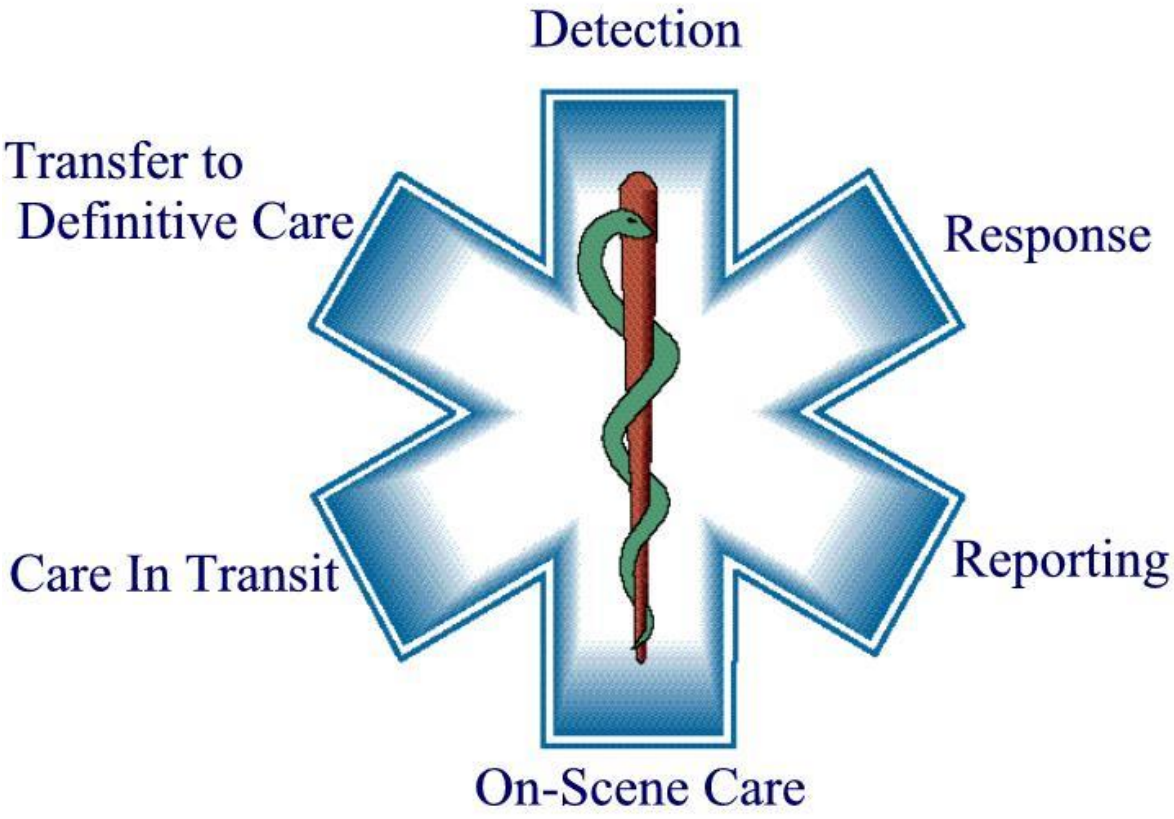
ECP Handbook



2023 Edition

Table of Contents

Introduction

This little handbook started as a hand-written A6 note pad which I developed as a new graduate. The purpose was to avoid forgetting something while managing a patient! Looking back, on this now well-worn notebook, it became clear updates were needed. ECP scope of practice has expanded, and evidence-based medicine has progressed. And so, this new, updated, digitized version was born! I hope it will assist you as much as it has me.

Notes on Use

This handbook is not comprehensive, nor does it seek to replace clinical judgement or knowledge. Each patient presentation is unique and there are myriad patient care considerations which simply cannot fit into a small, pocket-sized handbook. This handbook is meant purely as a memory-aid, including basic considerations around the management of specific conditions.

