chest trauma (ideally within the first 10 minutes of arrest)
- Traumatic arrest with previously witnessed cardiac activity in blunt trauma (ideally within the first 10 minutes of arrest)

Contraindication of ED Thoracotomy

- Multiple blunt trauma
- Severe head injury.

Traumatic pneumothorax

Classification (aetiological)

- Blunt
- Penetrating

Diagnosis:

Symptoms:
- Asymptomatic
- Ipsilateral pleuritic chest pain
- Shortness of breath
- Non-productive cough

Signs:
- Reduced movement of chest wall
- Hyper resonant on percussion
- Diminished vocal fremitus
- Diminished or absent breath sound

Investigations:

CXR P/A view (best during expiration):
Hyper-translucent area
No bronco-vascular markings
Collapse lung border

Focused Ultrasound (e-FAST):
Highly sensitive in experienced hands

CT-Scan of chest:
Better delineation in associated parenchymal diseases
Can distinguish between large bullae & pneumothorax

Tension Pneumothorax signs and symptoms include:

- Pleuritic chest pain
- Shortness of breath
- Anxiety
- Cyanosis (falling SPO2)
- Tachycardia
- Hypotension
- Deviation of trachea
- Absence of breath sounds
- Sweating
- Engorged neck veins

CXR: (if suspecting a tension pneumothorax clinically, do not wait for imaging)

Complete collapse of lung
Shift of mediastinum
Inversion of hemi diaphragm

Management depends on:

- Type of pneumothorax
- Size of pneumothorax
- State of recurrence
- Availability of medical facilities
- State of underlying lung condition

Initial management:

a) **Clinically stable patient:**

(Asymptomatic, previous good health, <20% pneumothorax, no evidence of clinical & radiological progression)

- **Observation**
- **Needle aspiration – controversial**

b) **Clinically unstable patient:**

- **Tube Thoracostomy**

(Indications: moderate to large pneumothorax, significant symptoms, radiological progression, total collapse, tension, contralateral pulmonary diseases).

- Tension pneumothorax is a surgical emergency.
- ***As a general physician or EMO dealing with patients with respiratory distress suspicion of pneumothorax is very crucial.***
- Intervention at the proper time and referral of the patient if necessary should be encouraged.

Tube Thoracostomy (The most common thoracic surgical procedure)

It is a procedure by which a tube is inserted into the chest cavity in order to evacuate air or fluid. The indications are:

Pneumothorax	Haemothorax
empyema thoracis	pleural effusion
chylothorax	post-operative drainage

CHEST TUBE INSERTION:

PRE-OPERATIVE:

* Consultation & Counselling.
* Informed Written Consent.
* Recent Chest X-ray.
* Analgesia, Light Sedation & Nebulization.

INSERTION SITE:

Usually inserted in the 3rd To 6th intercostal space on anterior or mid axillary line or in between.

TECHNIQUE

Please use 5th intercostal space on anterior axillary line.

Painting with povidone - iodine and draping.

Use adequate local anaesthesia.

Make a 2-3cm transverse incision on the site of desired entry.

Use blunt dissection with a curved spreading clamp (Kelly Clamp or a mosquito forceps).

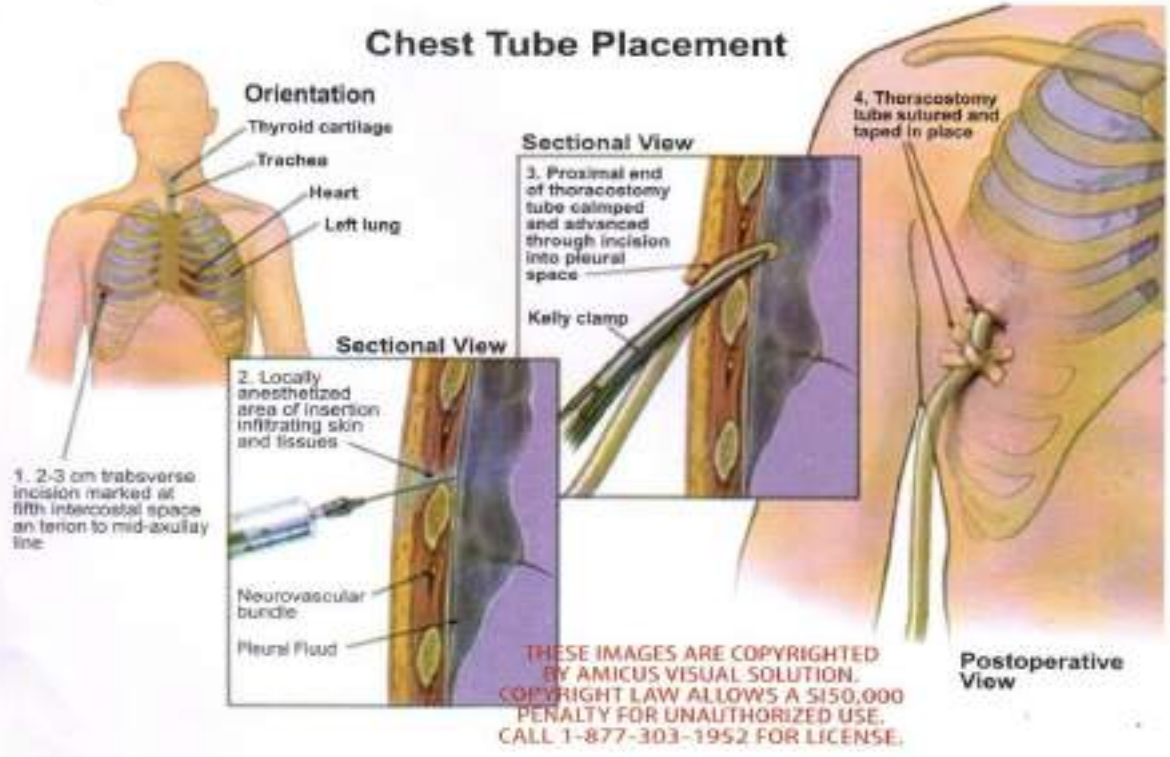
Use finger to explore the space for pleural adhesions and to verify location.

Grasp the tip of the tube with a large haemostat and insert into the thoracic cavity.

Connect tube to under water- seal drainage system.

Close wound with heavy (silk) sutures.

Place dressing over the tube.



10. Acute Abdomen

SMK Akter

Non-traumatic

Def: an acute abdomen donates any sudden, spontaneous, non-traumatic disorder whose chief manifestation is in the abdominal area and for which urgent operation may be necessary.

Introduction:

- A common reason for seeking medical attention in the outpatient department.
- Age and sex is an important consideration in the diagnosis.
- Management should be guided by clinical judgment and investigations.

Clinical evaluation:

History

- Age
- Sex
- Main site
- Radiation
- Onset / duration
- Type of pain / character
- Severity
- Periodicity / frequency
- Special time of occurrence (after meal, medicine, time)
- Aggravating and relieving factors
- Associated symptoms (e.g., Faintness, period of amenorrhoea)

Past history: similar episodes, trauma, surgery or interventions.

Drug history: NSAIDS, steroids, anti-coagulants, anti-platelet drugs

Menstrual history: LMP-

Social history: Smoking, Alcohol, Substance abuse

Last meal/drink

Possible intake of unhygienic food/drink

Examination

General – hydration, pallor, degree of distress, fever

CVS – Pulse, BP

Resp – rate, chest movement, air entry, added sounds

Abdomen:

Inspection – movement with respiration, cough test, distention, shape, hernia orifice, genitalia

Palpation – guarding, rigidity, tenderness, rebound tenderness, lumps, Murphy's sign

Percussion – liver dullness, free fluid

Auscultation – exaggerated, absent

Diagnostic Criteria –

1. Pain in the abdomen - Usually sudden onset, colicky, progressively worse, either localized or generalized. Pain may be shifted to other area or may be referred to particular area. Frequently pain is associated with abdominal cramp.
2. Vomiting – On several occasions, may be followed by nausea. Sometimes vomiting may be associated with abdominal cramp.
3. Distension – Usually distension is generalized, may be localized. It is usually associated with progression of pain.
4. Constipation – Less important feature. But whenever present signifies serious form of acute abdomen.
5. Diarrhoea – Not a cause of gastroenteritis. If the nature of stool varies, then it signifies some serious condition.
6. Rebound tenderness – May be either localized or generalized. Presence of this sign indicates underlying peritonitis.
7. Other features – Cullen's sign, Rovsing's sign, Grey Turner's sign, tachycardia, hypotentionetc

Initial Management –

1. Patient should be immediately kept nil by mouth. No solid or liquid is allowed.
2. Immediately start electrolyte containing fluid - Intravenous fluid and electrolytes.
3. Analgesics – work up the analgesic ladder using per-rectal or intravenous medication.

4. Antispasmodics – better start as intramuscular form.
5. Nasogastric tube insertion, if huge abdominal distension or intestinal obstruction.
6. Urinary catheterization – if acute retention, dehydration or shock.

Further Management –

Decision for hospitalization

1. Progressive pain
2. Needs observation
3. Needs immediate operation.
4. Where facility for resuscitation is not available refer the patient to the appropriate centre.

Investigation –

1. Goal is as minimum intervention. No need for investigation if patient needs to be transferred to another place.
2. Draw at least 10 cc of blood at a time to do a good number of investigation at a time. Hiererchy of haematological requisition are as follows : 1. Blood sugar, 2. CBC, 3. S.Electrolytes, 4. S.Lipase, 5. Blood grouping, 6. PBF, 7. Culture.
3. X-ray:- Chest P-A view and abdomen in erect posture at a time or in same film.
4. Ultrasonogram:- If facility available in the same campus.

Definitive Management –

1. Appendicitis – appendicectomy should be done within 4 hours at least District Level Hospital.
2. UTI – treat non-operatively.
3. Pneumoperitoneum – If associated with peritonitis, immediate laparotomy should be done in a centre where facility for laparotomy is available.
4. Ruptured ectopic pregnancy – Immediate operation. Blood transfusion.
5. Intestinal Obstruction – may need operation. Decision for operation should be taken by a competent specialist.
6. Intra-abdominal malignancy – refer to the appropriate centre.
7. Acute Cholecystitis – Initial conservative management.

Management protocol for Blunt Abdominal Trauma

Treatment of blunt abdominal trauma begins at the scene of injury and is continued upon the patient's arrival in emergency department or trauma centre. Management may involve non-operative measures or surgical treatment as appropriate.

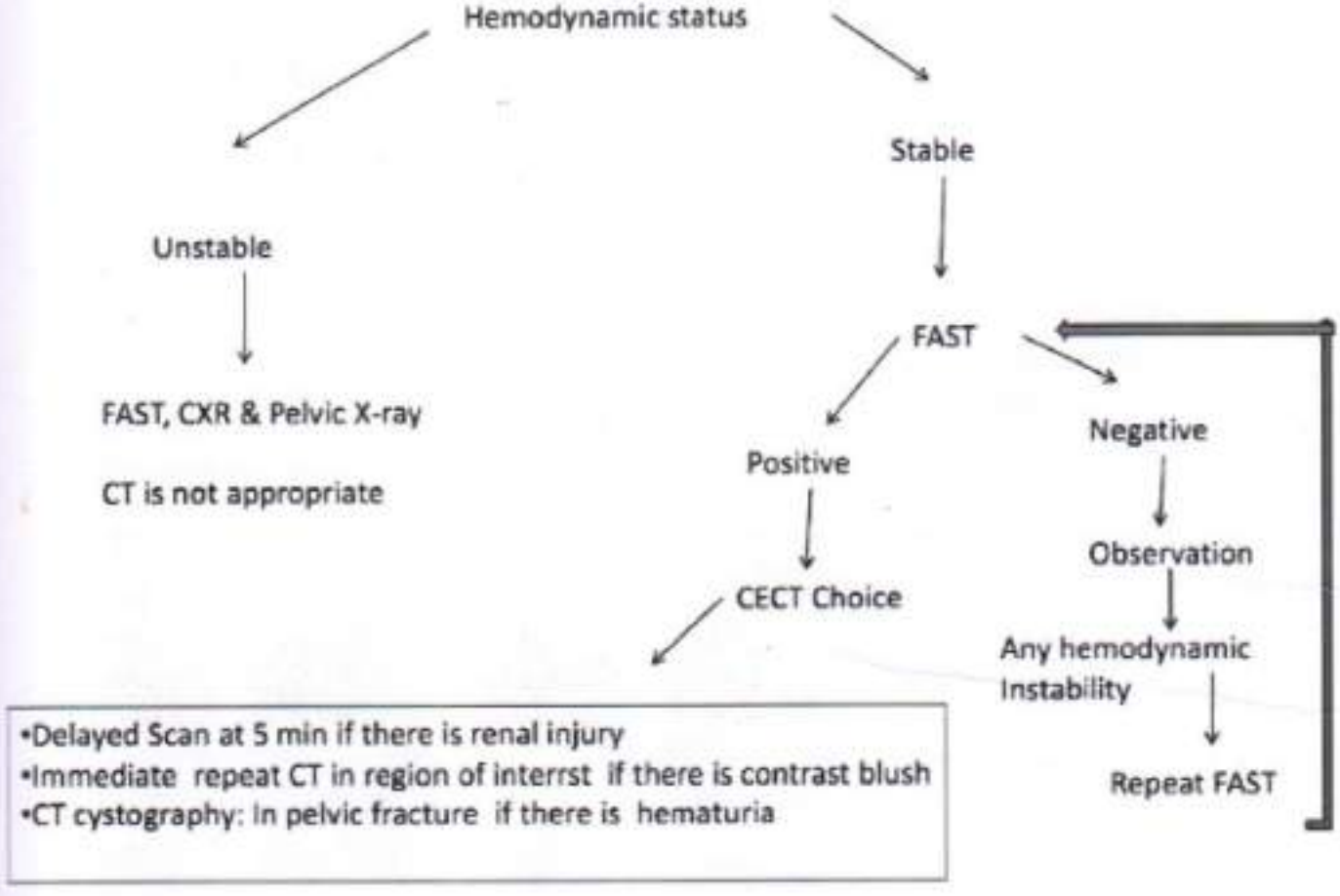
- Securing the airway, stabilization of cervical spine, placing large bore intravenous lines and administration of crystalloid IV fluid must take place
- Consider broad spectrum antibiotics, analgesics and anti-ulcerants also.
- External haemorrhage rarely is associated with blunt abdominal trauma. If external bleeding is present, control it with direct pressure.
- Administer a fluid bolus of lactated Ringer or normal saline solution to the patients with evidence of shock. However NEVER DELAY patient transport while IV lines are secured.
- Promptly notify the destination hospital so that the facility can activate its trauma team and prepare for the patient.
- In the emergency department, a rapid primary survey should be performed to identify immediate life-threatening problems.
- The next priority is the assessment of circulatory status. Circulatory collapse in a patient with blunt abdominal trauma is usually caused by hypovolemia from haemorrhage.
- Effective volume resuscitation is accomplished by controlling external haemorrhage and infusing warmed crystalloid solution. Haemodynamic insufficiency despite the administration of 2L of fluid to adult patient indicates ongoing blood loss and is an indication for immediate blood transfusion.
- The primary survey is completed with a brief neurologic assessment (GCS). The patient is undressed and draped in clean, dry and warm sheets.
- Before placement of a nasotracheal tube and Foley's catheter, perform appropriate head, neck, pelvic, perineum and rectal examination.
- Bed side USG using a trauma examination protocol (FAST) can be used to determine the presence of intraperitoneal collection (blood, intestinal fluids etc.)
- Further investigation includes contrast enhanced CT scan of abdomen, pelvis or serial examination and USG.

Specific physical examination findings that call/shift for timely surgical evaluation are as follows:

- History of blunt abdominal trauma with shock or abnormal vital signs (e.g., tachycardia, hypovolumia).
- Evidence of shock without obvious external blood loss.
- Evidence of peritonitis (e.g., marked tenderness involuntary guarding, percussion tenderness).
- Findings consistent with potential intraabdominal injury (e.g., lap belt signs, lower rib fractures, lumber spine fractures)
- alteration of level of consciousness or sensation whether due to drugs, alcohol or head/spine injuries.
- Patient who require other prolonged operative interventions (e.g., orthopedic procedures)

If consultants with expertise in management of blunt abdominal injuries are unavailable, arrange the patient transfer to the nearest appropriate centre as soon as the injury is identified.

Imaging Guidelines for Abdomen Trauma



11. Neurological Emergencies

MS Shahi

Acute Severe Headache

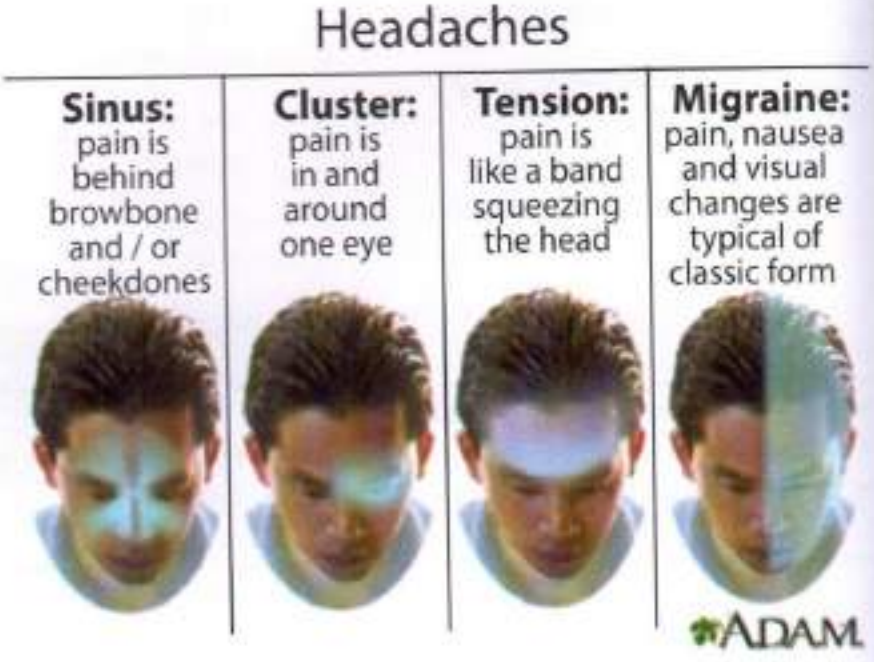
Introduction:

- Headache is a common presenting complaint in the emergency department (ED)
- The differential diagnosis is broad and includes benign primary causes as well as ominous secondary causes.
- As many as every third of patients presenting to the ED with acute headache will be harbouring potentially fatal or disabling intracranial conditions such as subarachnoid haemorrhage (SAH).
- So, patients with acute headache require prompt evaluation and appropriate management

Causes of headaches presenting in the ED:

Primary headache syndromes

- Migraine
- Cluster headache
- Primary Thunderclap headache
- Hypnic headaches
- Benign exertional/sex headache



Secondary headache syndromes

Traumatic

- Subdural/extradural/subarachnoid/intracerebral haemorrhage

Vascular disease

- Subarachnoid haemorrhage
- Intracerebral haemorrhage
- Dissection of carotid/vertebrobasilar arteries
- Cerebral venous thrombosis
- Vasculitis (including giant cell arteritis)

CNS infection

- Meningococcal encephalitis
- Cerebral abscess

Non-vascular intracranial disease

- Idiopathic intracranial hypertension
- Intracranial tumour
- Pituitary apoplexy

Others

- Hypertensive encephalopathy
- Cervical spine disease
- Dental, ENT or ophthalmic disease (e.g. sinusitis, acute glaucoma)

Diagnostic approach:

Search for 'Red flags' of worrisome Headache-

- Worst" headache ever
- First severe headache
- Subacute worsening over days or weeks
- Fever or unexplained systemic signs
- Vomiting that precedes headache
- Pain induced by bending, lifting, cough
- Pain that disturbs sleep or presents immediately upon awakening
- Known systemic illness
- Onset after age 55 years
- Abnormal neurologic examination
- Pain associated with local tenderness, e.g., region of temporal artery

Physical examination:

General:

- BP (malignant hypertension can cause headache)
- Temperature (infective aetiology)
- Anaemia
- Lymph node
- Rash (meningococcal rash)
- Scalp should be palpated for tenderness (temporal arteritis)

Neurological:

- Level of consciousness (GCS), alerted consciousness indicates secondary causes
- Funduscopy (Papilloedema, fundal hemorrhage)
- Cranial nerves (III & VI nerve palsy)
- Features of meningeal irritation (neck rigidity &Kernig's sign)
- Long tract signs (hemiplagia)

Secondary Headache

Glaucoma	Associated with blurred vision, nausea, vomiting and seeing halos around lights; ophthalmologic emergency
Acute or chronic subdural hematoma	Antecedent trauma, may have subacute onset, altered level of consciousness or neurologic deficit may be present
Idiopathic intracranial hypertension	Often abrupt onset, associated with nausea, vomiting, dizziness, blurred vision and papilledema, may have cranial nerve VI palsy; aggravated by coughing, straining, or changing position
Brain Tumour	Worse on awakening; generally progressive; aggravated by coughing, straining, or changing position; neurological exam often abnormal
Cerebral Venous Sinus Thrombosis	Associated with convulsion, dizziness, blurred Vision and papilledema
Subarachnoid haemorrhage	Explosive onset of severe headache (thunderclap headache); 10%–50% may be preceded by low-grade sentinel headaches
Meningitis	Fever; meningeal signs
Encephalitis	Neurologic abnormalities, confusion, altered mental status or level of consciousness
Sinusitis	Usually worse when lying down; nasal congestion; tenderness over affected sinus
Temporal arteritis	Almost exclusively in patients older than 50 years; associated with tenderness of scalp or temporal artery and jaw claudication; visual changes

Investigations:

Routine

- CBC with ESR
- Blood sugar
- S. Creatinine
- X-ray PNS (O/M view)
- X-ray mastoid (Towne's view)
- X-ray skull/cervical spine

Neuroimaging in headache

CT scan preferred:

Head injury
- Fracture
- Contusion
- SDH
- EDH

Acute haemorrhagic stroke
- Subarachnoid
- Intracerebral

Sinusitis, mastoiditis

MRI preferred:

CNS infections
- Meningitis
- Encephalitis
- Brain abscess

Brain tumour
- Primary
- Metastatic

Lumbar puncture (in suspected Meningitis, Encephalitis, SAH, IIH)

MR Angiography/CT Angiography (Intracranial aneurysms)

MR Venography/CT Venography (Cerebral venous sinus thrombosis)

Management of Headache in ED:

- The immediate responsibilities are to provide differential diagnoses, initiate any immediate treatment required (including analgesia), and organize appropriate investigations.
- Virtually all sudden onset headache patients require admission for cerebral imaging and possibly lumbar puncture.
- Drugs with antithrombotic properties (that is, aspirin and other non-steroidal anti-inflammatory drugs) should
- be avoided, and paracetamol (for less severe headaches) is the drug of choice. Some patients may require the judicious use of diamorphine.
- Ideally patients presenting with an acute headache who require admission to hospital should be managed on a neurological ward.

Treatment of Acute SAH:

- Tailor this according to the presentation and the need for resuscitation:
- Maintain SpO_2 94–98 %.
- Provide adequate analgesia and antiemetic. paracetamol (1g PO) and/or NSAID may sufficient. Some patients require more potent analgesics (e.g. morphine titrated in 1mg increments IV according to response) — proceed slowly to avoid drowsiness.
- If unconscious (GCS < 8), severely agitated or combative, tracheal intubation.
- Insert a urinary catheter and arterial line. Contact neurosurgical or neuro intervention team -further treatment options.
- Nimodipine (60mg PO every 4hr or 1mg/hr. IVI) to prevent and treat ischemic neurological deficits secondary to vasospasm.
- Mannitol IV (e.g. 200mL of 10 %) if there is evidence of ICP.

Treatment of acute attack of Migraine:

- Give simple analgesia (e.g. paracetamol 1g PO PRN qds or NSAID) in combination with an anti-emetic (e.g. metoclopramide 10mg PO, or IV).
- Refer for admission patients who have neurological signs, altered mental status, or where there is diagnostic uncertainty (including change in severe headache pattern).
- Acute attacks that fail to respond to simple measures may respond to other drugs, but these are associated with significant adverse effects. 5HT 1 agonist sumatriptan (6mg SC or 50mg PO or 20mg intranasally) is effective.

Treatment of acute cluster headache:

- High flow O 2 (12 L/min via reservoir mask) for 15minsometimes provides relief. Otherwise, use paracetamol/NSAID.

Treatment of Temporal Arteritis:

- In view of the serious risk of rapidly progressive visual loss, if suspected give 200mg IV hydrocortisone (or 40mg prednisolone PO) immediately.
- Refer to the neurologist or ophthalmologist as an emergency — the diagnosis may be confirmed by temporal artery biopsy.

Management Severe hypertension (diastolic > 125mmHg):

- Refer patients with a diastolic pressure > 125 mmHg or evidence of hypertensive encephalopathy to the medical team.
- There is a significant risk of complications (stroke or MI) if the BP is reduced rapidly. It may be appropriate to commence oral antihypertensive therapy using a B-blocker (eg atenolol or labetalol) or calcium channel blocker (e.g. nifedipine).
- If treatment is appropriate, commence an IVI of sodium nitroprusside, labetalol or GTN with continuous BP monitoring via an arterial line and admit to high dependency unit (HDU) or ICU.