It should also be noted that not every management option mentioned should be used on every patient. For example, under *Cardiac Arrest* the medications Lignocaine and Amiodarone are mentioned. This does NOT mean that in every instance of cardiac arrest both medications should be administered. They are simply noted as a reminder should they be indicated. Furthermore, medications containing the '*' symbol may only be administered with consultation as per the latest guidelines (e.g. *IV Nitrates**). In essence, every point mentioned in this reference book should be read with the following in mind: *"…if necessary/indicated".*

As an example of how this handbook is intended for use, consider the management of an asthmatic patient. This patient should be managed according to clinical guidelines and one's knowledge/clinical judgement. Once immediate, life-saving interventions have been performed, this handbook may be used as a memory-aid to avoid omissions. Furthermore, it may be useful day-to-day as a reminder of how to manage relatively rare incidents or as an academic tool when, for example, running patient simulations for students.

Please feel free to distribute and edit this document as you see fit – it is meant as a free resource which can be used as a customizable template and adjusted to any style or qualification – it's completely up to you! If you have any ideas or suggestions for updates, please let me know so this little handbook can be continually improved.

Caleb Gage

caleb.gage@gmail.com

**References to material can be provided upon request. I do not claim any ownership of the material but have simply compiled information. It remains each health care provider's responsibility to keep up to date with current, acceptable medical practice.*

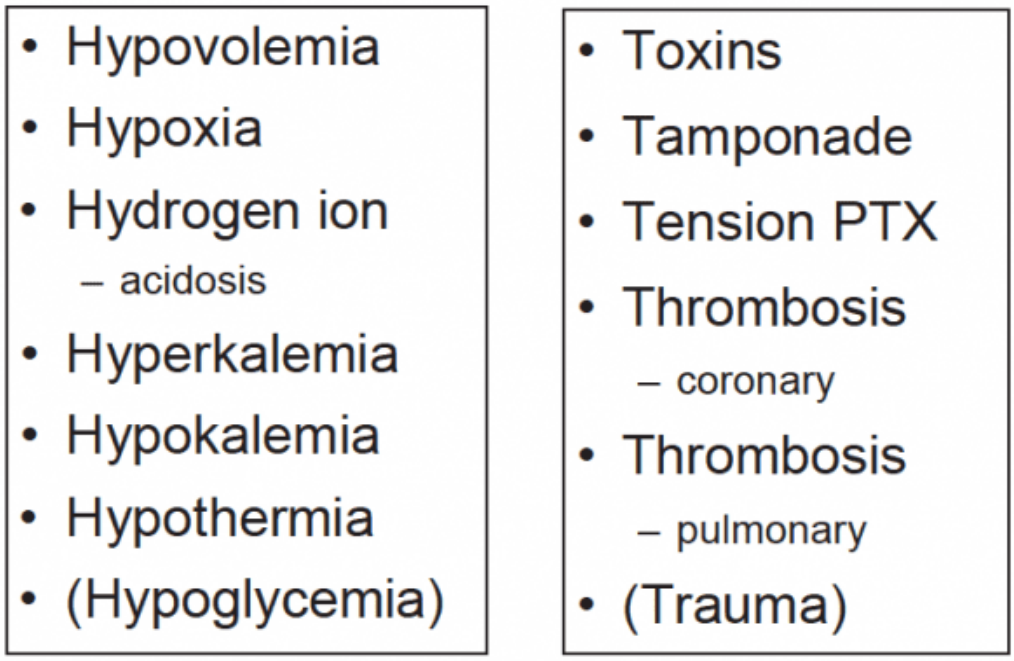
Pathologies

A. Cardiovascular

1. Cardiac Arrest

Basics

- **High quality** CPR:
  - Adequate compression depth (adults: 5cm, paeds: ≥1/3 AP diameter)
  - Allow full chest recoil
  - Adequate compression rate (100-120/min)
  - Minimize hands-off time (<5-10s)
  - Avoid aggressive ventilations.
  - ETCO2 to monitor.
- **Defibrillate** early.
- Ensure **high quality** CPR before performing advanced procedures.
- Use **metronome** for compressions.
- Ensure **timekeeping**: stop/swap/analyse every 2min.
- Count CPR cycles **out loud**.
- **Communicate** with patient **family** – allow them to **watch** if appropriate.
- Ask about **legal documentation** (i.e. living wills, DNRs)
- Assess for **reversible causes** of cardiac arrest:



Note: Hypoglycaemia and Trauma removed from most guidelines, but are worth assessing.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• BVM/BVT at FiO2 1.0	• BVM/BVT at FiO2 1.0 (Newborn: R/A initially)	• None
Adrenaline	• 1mg IV every 3-5min • 0.1-1mcg/kg/min IV infusion for Post-ROSC hypotension	• 0.01mg/kg IV every 3-5min • 0.1-1mcg/kg/min IV infusion for Post-ROSC hypotension	• None
Amiodarone	• 300mg IV (150mg repeat dose)	• 5mg/kg IV (may repeat, max. 15mg/kg)	• Iodine allergy • Torsades • Lignocaine use
Lignocaine	• 1mg/kg IV (0.5mg/kg repeat dose)	• 1mg/kg IV (0.5mg/kg repeat dose)	• Amiodarone use • Known allergy
Other relevant medications: **Sodium Bicarbonate** (TCA, aspirin, cocaine OD), **Calcium Chloride** (Hyperkalaemia), **Magnesium Sulphate** (Torsades), **Dextrose** (Hypoglycaemia), **Naloxone** (Opioid OD), **Flumazenil** (BZD OD), **Atropine** (Organophosphate OD).			

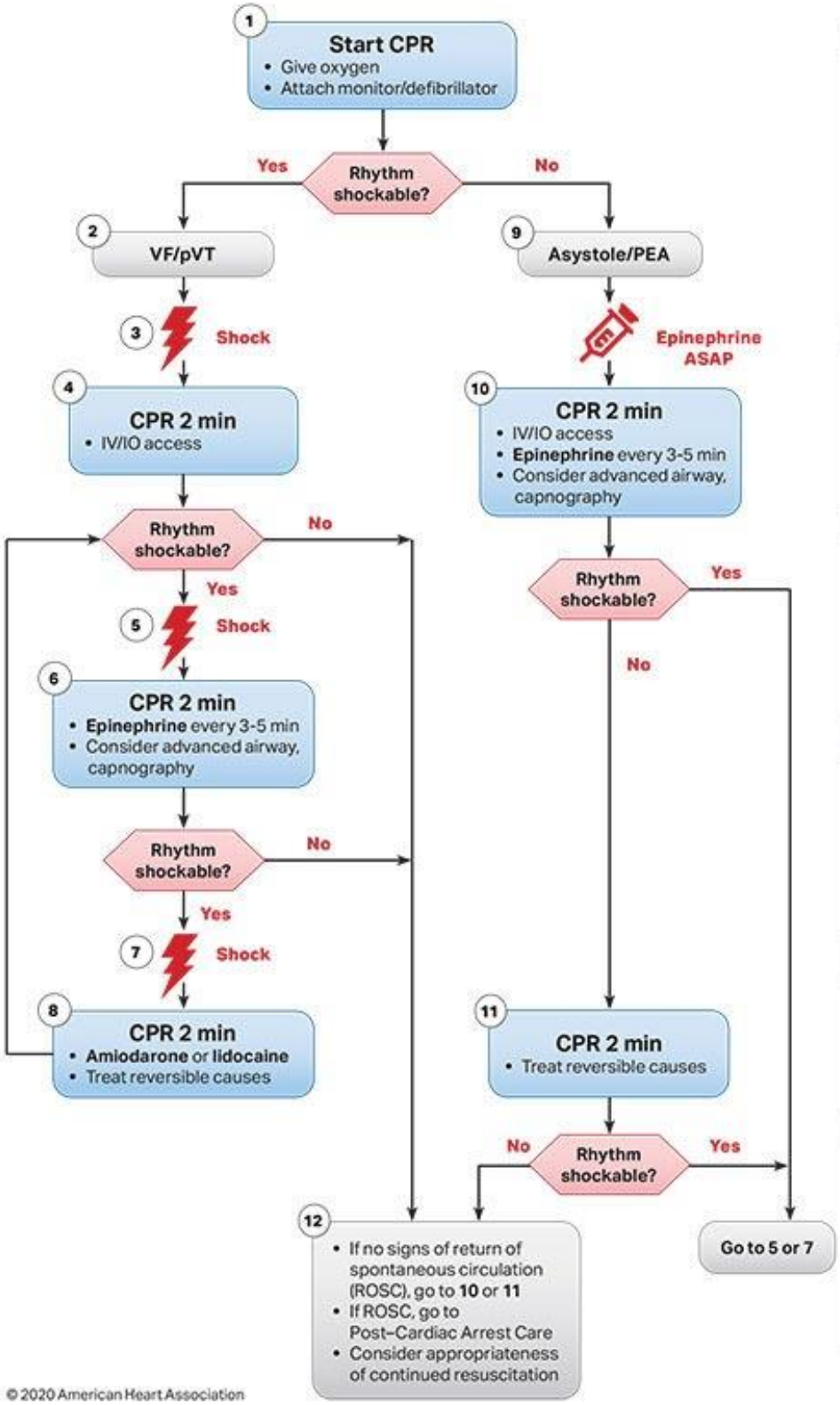
Fluid Therapy

- Patient dependant (i.e. hypovolaemia as reversible cause) - Warmed crystalloid may be considered.
- Post-ROSC hypotension: consider 1-2L warmed crystalloid.

Procedures

- Defibrillation – May use escalating doses. Initial: Adults 120-200J (biphasic), 360J (monophasic), Paeds 4J/kg (10J/kg or adult dose max).
- ETI (SGAs may be used): airway protection, ETCO2 monitoring, asynchronous compressions, airway suctioning, in-line nebulisation. Avoid PEEP.