Management of acute Meningitis:

- Resuscitate if necessary, give oxygen and obtain venous access.
- Start antibiotics *immediately* (without waiting for investigations) if the patient is shocked or deteriorating or there is any suspicion of meningococcal infection (especially a petechial or purpuric rash): give IV ceftriaxone or cefotaxime (adult 2g; child 80mg/kg). Give vancomycin ± rifampicin if penicillin-resistant pneumococcal infection is suspected.
- Give IV dexamethasone (0.15mg/kg, max 10 mg, q.d.s for 4 days) starting with or just before the first dose of antibiotics, especially if pneumococcal meningitis is suspected.
- *Provide supportive treatment including:*
  - IV fluids. - Pressure area care.- Monitor conscious level, T °, BP, ECG, SpO_2, and fluid balance.
- Get expert help promptly and organize ICU care

HEAD INJURY

Introduction:

- Most frequent cause of hospitalization
- Leading cause of death in young adult male
- Once a head injury has occurred, nothing can alter the impact damage
- The aim of head injury management is to minimize the damage arising from secondary complication

Causes of Head injury:

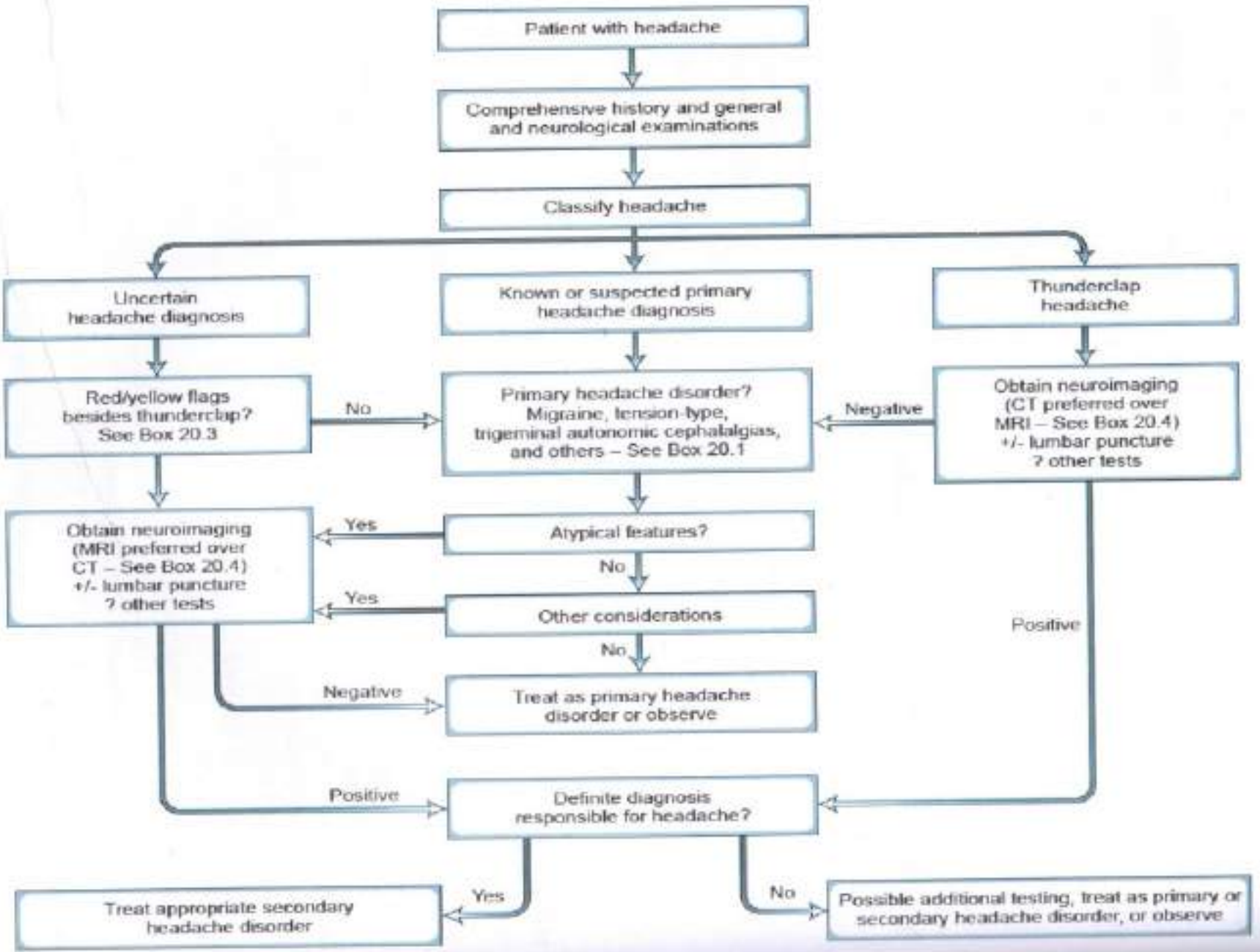
- Road traffic accident (RTA)
- Physical assault
- Fall from height/ground

Types of Head injury:

- Primary/Secondary head injury
- **Minor** (GCS 15 with no loss of consciousness) /**Mild** (GCS 14 or 15 with loss of consciousness /**Moderate** (GCS 9-13) /**Severe** (GCS 3-8) head injury
- Closed/ Open (chance of contamination, needs surgical toileting)

Assessment of Head injury

- **Points to determine**- Period of loss of consciousness, Headache, Vomiting, Convulsion
- Cause and circumstance of injury


Patient with headache
Comprehensive history and general and neurological examinations
Classify headache
Uncertain headache diagnosis
Known or suspected primary headache diagnosis
Thunderclap headache
Red/yellow flags besides thunderclap? See Box 20.3
No
Primary headache disorder? Migraine, tension-type, trigeminal autonomic cephalalgias, and others – See Box 20.1
Negative
Obtain neuroimaging (CT preferred over MRI – See Box 20.4) +/- lumbar puncture ? other tests
Obtain neuroimaging (MRI preferred over CT – See Box 20.4) +/- lumbar puncture ? other tests
Yes
Atypical features?
No
Yes
Other considerations
No
Positive
Negative
Treat as primary headache disorder or observe
Positive
Definite diagnosis responsible for headache?
Yes
Treat appropriate secondary headache disorder
No
Possible additional testing, treat as primary or secondary headache disorder, or observe

Examination of Head injury

- **Evidence of Head injury**- from external wound
- **Evidence of base of the skull fracture**
  - CSF rhinorrhea/ otorrhoea
  - Peri-orbital hematoma- Racoon's eye
  - Post-auricular ecchymosis- Battle's sign
- **Conscious level-** scoring Glasgow Coma Scale (GCS)
- **Pupil response-** Light reflex, Unequal size
- **Limb weakness-** Hemiparesis usually occurs in limbs contralateral to the side of lesion
- **Neurological examination**and Looking for other injury
- **Investigation-** X-ray Skull (B/V), CT scan of Head

Glasgow Coma Scale

Eye opening	Description	score
Spontaneous	Opens eye on his own	4
To voice	Opens eye when ask to in loud voice	3
To pain	Opens eye when pinched	2
No response	Do not open eyes	1
Verbal response		
Oriented	Carries on a conversation correctly and oriented about time, place & person	5
Confused conversation	Seems confused and disoriented	4
Inappropriate words	Talks to that the examiner can understand him but of no sense	3
Incomprehensible sounds	Make sounds that the examiner cannot understand	2
No response	Make no noise	1
Best motor response		
Obeys command	Follow simple commands	6
Localizes pain	Bringing the hand up beyond the chin	5
Withdraws from pain	Pull examiner's hand when pinched	4
Abnormal flexion	Flexes body inappropriately to pain	3
Abnormal extension	Body become rigid in extended position when examiner pinches him	2
No response	Has no motor response to pain	1
Total score		**15**

Indication of CT scan and admission in TBI

Category	Findings	CT scan/Admission
Low risk	Asymptomatic, mild H/A, dizziness, scalp injury	X
Moderate risk	Loss of consciousness, progressive H/A, seizure, vomiting, signs of basilar skull #, age **< 2** years, Polytrauma, GCS **≤ 14**	yes
High risk	Decreasing level of consciousness, focal neurological sign, penetrating skull injury, depressed #, GCS **≤ 14**	yes

Intracranial pressure (ICP)-Head injury causes raised ICP

- **Normal intracranial constituents** are- (if one component ↑, another should ↓)
  - Brain parenchyma 1400 ml
  - Cerebral blood volume 150 ml
  - CSF 150 ml
- **Normal ICP-**
  - I. Term infants 1.5-6 mm Hg
  - II. Young children 3-7
  - III. Adult and older children <10-15
    - Raised ICP needs treatment 20-25
    - Deadly ICP >25-30

Traumatic Intracranial-HTN may be due to-

1. Cerebral oedema (cytotoxic oedema)
2. Hyperaemia- possibly due to **vasomotor paralysis**, more significant than oedema
3. Mass effect from- EDH, SDH, ICH, FB(bullet), depressed skull fracture
4. HCP due to obstruction of CSF circulation or absorption
5. Hypoventilation (→hypercarbia→ vasodilation)
6. Others- Systemic HTN, Venous sinus thrombosis, ↑ Jugular venous pressure, status epilepticus

Treatment of elevated ICP

- Generally accepted level to begin treatment is **ICP** 20-25 mm Hg
- Goals: Keep ICP < 20 mm Hg, Keep CPP > 50 mm Hg
- $PaCO_2$ is the most potent cerebral vasodilator

Summary of treatment:

Step	Rationale/Remedy
1) Elevate Head end of Bed 30-45°	↑ Venous outflow →↓ICP
2) Keep neck straight	"
3) Avoid hypotension & control HTN if present	Nitroprusside or Beta blocker
4) Avoid hypoxia (SPO_2< 90%)	Maintain airway & adequate O_2
5) Ventilate to normocarbia ($PaCO_2$=35-40mm Hg)	O_2 inhalation with mask
6) IV channel with fluid	Choice is isotonic fluid (**NS** + 20 mEq KCL/L), *Hyperglycemia aggravate cerebral edema, *Steroid may cause Hyperglycemia
7) Light sedation & prophylactic hypothermia >48h	→↓$CMRO_2$, (Cerebral metabolic rate of O_2 demand); also ↓mortality
8) PPI/ H_2 blocker	To prevent stress (Cushing's) ulcer
9) CT scan of head	To rule out surgical condition
Specific measures for IC-HTN	
10)Central Venous (CV) line	If high dose mannitol are needed
11) Heavy sedation with **Fentanyl** (1-2ml IV q 1 hr), Low dose **Phenobarbital** (100 IV q 4H, Pediatrics 2-5mg/Kg IV q 4h) or **Propofol** drip	↓ Sympathetic tone & HTN
12) Drain **3-5 ml CSF** with Intraventricular catheter	↓Intracerebral volume
13) Hyperventilation (for **short** period)	↓ $PaCO_2$→↓CBF →↓ICP
14) **Mannitol** (0.25-1gm/Kg bolus, then 0.25gm/Kg q 6 hr); alternative- **Furosemide** (**skip**, if hypovolemia/hypotension)	Expands plasma volume, ↑S. tonicity→ draws fluid out of brain *maintain euvolemia& renal output
15) if S. Osmol< 320, 10-20ml 23.4% hypertonic saline (HS)	Some patients **refractory** to mannitol will respond to HS
*Routine use of **steroid (glucocorticoid)** is not recommended in the treatment of head injury	
If IC-HTN persists, consider second tier therapy	
16) High dose barbiturate, hyperventilation for longer period, hypothermia	
17) Surgical treatment	Evacuation of hematoma, excision of contused brain, decompressive craniectomy
18) Lumber drainage	Watch for 'cerebral Sag'

Cautions with Mannitol

1. Mannitol opens BBB which can aggravate **vasogenic cerebral oedema**
2. Corticosteroids + **phenytoin** + mannitol may cause **Hyperosmolar non-ketotic state** with high mortality
3. High dose of mannitol carries the risk of acute renal failure (acute tubular necrosis) specially if S. osmolarity is > 320 mOsm/L. Catheterization should be done prior to mannitol therapy. (Furosemide is an alternative if osmolarity is > 320)

Phenobarbital

- Fast onset (full effects within **15 mins**), Short duration of action (**3-4 hrs**), Half-life is **15-48**hrs
- Protocol in adults-

a. **10**mg/Kg IV over 30 mins
b. Then **5**mg/Kg q 1hr x 3 doses
c. Maintenance- **1**mg/kg/hr
d. Check S. phenobarbital 1 hr after loading dose (usually 3.5-5mg%),
e. Then check every day, if >5 & ICP acceptable, ↓dose

HEAD INJURY- SPECIFIC TYPE

CONCUSSION

- **Def:** Alteration of consciousness without structural damage as a result of non-penetrating TBI
- Altered consciousness may include confusion, **amnesia (the hallmark),** LOC (not a requirement)
- Other possible findings- vacant stare, disorientation, slurred speech, emotional exacerbation
- **CT** - normal or mild swelling; **MRI**- demonstrates abnormalities in 25% cases (edema)
- Concussion may be followed by post-concussive syndrome
- **Grading of concussion-**

Grade	AAN (American association of neurology) system
1 (mild)	Transient **confusion,** No LOC, Symptoms resolves in < **15** min
2 (moderate)	Symptoms last > **15** min (posttraumatic **amnesia** is common)
3 (severe)	Any **LOC**(loss of consciousness)

DIFFUSE AXONAL INJURY (DAI)

- After a rotational or deceleration head injury
- May be diagnosed **clinically** when loss of consciousness (coma) lasts > **6 hours** in absence of evidence of intracranial mass or ischemia, ventricles may be slit-like
- In its **severe** form
    - Haemorrhagic foci seen in corpus callosum and brainstem
    - With **microscopic** evidence of diffuse injury to axon

DAI grade	Description
Mild	Coma **>6-24 h**, F/by **mild to moderate** memory impairment and disability
Moderate	Coma **>24 h,** F/by **confusion**&long-standing **amnesia, mild to severe** memory & cognitive deficits
Severe	**Coma** lasting for **months**; memory, cognitive, speech, sensorimotor and personality deficit

SKULL FRACTURES

- **Classified** as either closed (simple) fracture or open (compound) fracture
- **Diastatic fracture-** extend into and separate sutures, most common in young children
- **Linear # in x-ray**- a very thin dark black straight course
- **Fracture in paediatrics**-
  - I. **Simple depressed skull fracture**
    - **Indication for surgery**- dural tear, cosmetic defect in older children, focal neurologic deficit
  - II. **Ping-pong ball fracture-**
    - Caving in a focal area of skull, Seen only in new-born
    - No treatment is usually required **except** Intraparenchymal bone fragment, neurologic deficit, signs of ↑ICP, CSF leak
- **Treatment**- elevation of the depressed bone
- **Indication for surgery**- open fracture or depressed > the thickness of calvaria

EPIDURAL HEMATOMA

- Rare before age 2 years and after 60 years (as dura is more adherent)
- **Source of bleeding**- 85% arterial, mostly middle meningeal artery; other- dural sinuses
- **Presentation**
  - I. Brief post-traumatic **loss of consciousness**
  - II. Followed by **lucid interval** for several hours (also seen in SDH)
  - III. Then, obtundation, **contralateral** hemiparesis and **ipsilateral** pupillary dilatation
- **Other findings**- Headache, Nausea, Vomiting, seizure, ↑ICP
- **CT scan**- classic biconvex **high density** restricted to suture line
- **Treatment**-
  - Small (< 1 cm) EDH with minimum neurologic symptoms can be followed up except in posterior fossa
  - **Indication** for surgery
    - I. EDH volume **> 30** cm^3
    - II. EDH with **all** of the following characteristics can be managed **non-surgically** with serial CT scan and close observation
      - a. EDH volume <30 cm^3
      - b. And thickness < 1.5 cm
      - c. And midline shift < 0.5 cm
      - d. And GCS > 8
      - e. And no focal neurologic deficit
  - **Surgery**- craniotomy and evacuation of clot with haemostasis
  - **Timing of surgery**- as early as possible
- **Mortality**- Even optimal treatment within few hours results in **5-10%** mortality

SUBDURAL HEMATOMA

- **Acute SDH**
  - 2 common causes- **parenchymal laceration** and **tear of surface or bridging vein**
  - May also occur in patients on **anticoagulant** therapy without a history of trauma
  - **CT scan- crescentic** hyper dense mass crossing the suture line
  - **Indication for surgery**
    1. Thickness **> 1 cm** or midline shifting **> 0.5 cm**
    2. Thickness < 1 cm or midline shifting < 0.5 cm **should undergo surgery**, if
       I. GCS drop by ⩾ **2** from admission GCS
       II. and/or pupils are asymmetric (anisochoria) or fixed and dilated
       III. and/or ICP **> 20** mm Hg
  - **Surgery**-Decompressivecraniectomy and removal of clot & haemostasis with or without removal of bone flap and duroplasty
  - **Timing of surgery**- within 4 hours
  - **Mortality**- 50-90% (because of underlying brain injury)
- **Chronic SDH**
  - Generally, occurs in **elderly**
  - Risk factors- head trauma, alcohol, seizure, CSF shunt, **coagulopathy**
  - Classically contains dark **motor oil** fluid
  - CT scan- **crescentic** hypo/ hyper dense mass over brain surface
  - **Treatment**- correction of coagulopathies and burr hole and evacuation of CSDH

INTRACEREBRAL HEMORRHAGE (ICH) and CONTUSION

- Bleeding into the brain tissue itself
- Cerebral contusions are common at the site of impact (coup) or on the other side of brain (counter-coup)
- Causes of ICH should be evaluated (like traumatic, hypertensive bleed, arterio-venous malformation) before treatment

POST-TRAUMATIC SEIZURE

- **Condition with increased risk**
  - Acute haematoma (EDH, SDH,ICH)
  - Open depressed # with parenchymal injury
  - Seizure within the first 24 hr of injury
  - GCS < 10
  - Penetrating brain injury
  - Cortical haemorrhagic contusion on CT
- Routine use of prophylactic antiepileptic drugs in TBI is **ineffective** in preventing late development of pot-traumatic seizure

BRAIN DEATH

- **Criteria**
  1. **Absence of brainstem reflex**
     A. Fixed pupil
     B. Absent corneal reflex
     C. Absent occulo-vestibular reflex (cold water calorics)
     D. Absent gag and cough reflex
  2. **Apnoea**- with arterial PCO_2> 60 mm Hg
  3. No response to **deep central pain**
  4. **Vital signs and general criteria**
     A. Core temperature > 32.2°C (90°F)
     B. SBP 90 mmHg
     C. No drugs that could stimulate brain death

Status Epilepticus

Definition

- Traditionally defined as continuous, unremitting seizure lasting longer than 30 minutes,or recurrent seizures without regaining consciousness between seizures for greater than 30 minutes.
- Newer literature and common neurology practice usually accept 5 minutes or longer as definition for status epilepticus.

Epidemiology of SE:

- Most common in ages > 60 &< 12 months
- Approximately 10% to 15% of patients with chronic epilepsy will experience an episode of SE at some point of their clinical course.
- Approximately 7% to 10% of patients with chronic epilepsy initially present with an episode of SE.

Aetiologies of status:

- Anti-Epileptic drug noncompliance 20%
- Old brain injury 15%
- Acute vascular injury 15%
- Alcohol related 10%
- Metabolic/electrolyte disturbance 10%
- CNS infection 5%
- Cerebral tumor 5%
- Acute trauma 5%
- Global hypoxic injury 5 %
- Drug toxicity < 5 %

Types of Status Epilepticus:

- Convulsive
  - Generalized (Most common presentation of SE)
    - Myoclonic
    - Clonic
    - Tonic
    - Tonic-Clonic
  - Partial
    - Simple
    - Complex
    - Secondarily Generalized
- Non- Convulsive
  - Generalized
    - Absence
    - Atonic
  - Partial
    - Simple
    - Complex
    - Secondarily Generalized

Treatment algorithm of convulsive status epilepticus:

- **Stabilization phase (0-5 minutes of seizure activity),** includes standard initial first aid for seizures and initial assessments and monitoring.
- Initial therapy phase (5-20 minutes of seizure activity) when it is clear the seizure requires medical intervention, a benzodiazepine (specifically IM midazolam, IV lorazepam, or IV diazepam) is recommended as the initial therapy of choice, given its demonstrated efficacy, safety, and tolerability.
- **Second therapy phase (20-40 minutes of seizure activity),** when response (or lack of response) to the initial therapy should be apparent. Reasonable options include fosphenytoin, valproic acid and levetiracetam.
- Because of adverse events, IV phenobarbital is a reasonable second-therapy alternative if none of the three recommended therapies are available.
- **Third therapy phase (40+minutes of seizure activity),** The guideline found strong evidence that initial second therapy is often less effective than initial therapy, and the third therapy is substantially less effective than initial therapy.
- Thus, if second therapy fails to stop the seizures, treatment considerations should include repeating second-line therapy or anesthetic doses of either thiopental, midazolam, pentobarbital, or propofol (all with continuous EEG monitoring).

0–15 min

- IV: normal saline at TKO
- If blood glucose low: 1 ampule D50 (50 mL IVP) and start second IV with D5NS
- Thiamine 100 mg IVP if given D50 or if cachectic/ malnourished/alcoholic
- If actively seizing:

  -Lorazepam IV, 10 mg at <2 mg/min

  -Fosphenytoin, max. delivery rate = 150 mg/min. Total dose 20 mg/kg

15–60 min

- For patients with decreasing seizures after fosphenytoin load: additional 10 mg/kg of fosphenytoin
- For patients continuing to seize who require intubation:

Thiopental

Consider additional dose of fosphenytoin 10 mg/kg for continuing seizures post intubation

Midazolam: 0.3 mg/kg by slow IV injection, may repeat at 5-min intervals ×3 doses.

or:

Propofol: 1–2 mg/kg, then 2–10 mg/kg/h

or:

Pentobarbital: 5 mg/kg loading dose (to achieve burst-suppression pattern on EEG) repeat load as necessary to max. of 15 mg/kg, then 1–3 mg/kg/h maintenance dose ×6–12 h

or:

Phenobarbital: 20 mg/kg at <100 mg/min

Management Algorithm for Status epilepticus

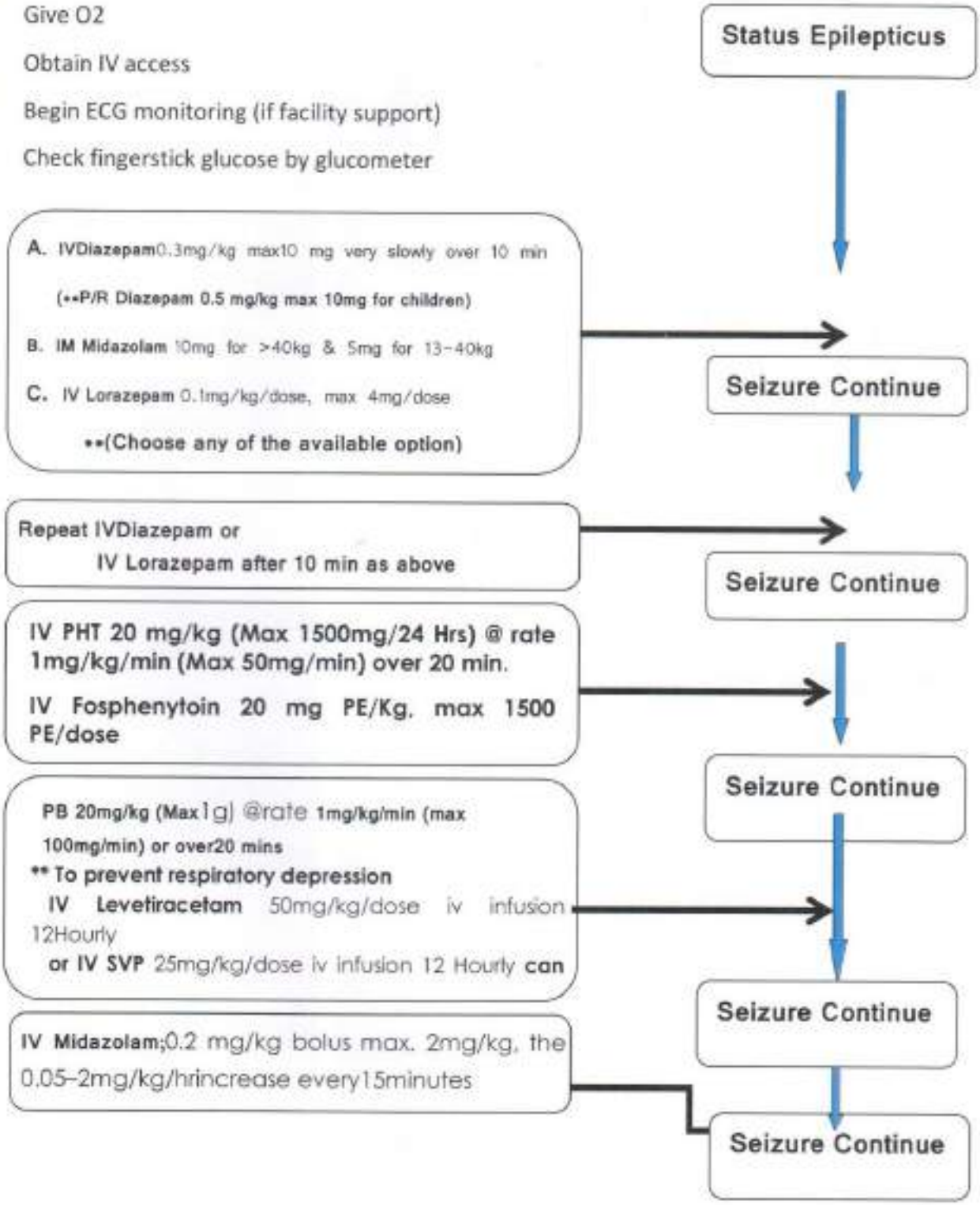
Check emergency ABC's

Give O2

Obtain IV access

Begin ECG monitoring (if facility support)

Check fingerstick glucose by glucometer



12. Obstetric and Gynaecological Emergencies

SP Jaba

Common obstetric emergencies	Common gynaecological emergency
Severe Pre-Eclampsia, Eclampsia	Molar pregnancy
Obstructed labour	Twisted ovarian tumour
Ante-partum haemorrhage	Ectopic pregnancy
Post-partum haemorrhage	Abortion & complication
Ruptured uterus	Severe P/V/B-AUB, CaCx
Obstetric shock due to any cause	

Eclampsia / Severe Pre-eclampsia

Symptoms/Signs:

BP ≥ 140/90 mm Hg	Proteinuria 2+ or more (HCT)
Severe headache	Blurring of vision
Epigastric pain, upper abdomen pain, vomiting	Hyperflexia, Clonus
Jittery movements	Convulsing or H/O convulsion (single/more)
Consciousness level reduced or unconsciousness	Breathlessness
Decreased urine output	Bleeding tendency