- Post-ROSC care: optimize oxygenation and ventilation, manage hypotension, 12-lead ECG, targeted temperature management (32-36ºC) where appropriate.
- IO insertion may be required.
- ABG.
- NGT.
- Needle thoracentesis.
- Precordial thump (witnessed arrest).

Adult Cardiac Arrest Algorithm (VF/pVT/Asystole/PEA)



CPR Quality

- Push hard (at least 2 inches [5 cm]) and fast (100-120/min) and allow complete chest recoil.
- Minimize interruptions in compressions.
- Avoid excessive ventilation.
- Change compressor every 2 minutes, or sooner if fatigued.
- If no advanced airway, 30:2 compression-ventilation ratio.
- Quantitative waveform capnography
  - If P_{ETCO_2} is low or decreasing, reassess CPR quality.

Shock Energy for Defibrillation

- **Biphasic**: Manufacturer recommendation (eg, initial dose of 120-200 J); if unknown, use maximum available. Second and subsequent doses should be equivalent, and higher doses may be considered.
- **Monophasic**: 360 J

Drug Therapy

- **Epinephrine IV/IO dose:** 1 mg every 3-5 minutes
- **Amiodarone IV/IO dose:** First dose: 300 mg bolus. Second dose: 150 mg.
  or
  Lidocaine IV/IO dose: First dose: 1-1.5 mg/kg. Second dose: 0.5-0.75 mg/kg.

Advanced Airway

- Endotracheal intubation or supraglottic advanced airway
- Waveform capnography or capnometry to confirm and monitor ET tube placement
- Once advanced airway in place, give 1 breath every 6 seconds (10 breaths/min) with continuous chest compressions