Categories:

Eclampsia: BP ≥ 140/90 and convulsion

Severe PE: Diastolic BP ≥ 110 with 2+ proteinuria or DBP ≥ 90 with severe headache / blurring vision/epigastric pain/vomiting with proteinuria 2+ or more

Mild PE: DBP <110 without symptoms proteinuria 1+

Gestational HTN: ≥ 140/90 without proteinuria

General management:

1. Pregnant women unconscious or convulsing: shout for help
2. Systematic ABCDE assessment
3. Maintain basic principles of treating the unconscious patient.
4. If unconscious – keep her in left lateral position (eclamptic position)
5. If convulsing, protect her from injuries, but do not attempt to restrain her and never leave her alone.
6. I/V access:
    a. I/V fluid: normal saline or Hartman's solution
    b. Magnesium sulphate: 2mg IV
7. Provide constant super vision
8. Continuous catheterization. Strick fluid balance. Maintain intake output chart
9. Nutrition: I/V fluid 24 hours after deliveryfollowed by oral feeding if conscious or NG tube feeding of 250 ml fluid every 2 hours.
10. Antibiotics: Ampicillin 500 mg IM/IV 6 hourly or Amoxicillin 8 hourly
11. Monitor
    a. Pulse, BP, Respiratory rate every ½ hourly
    b. Reflex, U/O, Lung bases
    c. FHR
12. Care of eye, skin, mouth in unconscious patients

Investigations:

- CBC
- Blood grouping and Rh typing
- Blood urea
- S. creatinine
- S. electrolytes
- SGPT
- S. Billirubin
- Urine for protein
- Bed side clotting test

Prevention/control of convulsion:

- $MgSO_4$ therapy (IV/IM protocol)

Loading dose	$MgSO_4$ 4g (8 hourly) in 12 ml DW - slow I/V over 10-15 min $MgSO_4$ Deep IM (6g = 12 ml) 3g in each buttock
Maintenance	$MgSO_4$ Deep I/M (2.5 mg = 5 ml) 2.5 g 4 hourly in alternate buttock Up to 24 hours after last convulsion

I/V protocol – If only inj. Nelepsin available

Loading dose – Inj. Nalepsin 4g (100 ml) – repaid I/V
@ 60-70 d/min within 20 min.

Maintenance dose – within next 1 hour – 2gm (50 ml)
@ 12 drops/min
- within next 4 hr – 4gm (100 ml)
@ 6 d/min

IM protocol: If skill provider to give IM inj. is not available use IM protocol

Loading dose – Inj. $MgSO_4$ 2 amp. (5gm)
10 gm in each buttock deep I/M

Maintenance dose – Inj. $MgSO_4$ 2 amp. (2.5 gm)
deep I/M 4 hourly
in attendant buttock up to 24 hours

ABORTION /VAGINAL BLEEDING IN EARLY PREGNANCY

Symptoms/Signs:

- Vaginal bleeding in first 22 week (WHO)
- Pain in lower abdomen
- Passage of fleshy mass/clots.

General management: Counselling

1. Rapid evaluation of vital sings
2. Resuscitation (if shock present)
3. Analgesic: Inj. Pethedine
4. I/V access and I/V fluid: NS/ Ringer's solution
5. Blood transfusion: when needed

Investigations:

1. Complete blood count
2. Blood group ABO, Rh typing
3. USG of lower abdomen and pelvis
4. Urine for pregnancy test/blood for βHCG

Management:

Inevitable Abortion	
Uterus < 12 week	Uterus > 12 week
Resuscitation MVA/E&C Antibiotic	Await spontaneous expulsion Oxytocin infusion 20 IU in 1 L NS/RL @ 20 d/min Antibiotic F/U

Complete abortion
F/U after 7 days If heavy bleeding, pain, fever, ensure early F/U by C/F, USG Antibiotic

Incomplete Abortion	
Uterus <12 weeks	Uterus >12 weeks
Tab. Misoprostol 600mg oral/400mg sublingual or MVA/D&C Antibiotic F/U	Tab. Misoprostol 600 Mg oral/400 mg s.l or Oxytocine infusion 20 lU in 1L NS/RL @ 20 d/min MVA if needed after expulsion Antibiotic

Missed Abortion	
Uterus <12 weeks	Uterus >12 weeks
Tab. Misoprostol 600mg oral/800mg vaginally in posterrior fornix or 600 mg s.l repeated 3 hourly for 3 doses or MVA/D&C	To help expulsive Tab/ Misoprostol 400 mg in posterior fornix or Oxytocine infusion 20 lU in 1L NS/RL @ 20 d/min Evacuation of ut. after expulsion if needed Close monitoring in scarred uterus Antibiotic F/U

Septic abortion

General management:
Reassurance/Confidentiality
I/V access: NS/RL, maintain nutrition
Antibiotics: Immediate parenteral broad-spectrum combination antibiotics
Pain relief: Inj. Pethedine
Antipyretic with cold sponging
Catheterization, strict fluid balance, maintain intake output chart
Inj. T.T. 0.5 ml IM/Tetanus immunoglobulin IM

Investigations:

- CBC
- Blood grouping and Rh typing
- Blood Urea
- S. Creatinine
- S. electrolytes
- HVS/pus/urine/blood for C/S
- USG abdomen
- X-ray abdomen in erect posture
- Monitor- Pulse, BP, Temp, I/O chart
- Counseling – very important before PAC (Post Abortion CAre)

- **Shock**

↓

Rx of shock

- **Rx of vaginal bleeding**

↓

↓ ↓ ↓

Retained product VMA/ D&C

Cervical or vaginal teas
Repair of cervical / vaginal teas

Perforation of uteres
Laparotony
Rapaire of ut/Subtotal hysteroctomy

Ectopic pregnancy

↓

Ruptured
H/O sharp pain/ fainting
Shock/pallor
Abdominal distention

↓

I/V fluid
Resuscitation
Blood transfusion
Immediate laparotomy

Unruptured/chronic

↓

- Symptoms of early pregnancy
  - Abdomen/pelvic pain
- USG / pregnancy test/β HCG

↓

Laparotomy orLaparoscopy or
Medical Mx

Molar pregnancy

Symptoms Signs:

- Mild to severe bleeding
- Cramping pain
- Severe vomiting/nausea
- Early onset of PE
- Passage of grape like structures
- Uterus large & softer than normal

Investigations:

- USG- No evidence of fetus
- β HCG
- Blood grouping and Rh typing

Rx:

- MVA/suction evacuation
- Keep blood ready

Follow up

Obstetric shock

Conditions in obstetric where shock may occur:

- Bleeding in pregnancy and / or post-partum

  1) Early pregnancy: abortion, ectopic pregnancy Molar pregnancy

  2) Late pregnancy &labour: Placenta praevia, abruptio placenta, rupture uterus

  3) Post-partum – PPH due to uterine atony, injury in genital tracts retained placenta, rupture uterus

- Infection: Septic abortion, metritis, acute pyelonephritis

- Trauma: Uterine & bowel injury during abortion. rupture uterus, tears of genital tract

Symptoms/Signs:

Consciousness: confused, no response to verbal stimulation or pain (Coma)
Skin: Cold, clammy, pallor
Pulse: Rapid, low volume >110/min
BP: (SBP < 90mmHg)
Respiration: Rapid / air hunger/gasping
Hydration: Dehydrated. Urine output (<30 ml/hr)
P/V/E: according to cause of shock

Immediate Management:

- Shout for help
- Left lateral position
- I/V access: Use 16G canula
- If a peripheral vein cannot be cannulated, perform venesection
- Sent blood for Hb%, grouping Rh typing & cross matching
- Start NS/RL
- Continuous catheterization
- Maintain intake output chart
- Monitor;
  - vital sign
  - Pulse
  - Resp
  - Temp
  - Urine output

- Keep the patient warm by covering with blanket
- Foot end raised
- Counselling, reassurance
- Bedside clotting test (When needed)

Specific management

Haemorrhage:

- Resuscitation
- Control bleeding
- Replace blood
- Find out the cause
- Rx of cause

Infection:

- Collect appropriate sample for C/S before start antibiotics
  - Blood
  - Urine
  - High vaginal swab
  - Pus
- Combination antibiotic for both aerobes & anaerobes
  - Ampicillin: 2g I/V 8 hourly
  - Gentamycin: 5 mg/kg I/V 24 hourly
  - Metronidazole: 500 mg 500mg I/V 8 hourly
- Antipyretic
- Resuscitation

Others:

- Eclampsia – Mx of eclampsia protocol
- CVA
- Cardiac cause
- Pulmonary embolism
- Drug reaction
- Hypoglycaemia
- Hepatic shock
- Amniotic fluid embolism

Rx according to cause / Refer

Reassessment: Signs of improvement

Stable pulse: 90/min or less

B.P: SBP ≥ 100 mm Hg

Improving mental status

Increased urine output (≥ 30 ml/hour)

Postpartum Haemorrhage

Symptoms/Signs:

Excessive vaginal bleeding >500 ml

or prolonged moderate bleeding

or any bleeding which deteriorates maternal condition after child birth

Anticipate PPH:

- Prepare for every birthing woman
- Past H/O PPH
- H/O APH, HTN, Prolonged labour, multiple pregnancy, polyhydramnios
- Instrumental delivery injudicious intervention
- Choroamnionitis, induction & augmentation of labour by oxytocin

General management:

- Call for help
- Assess ABC and start resuscitation
- Oxytocine 10 IU I/M
- I/V access- wide bore cannulae
- Give NS/Hartman's sol & 20 IU oxytocin in 1L within 15 min and next 1L within 30 min and regulate the infusion according to response
  (Target – pulse <100/min
  SBP>100 mm Hg)
- Catheterization
- Initiate and encourage breast feeding
- Inj. Ergometrine 0.2 mg I/M
- Tab. Misoprostol 800-1000 mg PR

Investigations:

Hb%, Blood grouping & Rh typing and arrange bl. transfusion

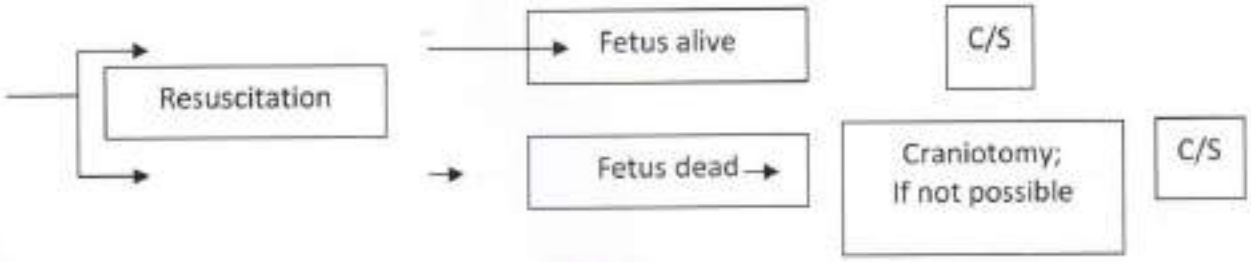
Reassurance & Counselling

Obstructed Labour

General management:

- Rapid evaluation of pulse, BP, Temp. Resp. urine volume, protein, acetone
- Supportive care, counseling
- Hydration – I/V fluid
- Antibiotics – in case of prolonged rupture of membrane / PROM
- Urine for ketone
- Review partograph
- Asses foetal condition – FHR in 1 min, Status of membrane, liquor
- Exclude CPD

Specific management:



13. Burn Management

MMR Choudhury

Burns are a special type of trauma. They may be:

Isolated burn injury - Flame burns, scalds, electric burns or chemical burns.

Burn with associated injury - Road traffic accidents, blasts/explosions, electrocution or history of jump or fall (fire in high rise building)

Pre-hospital First Aid:

STOP, DROP and ROLE

Rescue the burn victim and cool the burn surface with pouring of water for 20-30 minutes (normal room temperature)

Remove the burned dress and jewelries from the body.

Transport the patient to the nearest Upazilla Health Complex covered with clean cotton cloth with proper care.

Be mindful of hypothermia and dehydration. During transportation patient may drink green coconut water or oral saline.

If there is any health worker who is expert in i.v.cannulation then they may start i.v. Hartman solution or Normal Saline according to the age & surface area of burn.

N.B- (Not to do- use of coconut oil, potato smash, tooth paste, egg, cow dung or mud and plant leaf to cover the wound).

In the emergency room

A burn patient is a trauma victim and thus should be treated as per the ATLS protocol as outlined in the ATLS chapter. During initial survey, ignore the burn and treat the patient as trauma patient.

Fluid Resuscitation: (First 24 hours)

- >10% in children and >15% in adult needs fluid.
- Estimate burn area (either by rule of nines or Lund Browder chart)
- Commence IV fluid Hartmann's Saline as per modified Parkland formula and adjust according to urine output (Formula is just a starting point).
- 3-4 ml/kgs/% of TBSA (total body surface area) burnt = IV fluid in milliliters to be given in the 24 hours.
  - Give half in first 8 hours of burn injury and half in the following 16 hours.
  - For children < 30kg, in addition to resuscitation fluid start maintenance fluid with 5% dextrose in ½ strength normal saline.

Example: Fluid calculation in 22 kg child with 20% burn.

a) Resuscitation fluid = 4x22x20= 1760ml (880 ml in 1st 8 hours and 880 ml in next 16 hours).

b) Maintenance fluid = First 10kg 10x100 = 1000ml

Next 10kg 10x50 = 500 ml

Next 2kg 2x20 = 40 ml

Total	= 1540 ml

Net fluid = 1760+ 1540 = 3300 ml. Give Maintenance fluid at continuous rate over 24 hours.

- While giving large volumes of fluid it is important to avoid overload and consequent heart failure. Insert urinary catheter for all burns >10% in children and >15% in adults, all electric burn, genital burn and attach hourly urine bag and adjust fluid each hour according to previous hour's output.
- Remember: The infusion rate is guided by hourly urine output, not by the formula. Urine output should be maintained:

  Adult 0.5ml/kg/hour

  Children 1ml/kg/hour

Electric burn 2 ml/kg/hour

- If output <0.5ml/kg/hr increase fluid by a third of the previous hour's infusion.
- If >1ml/kg/hr in adult, >2ml/kg/hr in child decrease fluid by a third of the previous hour's infusion.

More than the calculated volume of fluid is required in haemochromogenuria (dark red to black urine), inhalation burns and electric burns.

- A central venous line is indicated if no peripheral line is available or in >40% burn.

Pain relief: Morphine/Nalbuphine IV slowly in small increments according to pain severity.

Antibiotics: For 1st week gram positive coverage (empirical). If already infected cover both gram positive and negative.

Tetanus prophylaxis- both TT and TIG if not immunized. If immunized already and got booster dose within 5yrs only TT.

Other medication: anti-ulcer drugs, antihistamines

Monitor clinically:

Maintain I/O chart.

Pulse, BP, Respiratory rate.

Temp - Mild fever expected secondary to hypermetabolic state.

Investigations:

Pulse-oximetry - in case of inhalation injury, shock and ventilated patient.

ECG

Blood - Sugar, electrolytes, CBC, albumin, creatinine, drugs, blood gas.

Urinalysis

X Rays - according to injury suspicion.

Reevaluate the patient clinically.

Secondary survey (burns specific)

- History
  - AMPLE history.
  - How hot was the water?
  - How long was the contact?

- Did the burn occur in closed space?
- Ignition of clothing in electric flash burn?
- Any first aid (water) given? For how long?
- How long ago did the burn happen?

- Head to toe examination.

Initial wound care (Emergency room)

- Adequate analgesia/anesthesia (in children).
- Adequate explanation of procedure.
- Maintain a warm environment
- Wash and dry within 30 min
- Blisters are opened across joints. Do not rupture smaller blisters and larger blister in other area.
- Dress with silver sulfadiazine cream and cover with sterile gauze and cotton or apply hydrocolloid dressing and cover with sterile gauze and cotton after proper assessment and recording (chart & photograph).
- Tetanus immunization status.
- Reevaluation-
    - Airway, Breathing
    - Circulation - oedema, constricting eschar, state of hydration.
    - Level of consciousness
    - Urine output
- Documentation-
    - The Burn patient is a medicolegal case and the papers very often go to the court of law.
    - Keep meticulous record of history, injury details and the condition of the patient along with the details of treatment given to the patient.
    - Record the statement of the patient in case of non-accidental burns.

- Definitive management or preparation for transfer.
- Procedures- central catheterization, escharotomies, fasciotomy.

Referral criteria from primary/secondary level hospital:

All the *Upazilla*, District and Medical college hospital that will need to refer burn patients to specialized burn centre should have in place a transfer agreement. This agreement should identify which patient will be referred, what specific stabilization will be expected, what needs the patient will have during transfer.

1. Burns greater than 10% of total body surface area in paediatric (<12 years) and geriatric group (>60 years).
2. >15% burn in adult (Partial thickness).
3. Full thickness burn >5% of total body surface area.
4. Burns of special areas - face, hands, feet, genitalia, perineum, and major joints.
5. Electrical burns and lightning injury.
6. Chemical burns.
7. Burns with associated inhalation injury.
8. Circumferential burns of the limbs or chest, neck.
9. Burns in people with pre-existing medical or psychological disorders that could complicate management, prolong recovery or increase mortality.
10. Burns with associated major trauma.
11. Burns in pregnancy.
12. Burns in patients who will require special social, emotional, rehabilitative intervention.

Criteria for burn patients to be called "Critical":

1. >15% burn in a child, >30% burn in adult with partial thickness/full thickness burn.
2. All inhalation burns.
3. All chemical burns.
4. Patient presenting late with inadequate resuscitation and/or in a state of sepsis.
5. All electric burns in first 24 hours.

Indication of escharotomy

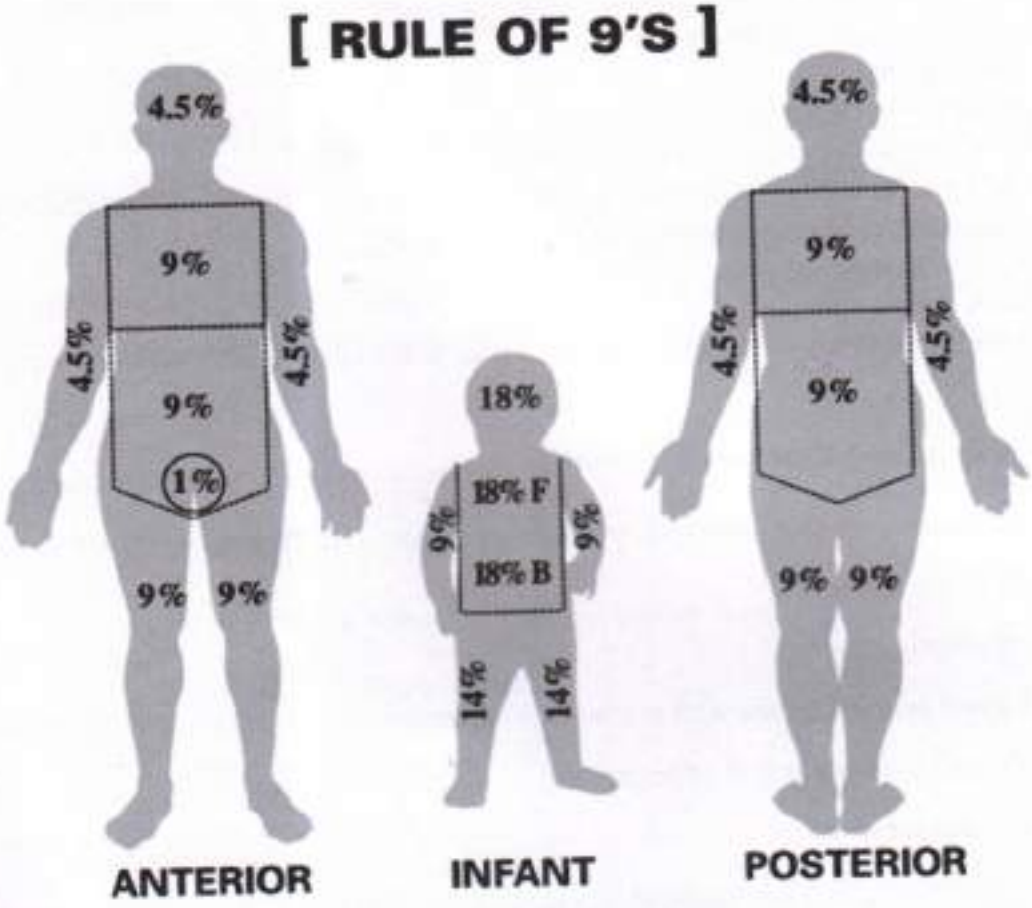
Circumferential full thickness and deep dermal burns of the chest or limbs with circulatory or respiratory compromise.

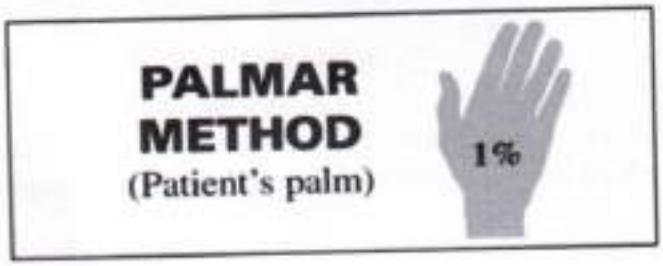
Indication of fasciotomy

Electric burn involving limbs causing suspected or established compartment syndrome.

Assessment of body surface area by Wallace rule of nine:

Body part	Estimated Body Surface Area(BSA)	
	Adult	Children
Entire left upper limb	9%	9%
Entire right upper limb	9%	9%
Entire head, neck, face	9%	18%
Entire chest	9%	9%
Entire abdomen	9%	9%
Entire back	18%	18%
Entire left lower limb	18%	13.5%
Entire right lower limb	18%	13.5%
Perineum	1%	1%





14. Genito-Urinary Emergencies

MS Ahmad

Acute retention of Urine

Causes of Acute Urinary Retention	
Common causes in males	Common causes in females
Prostatic hyperplasia/cancer	Retroverted gravid uterus
Urethral stricture	Atrophic urethritis
Post-operative	Multiple sclerosis
Other causes: acute urethritis, prostatitis, phimosis, traumatic urethral rupture, bladder blood clot, urethral calculi, prolapsed intervertebral disc, drugs, faecal impaction, anal pain	

Assessment: In most cases the presentation is quite straight forward and obvious with the patient in considerable discomfort. Examination reveals a large, distended abdomen with tenderness over bladder and dull percussion note. A per-rectal examination should be performed to assess the prostate and check anal tone. Ultrasound or bladder scan can be used to assess the pre-void volume.

Management: Decompression with a Foley's catheter is the best approach as long as there are no contraindications. If so, a suprapubic catheter may be used, by someone who is experienced in the technique. After drainage, record urine output. Take a sample for urinalysis. If frank blood noted, consider a three-way catheter and refer to a urologist.

Testicular Problems

Torsion: Common in children and adolescents, it may present as testicular pain or abdominal pain of sudden onset, associated with vomiting. The torted tested may be seen to be lying in a horizontal plane. The testis may be red and swollen. Rotating the testis along its vertical axis may help relieve the pain and torsion. This is an emergency requiring immediate referral for surgical exploration.

Acute epididymitis: Typical in young, sexually active men, as a result of chlamydia or gonococcus. In those above 35 years, it is typical of urinary tract infections with associated underlying

pathology. It presents with a gradual onset ache, and swelling over the testis. Once torsion has been ruled out, this is treated with antibiotics, analgesics and rest.

Orchitis: May present as epididymo-orchitis or associated with parotitis as viral mumps. Treatment is with analgesia and follow up.

Testicular lump: May occur as a result of inguinal hernia, hyrdocoele, epididymal cyst or tumour. This can be managed in the community.

Penile Problems

Paraphimosis: This is swelling of the glans caused by a stricture from the foreskin which has been retracted. It can be misconstrued as 'miracle circumcision' and left untreated. Untreated, necrosis may develop. There is a high chance of paraphimosis occurring iatrogenically in Bangladesh as most males are circumcised and repositioning of the foreskin after catheterisation may be forgotten. If manual reduction fails, perform a dorsal slit under local anaesthesia and arrange for a complete circumcision.

Priapism: This is a urological emergency and requires invasive intervention. It can be iatrogenic as a result of intra-cavernosal injections or by diseases like leukaemia, myeloma, sickle cell or spinal injury.

Penile trauma: Minor injuries involving the frenulum are common and can be treated by compression. If resolves advise to abstain from sexual activity for about two weeks, otherwise refer to surgical specialty.

Penile fractures are not a common occurrence but require surgical exploration, clot removal and repair.

Ureteric Colic

Typically caused by renal calculi or ureteric blood clots, this classical loin to groin ache is associated with excruciating colic that often radiates to the iliac fossa, testes, tip of the penis or labia. It can be associated with nausea, vomiting, sweating and pallor. In the elderly, caution should be taken by considering the possibility of leaking abdominal aortic aneurysms.

Investigations: Urine dip stick may show microscopic haematuria in up to 80% of patients. Kidney functions along with calcium and phosphate levels are recommended. As up to 90% of renal calculi are radio-opaque, an X-ray KUB may reveal a stone. In such films, they may lie lodged at the pelvi-ureteric or vescico-ureteric junctions, or anywhere along the course of the ureter which typical follows the tips of the lumbar transverse processes. Pregnant patients would benefit better from ultrasound; non-contrast CT-KUB has a high sensitivity and specificity. If CT is not available, an intravenous urography is highly accurate

Treatment: a combination of opiates and NSAID's is highly effective. Patients with normal renal function and no obstruction on imaging can be discharged once pain settles. All other patients would require admission.

15. Ophthalmic Emergencies

MS Ahmad

The Red Eye

The atraumatic red eye can be a common presentation, but certain diagnoses should not be missed. These include the following:

Orbital cellulitis – This is a serious infection of the orbital tissue usually occurring as a sequela to trauma or spreading from the paranasal sinuses, lacrcimal sac or surrounding skin. A combination of fever, eyelid swelling, and erythema may be present. Cavernous sinus thrombosis and meningitis are potential complications. Intravenous antibiotics need to be commenced immediately and urgent ophthalmological referral needs to be made.