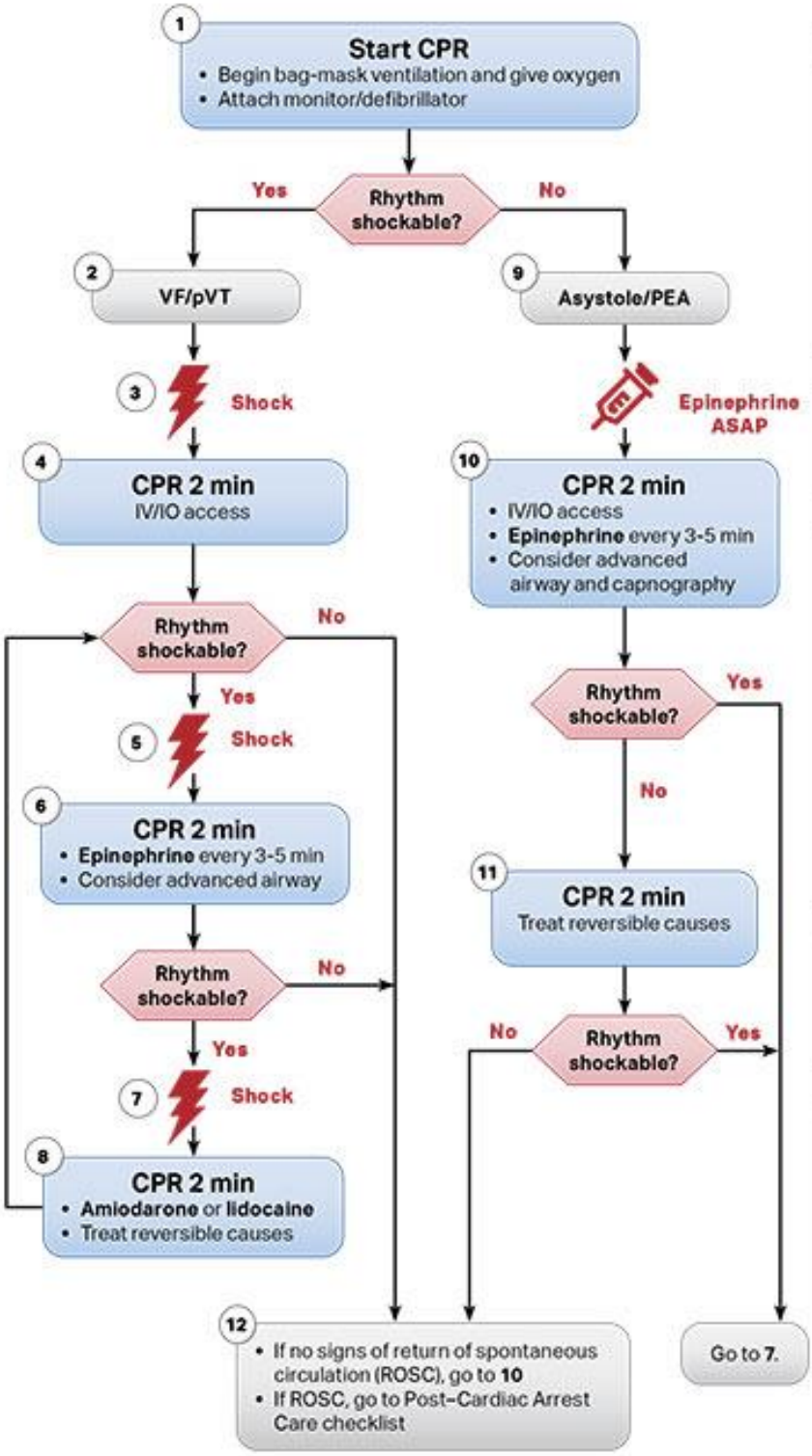
Return of Spontaneous Circulation (ROSC)

- Pulse and blood pressure
- Abrupt sustained increase in P_{ETCO_2} (typically ≥40 mm Hg)
- Spontaneous arterial pressure waves with intra-arterial monitoring

Reversible Causes

- **H**ypovolemia
- **H**ypoxia
- **H**ydrogen ion (acidosis)
- **H**ypo-/hyperkalemia
- **H**ypothermia
- **T**ension pneumothorax
- **T**amponade, cardiac
- **T**oxins
- **T**hrombosis, pulmonary
- **T**hrombosis, coronary

Pediatric Cardiac Arrest Algorithm



CPR Quality

- Push hard (≥⅓ of anteroposterior diameter of chest) and fast (100-120/min) and allow complete chest recoil
- Minimize interruptions in compressions
- Change compressor every 2 minutes, or sooner if fatigued
- If no advanced airway, 15:2 compression-ventilation ratio
- If advanced airway, provide continuous compressions and give a breath every 2-3 seconds

Shock Energy for Defibrillation

- First shock 2 J/kg
- Second shock 4 J/kg
- Subsequent shocks ≥4 J/kg, maximum 10 J/kg or adult dose