Acute irits/uveitis – May present with acute eye pain, photophobia, watering, blurred vision and floaters. Pupil may be small and irregular with circumcorneal erythema. Talbot's test is positive in which shining a light in the unaffected eye causes pain in the affected eye due to the consensual light reflex. Hypopyon and white deposits on the posterior cornea may be seen by slit lamp. Urgent ophthalmological referral is required for steroids and pupillary dilatation.

Acute closed angle glaucoma – Sudden closure of the drainage of aqueous humor in the eye of people suffering with long-sighted vision or in dim light can lead to severe eye pain, blurred vision and haloes. Pupil may be fixed, semi-dilated and ovoid. Initial treatment is with pilocarpine and analgesia with referral to ophthalmology.

Conjunctivitis – a self-limiting, common condition if virally mediated, it may require topical antibiotics if caused by bacteria. A gritty sensation in the eye associated with eye lid swelling and inflamed conjunctiva. Viral infections are usually very watery with associated photophobia while bacterial infections typical are associated with a mucopurulent discharge.

Subconjunctival haemorrhage – A painless well-defined area of haemorrhage over the sclera, typically resulting from sneezing, vomiting or from trauma.

Sudden Vision Loss

This is a very concerning presentation for a patient and thus requires emergency assessment and treatment.

Amaurosis fugax – typically described as a screen coming down over the eye, followed by complete recovery over seconds to minutes. Usually caused by thrombotic emboli in any of the retinal, ophthalmic or ciliary arteries. Urgent referral to the ophthalmology team is required.

Central retinal artery occlusion – embolic occlusions of the central retinal end artery lead to painless and sudden vision loss. A previous history of amaurosis fugax may be present. Direct light reflex may be absent with consensual reflex retained. Fundoscopy can reveal a pale retina with a swollen optic disc and a cherry red macula spot. Constant gentle pressure and massaging the globe for up to 15 seconds, releasing and repeating may dislodge the embolus. Sublingual GTN or IV acetazolamide may be given if there is a delay for ophthalmology review.

Central retinal vein occlusion – a more common cause of painless sudden vision loss than central retinal artery occlusion, this typical occurs in ageing individuals, chronic glaucoma or hypertension among other pathologies. Fundoscopy typically reveals the classic 'stormy sunset' appearance. Although no specific treatment is available, urgent referral is required to treat the underlying cause and protect the remaining unaffected eye.

Temporal arteritis – a common occurrence in those aged over 50 years or with polymyalgia rheumatica, this is caused by the inflammation of the posterior ciliary arteries. Jaw claudication, headaches and muscle pain may precede sudden vision loss. Tender temporal arteries on palpation and a raised ESR may also be present. Consider intravenous hydrocortisone and refer immediately.

Retinal detachment – may present similarly to amaurosis fugax but with no recovery. Can occur following trauma or in elderly patients and those with diabetes. Refer urgently for surgery for reattachment.

Eye Trauma

Blunt eye injury – may result in an orbital blow-out fracture through the floor of the orbit caused by antero-posterior compression of the eye ball. Bleeding behind the eye as a result of trauma can lead to orbital compartment syndrome which needs to be urgently decompressed by lateral canthotomy otherwise optic nerve ischaemia can develop. Assessments of visual acuity and pupillary light reflexes need to be made as do eye movements. Hyphaema (blood in the anterior chamber) may be present.

Penetrating eye injury – intraocular foreign bodies may result due to small metallic missiles (grinding, hammering, chiselling). Puncture wounds may be present on both aspects on the lid as well as cornea or sclera. There may be blood or air bubbles in the anterior chamber or a deflated globe. Vitreous haemorrhage may be noted by the absence of red reflex on fundoscopy. Analgesia, tetanus and antibiotics should be given while awaiting urgent ophthalmology referral.

Corneal trauma – projectiles with low energy may not be able to penetrate the globe and result as foreign bodies on the cornea, conjunctiva or on the inner aspects of the lids. These can be removed under local anaesthesia and a slit lamp. Corneal abrasions can present with excessive watering, photophobia and irritation. Treat with antibiotic ointment and analgesia.

Contact lens – Stuck lenses need to be rehydrated and removed by fingers or with micro-suction. Lost lenses may have folded up behind the upper lids. Acanthamoeba keratitis occurs due to a protozoal infection due to poor hygiene. Oedema and ulceration may develop, and urgent referral is required.

16. Death Declaration

A Ansar

Death Declaration

Declaration of death of a person is not so easy. Death is the most painful event in a family. The doctor has to inform the relatives of the dead about this painful event. The information is a tremendous shock, a jolt for the family members naturally. The doctor has to be very cautious in declaration of death. He/ She must be satisfied that, the respiration & circulation of the person which have stopped will not start or can't be started again. It had happened sometimes that death was declared premature. Such a misdiagnosis may be disastrous for the professional life of a doctor.

Now, the question arises then, on which basis, the event of death will be decided by the doctor.

What is the definition of the death?

There is no clear-cut definition of death in the world.

Black law dictionary defines death as "cessation of life or ceasing to exist."

Chamber's twentieth century dictionary defines death as – "Extinction of life" oxford dictionary gives the meaning as – "The end of a life".

Medicolegal definition:

Death is a permanent & irreversible cessation of functions of the three interlinked vital systems of the body namely the nervous, the circulatory and the respiratory system.

This definition essentially requires that a doctor, before going to declare death, must be satisfied that the functions of three interlinked vital systems have stopped permanently & irreversibly. Remember, if any of these 3 systems fails then other 2 will also fail because they are functionally interlinked.

Death is of two types:

1) Somatic, Systemic or Clinical – Defined as irreversible cessation of functioning of brain, heart and lungs resulting in complete loss of sensibility and ability to move the body. It is the extinction of personality or death of the body. The cells of different tissues of the body are still alive and will die after some time at different rates.

2) Molecular or cellular – It means death of cells and tissues individually, which takes place usually 1-2 hours after the stoppage of vital function. Molecular death occurs piecemeal. Individual cells will live on their residual oxygen, for a variable time after the circulation has stopped, depending on the metabolic activity of the cell. Nerves and tissue die rapidly, brain stems die within five minutes, but muscles live for one to two hours.

Clinical criteria of cessation of heart beating:

Absence of pulse (central)

Absence of heart sounds on repeated prolonged auscultation

Asystole on ECG

Clinical criteria of cessation of breathing:

Absence of respiratory movement

Absence of breath sounds on auscultation of the chest

Clinical criteria of cessation of cerebration:

Generalised flaccidity with generalised anaesthesia

Dilated and fixed pupils not responding to light

Absence of motor response within the cranial nerve distribution on painful stimuli

Absence of corneal reflex

Suspended animation (apparent death):

Sometimes, due to some reasons, a person may appear to be dead, and this is due to the slowing down of the functions of the body systems to the most minimum of levels. In such situations, the functions of the circulatory, respiratory and nervous systems may not be perceived by conventional methods. Although the person may appear to be dead, the function of these systems 'return' after some time either spontaneously or after proper resuscitation. Such a deathlike state is termed suspended animation or apparent death.

Types of apparent death:

Voluntary: Yogic practice

Involuntary:

- New born infant
- Insanity
- Drowning
- Electrocution
- Cholera
- Frozen coma
- Post-anaesthesia
- Shock
- Sun-stroke
- Snake bite

The mode of death:

This refers to the abnormal physiological state that existed at the time of death. According to Bicaht, there are three modes of death depending upon the system involved, irrespective of what the remote cause of death may be:

Coma – failure of brain function
Syncope – failure of cardiac function
Asphyxia – failure of respiratory function

The manner of death:

This refers to the design or fashion in which the cause of death came into being. This may be a natural death, or in case of injury (accidental or not) unnatural or violent. In developing countries, doctors are discouraged, and they refrain from mentioning the manner of death, but WHO recommends that the doctor should include the manner of death in their reports.

Changes after death:

1. **Immediate:**
   a. In sensibility and absence of ECG rhythm
   b. Cessation of respiration
   c. Cessation of circulation
2. **Early:**
   a. Facial pallor and changes in skin
   b. Primary flaccidity of muscle
   c. Changes in the eye
   d. Loss of corneal reflex
   e. Opacity of cornea
   f. Decrease of intraocular pressure
3. **Late:**
   a. Putrefaction
   b. Mummification
   c. Adipocere formation

Precautions to be taken to avoid misdiagnosis:

Some of the clinical signs of brain stem death may be there in hypothermia. This is why, before testing for the above features, the temperature of the subject should be raised to 35°C.

The diagnosis of brain stem death should be reached by a team of doctors, consisting of a neurologist, anaesthesiologist and an experienced doctor from the intensive care unit of the hospital.

The patient should be examined by the above team of doctors at least twice, with a reasonable gap of time in between.

None of the doctors who participate in the diagnosis of brain death should have any interest in the transplantation of an organ, removed from the subject.

REFERRAL SYSTEMS

SD Adnan

efinition of a Structural Referral System:

eferral system is a process, which ensures accessibility to higher levels of medical care for ents from the community or primary level health care facilities. Referral is usually pursued in r to obtain expert professional advice, undergo a diagnostic technique, seek a therapeutic rvention or receive in-patient care when these are not available at the referring facility. In rgencies and medico-legal cases, a patient may be referred to the emergency department of eferral hospital. The level of referral may be decided by the health care provider according e need for proper management of the patient. It could be directly from primary level to onal or tertiary if the specialty does not exist at *upazilla* health complex or district hospital.

ction Plan:

- dentification of types of services to be provided at each level of the institutions
- Development of referral protocols and referral cards
- Streamline the referral procedures by creating awareness amongst the health staff and the community
- Provision of adequate resources based on the norms for each level of the institutions
- Establishment of proper communication mechanism between PHC's and other higher-level referral centres
- dentification of suitable transport mechanisms to transfer the patients in need of referral

eferral System for Emergencies and Casualty:

nts with surgical emergencies who need referral to the next level of health care services t be referred within four (4) hours after stabilization. Within one hour of making a diagnosis stetric complications, patients in labour must be referred. Medical emergencies should be sed and referred within two (2) hours of arrival in the hospital.

Surgical and Orthopaedic Emergencies:

a. Extensive trauma
b. Spinal injuries
c. Head injuries (moderate or severe)
d. Fractures requiring open reduction and internal fixation (ORIF)
e. Acute abdominal pain
f. Complicated hernias
g. Acute bowel obstruction
h. Peritonitis
i. Kidney problems
j. Complicated peptic ulcer
k. Acute cholecystitis
l. Foreign body (FB) of the oesophagus, eyes or airways
m. Complicated appendicitis
n. Pelvic abscess
o. Severe burns

Obstetric and Gynaecological Emergencies:

a. Placenta previa
b. Abnormal foetal presentations, if external cephalic version might be considered
c. Acute complications in pregnancy
d. Complicated post-natal eclampsia
e. Patient with high risk of obstetric history at least at 38 weeks gestation

Medical and paediatric emergencies:

a. Diabetic pre-coma and coma
b. Hypertensive crisis not responding to common treatment
c. Acute cardiac and respiratory failure
d. Uncontrollable epileptic fits
e. Acute renal failure

Transport mechanisms to transfer the patients in emergency for referral care:

An emergency ambulance service is one that provides ambulances for ferrying Emergency patients and provides immediate medical care from the time of arrival of the ambulance up to handing the patient over to the receiving hospital.

The ambulance vehicle shall meet the vehicle specifications set by the Bangladesh Road Transport Authority (BRTA).

Ambulance Crew

Each Non-emergency Ambulance should be staffed by at least a two-member crew, one of whom is a driver, and the other the Ambulance Officer who may be either a Registered Nurse or trained Paramedic.