Drug Therapy

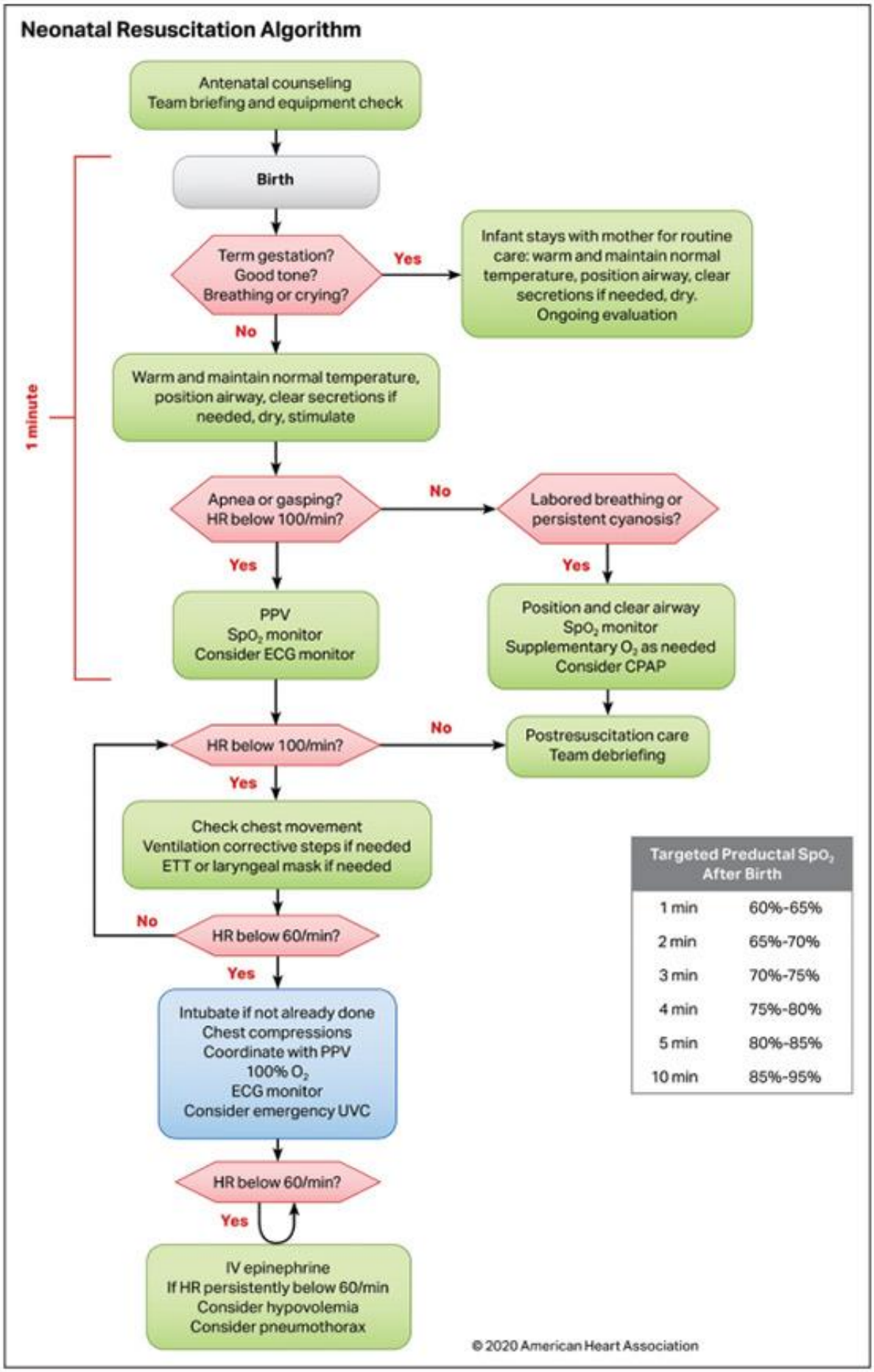
- **Epinephrine IV/IO dose:** 0.01 mg/kg (0.1 mL/kg of the 0.1 mg/mL concentration). Max dose 1 mg. Repeat every 3-5 minutes. If no IV/IO access, may give endotracheal dose: 0.1 mg/kg (0.1 mL/kg of the 1 mg/mL concentration).
- **Amiodarone IV/IO dose:** 5 mg/kg bolus during cardiac arrest. May repeat up to 3 total doses for refractory VF/pulseless VT
  or
  Lidocaine IV/IO dose: Initial: 1 mg/kg loading dose