The driver should have the following minimum qualifications/experience:

i. Possess a valid license to drive the ambulance

ii. Understand the usage of ambulance stretchers

iii. Undergone training in standard first aid

iv. Trained in defensive driving and be well-aware of the use of sirens and flashing lights for conveying emergency patients to hospital

The Ambulance Officer should be able to:

i. Measure vital signs e.g., pulse rate, respiratory rate, blood pressure

ii. Perform Basic Cardiac Life Support (BCLS) and be currently certified in BCLS.

iii. Use airway adjuncts such as oropharyngeal and nasopharyngeal airways, suction devices and basic oxygen delivery devices such as bag valve masks

iv. Use various types of stretchers and body immobilisation devices

v. Perform basic emergency procedures such as

   a. Control of external bleeding

   b. Application of dressings, bandages, slings and splints

vi. Monitor peripheral lines of stable patients

vii. Transfer and maintain patients with nasogastric tubes and urinary catheters

viii. Establish contact with a receiving hospital if the need arises

Vehicle Equipment

1. Siren and Wail Sound Horn or Two-tone horn
2. Red Beacon Light
3. Fire Extinguisher
4. Street Directory / Satellite Navigation
5. Bench Set and Safety Belts
6. Water Tank and Sink
7. Frosted or Tinted Side and Rear Window Glass (excluding the front side windows)
8. Radio Network Communication or mobile phone or other Ambulance-Hospital Communication Equipment
9. Adequate rear (including roof mounted) warning lights

Medical Equipment

1. Main stretcher with mattress, firm base and patient restraints
2. First Aid Box (standard) / Ambulance bag
3. Blanket
4. Trolley
5. Pillow
6. Hand Carried Stretcher
7. Wheel Chair with Restaints
8. Receiver for vomitus (kidney dish)
9. Bed pan
10. Urine bottle
11. Pocket mask with one-way valve (for CPR)
12. Bag-valve mask
13. Vital signs equipment e.g., blood pressure and thermometer
14. Stethoscope
15. Hand torch
16. Portable oxygen including spare cylinder
17. Tubing mask for oxygen
18. Portable suction unit
19. Detachable drip stand for use with stretcher

Emergency Department Useful References

Pretreatment

3 – 5 minutes prior to intubation

- **Fentanyl** 3mcg / kg
  - for High ICP / Vascular (eg dissection) / preeclampsia or eclampsia with elevated BP
- Consider **Lignocaine** 1.5mg / kg
  - for High ICP / Vascular with elevated BP

Immediate "push dose" Inotrope or Vasopressor

- Adrenaline 10mcg/ml = 1:100000; dose 0.5-2ml (5-20mcg as required 1-5 minutely)
  - In 10ml syringe draw up 9ml normal saline; now draw up 1ml of **1:10000** adrenaline (from prefilled syringe) and shake = 1:100000.
  - Label syringe "Adrenaline 10mcg/ml"; discard the other syringe.
- Metaraminol 0.5mg/ml; dose 1-2ml (0.5-1mg as required 2-5 minutely)
  - In 20ml syringe draw up 19ml normal saline; now draw up 1ml of 10mg/ml Metaraminol and shake
  - Label syringe "Metaraminol 0.5mg/ml"

Intubation Drugs

	Drug	Normotensive dose	Normotensive dose in 70kg patient	Hypotensive dose
SEDATION	Ketamine	2mg/kg	140mg	0.5mg/kg
SEDATION	Thiopentone	3-5mg/kg	300mg	0.5-1mg/kg
SEDATION	Propofol	1.5-3mg/kg	150mg	0.2mg/kg
PARALYSIS	Suxamethonium	1.5-2mg/kg	100mg	2mg/kg
PARALYSIS	Rocuronium	For RSI 1.2mg/kg	85mg	1.6mg/kg
PARALYSIS	Sugammadex	16mg/kg reversal of rocuronium 2min post administration	1120mg As 100mg/ml solution in 2 or 5ml vials	16mg/kg

Contraindications to Suxamethonium

- Malignant hyperthermia history
- Strokes with hemiparesis > 72 hours
- ICU stay > 2 weeks
- Burns / trauma > 72 hours
- NMJ disease
- Myopathies / Muscular dystrophies
- Hyperkalaemia (known or suspected)
- Guillain-Barre
- Penetrating eye injury and acute glaucoma

Initial post intubation analgesia / sedation infusions

Infusion	Dose	Mixer	Bolus	Rate	Indication
Morphine & Midazolam	50mg 50mg	50ml NS	0.05 ml/kg	0.05-0.1 ml / kg / hr 70kg adult – 5 ml / hr	Maintain analgesia & sedation
Propofol	500mg (50ml)		0.5 mg / kg	20-30 mcg/kg/min 70kg adult = 10 ml / hr	Stable, with severe neurologic injury.
Ketamine	200mg	50ml NS	0.5mg/kg	0.5mg/kg/hr 70kg adult = 9 ml / hr	Unstable

Initial Ventilator Settings

Adjust as per clinical & ABG assessment. Seek ICU advice if concerns

Settings	Normal Lungs	Asthma / COPD	ARDS / ALI Type lungs	Severe metabolic acidosis	Severe Head Injury
Mode	Volume				
FiO2	Start at 100% and titrate down rapidly ideally achieving FiO2 0.4 Aim for oxygen sats > 94%, pO_2 > 70, avoid significant hyperoxia. Aim P_{plat} < 30				
Vt ml/kg IBW	6-8	6-8	6	10	6-8
RR	14	8-10	18	28	16
PEEP	5	Asth 8 / COPD 5	5 - 10	5	5
I:E ratio	1:2	1:4 – 1:6	1:2	1:2	1:2
Notes	Maintain homeostasis and avoid lung injury	Watch for breath stacking & barotrauma. Consider permissive hypercapnoea	Watch pressures; may need to lower Vt and accept higher CO_2. Titrate FiO2 & PEEP	Maintain respiratory compensation for acidosis. Watch for gas trapping	Avoid high PEEP Aim PCO2 35-40

Modified from EmCrit Intubation Checklist — Dr James Rippey 2013 Review 2016

This checklist is for informational purposes only. ALL information must be vetted with your clinical judgment, pharmacy and hospital committees & regulations

RESUSCITATION TROLLEY BASIC CONTENTS AND LAYOUT - CHECKLIST	Fortnight commencing:													
Day	Mon	Tues	Wed	Thurs	Fri	Sat	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Date →														
DESCRIPTION / Expiry Date														
MONITOR/DEFIB TRAY														
Lifepak12/15 monitor/defib (Therapy Cable Attached)														
Battery support unit connected to Lifepak														
NIBP cable attached														
SpO2 cable attached														
Quik-Combo Pads Adult x 1														
Quik-Combo Pads Paed x 1														
ECG Dots x 8														
Scissors (Trauma)														
Torch (pencil)														
OTHER														
Sharps bin														
IV pole & mount														
Sphygmomanometer (manual within 2 metres of trolley)														
Stethoscope on pole														
Infant Bag Valve Mask (hanging on IV Pole)														
Paediatric Bag Valve Mask (hanging on IV Pole)														
Adult Bag Valve Mask (hanging on IV Pole)														
Goggles x 4														
DRAWER ONE - AIRWAY SUPPORT														
Endotracheal tubes - uncuffed 2.5mm x 1 each														
Endotracheal tubes - uncuffed 3mm x 1 each														
Endotracheal tubes - uncuffed 3.5mm x 1 each														
Endotracheal tubes - uncuffed 4mm x 1 each														
Endotracheal tubes - uncuffed 4.5mm x 1 each														
Endotracheal tubes - uncuffed 5mm x 1 each														
Endotracheal tubes - uncuffed 5.5mm x 1 each														
Endotracheal tubes - uncuffed 6mm x 1 each														
Endotracheal tubes - cuffed 5mm x 1 each														
Endotracheal tubes - cuffed 5.5mm x 1 each														
Endotracheal tubes - cuffed 6mm x 1 each														
Endotracheal tubes - cuffed 6.5mm x 1 each														
Endotracheal tubes - cuffed 7mm x 1 each														

DESCRIPTION	Day	Mon	Tues	Wed	Thurs	Fri	Sat	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
	Date →														
	Expiry Date ↓														
Endotracheal tubes - cuffed 7.5mm x 1 each															
Endotracheal tubes - cuffed 8mm x 1 each															
Endotracheal tubes - cuffed 8.5mm x 1 each															
Endotracheal tubes - cuffed 9mm x 1 each															
Laryngeal masks - size 1 x 1															
Laryngeal masks - size 2 x 1															
Laryngeal masks - size 3 x 1															
Laryngeal masks - size 4 x1															
Laryngeal masks - size 5 x 1															
50ml luer tip syringe marked with tape (LMA volumes for size)															
Suction catheters - size 6 x 2 each															
Suction catheters - size 8 x 2 each															
Suction catheters - size 10 x 2 each															
Suction catheters - size 12 x 2 each															
Suction catheters - size 14 x 2 each															
Batteries for laryngoscope x 2															

DRAWER TWO - BREATHING SUPPORT

Paediatric Hudson O2 mask x 1															
Paediatric non rebreather mask x 1															
Paediatric nebuliser mask x 1															
Adult Hudson mask x 1															
Adult nebuliser mask x 1															
Adult non rebreather mask x 1															
Nasal Prongs Adult x 1															
Nasal Prongs Paeds x 1															
Nebulisers x 4															
Salbutamol Nebuliser 5mg/ml x 3															
O2 tubing x 1															
CO2 indicators x 3 (disposable)															
Nasopharyngeal airways - Size 6 with Safety Pin attached x 1															
Nasopharyngeal airways - Size 7 with Safety Pin attached x 1															
Nasopharyngeal airways - Size 8 with Safety Pin attached x 1															

DESCRIPTION	Day	Mon	Tues	Wed	Thurs	Fri	Sat	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
	Date →														
	Expiry Date ↓														
DRAWER THREE - CIRCULATORY															
Tourniquet x 2															
Skin Prep x 5															
Retractable IV cannulas 14g x 3 each															
Retractable IV cannulas 16g x 3 each															
Retractable IV cannulas 18g x 3 each															
Retractable IV cannulas 20g x 3 each															
Retractable IV cannulas 22g x 3 each															
Retractable IV cannulas 24g x 3 each															
Retractable Butterfly needles - size 21 x 1 each															
Retractable Butterfly needles - size 23 x 1 each															
Manual Intraosseous Needles x 2															
Emergency Infusion device															
Transparent adhesive IV dressing x 5															
2.5cm micropore x 1 roll															
IV three-way tap with extension tubing x 2															
IV Giving sets x 2															
IV Burette x 1															
IV Pump Set x 1 (appropriate for infusion pump used)															
Mucosal Atomisation Device (MAD) x 2															
Alcowipes x 10															
Injection sites x 5 (interlink Smartsite)															
Vial access cannula x 5															
Non-safety needle-size 18g x 5 each															
Non-safety needle-size 21g x 5 each															
Non-safety needle-size 23g x 5 each															
Non-safety needle-size 25g x 5 each															
Non-safety syringes size 2ml x 5 each															
Non-safety syringes size 5ml x 5 each															
Non-safety syringes size 10ml x 5 each															
Non-safety syringes size 30ml x 5 each															
50ml luer lock syringes x 2															
Blood tubes SST, FBC, Xmatch. Coag x 2															
Blood culture bottles x 1 set Adult															
Blood culture bottles x 1 set Paediatric															
Blood gas syringes x 2															
IV additives labels x 5															
Bandages 5 cm crepe or conforming x 2															

DESCRIPTION	Day	Mon	Tues	Wed	Thurs	Fri	Sat	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
	Date →														
	Expiry Date ↓														
DRAWER FOUR															
Lifepak12/15 lead ECG cable															
Disposable Quick combo pads - size adult x 2															
Disposable Quick combo pads - size paeds x 2															
ECG printer paper x 3 rolls (Lifepak 12/15 paper)															
Lifepak 12/15 manual															
Therapy/pacing cable (if paddles attached to Lifepak)															
ECG electrodes x 1 packet															
Clippers															
Combine x 2															
Sterile guaze x 2 packets															
Spare torch batteries															
Paediatric SPO2 Probe															
DRAWER FIVE (or See Through Drawer if applicable)															
First Line Drugs															
Adrenaline 1:10,000 minijet x 4															
Atropine Sulphate 100 mcg/ml minijet x 2															
Amiodarone 150mg x 2															
Anginine Tablets															
Aspirin - One box															
Second Line Drugs															
Adenosine 6mg/2ml ampoule x 4															
Adrenaline 1:1000 ampoule x 10															
Amioderone 150mg/3ml x 6															
Atropine 600 ug/ml x 4															
Calcium Gluconate 1gm/10mls x 4															
Ceftriaxone 1g x 2															
Diazepam 5 mg rectal x 2															
Glucose 50% 50mls vial x 1															
GTN 50mg/10ml x 1															
Magnesium Sulphate 10mmol/5ml ampoule x 2															
Mannitol 20% (500 ml) x 1 bag															
Midazolam 5mg/5mls x 3															
Midazolam 5mg/1ml x 3															
Naloxane Hydrochloride 0.4mg x 2															
Noradrenaline 2mg/2mls ampoule x 3															
Phenytoin 250mg/5mls ampoule x 4 +															

DESCRIPTION	Day	Mon	Tues	Wed	Thurs	Fri	Sat	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
	Date →														
	Expiry Date ↓														
Phenytoin disposable filter x 1															
Sodium bicarbonate injection 8.4% 100ml minijet x 1															
Sterile water for injection 10mls ampoules															
SIDE OF TROLLEY															
Oxygen tank holder															
Oxygen cylinder - size C with regulator & twinovac attached															
Adult Yankauer tubing connected to twinovac suction															
Top swing pocket -															
NIBP cuffs - size infant arm															
NIBP cuffs - size child															
NIBP cuffs - size small adult															
NIBP cuffs - size adult															
NIBP cuffs - size large arm															
NIBP cuffs - size adult thigh															
Second swing pocket															
Normal saline 0.9% 1000 mls x 4															
For paediatrics 0.45% Saline with 5 % Dextrose (1000mls)															
Normal saline 0.9% 100mls x 2															
5% Dextrose 100mls x 2															
HOOK ON BACK OF TROLLEY															
Extension cord															
Signature of person checking contents daily		Sign:	Sign:	Sign:	Sign:	Sign:	Sign:	Sign:	Sign:	Sign:	Sign:	Sign:	Sign:	Sign:	Sign: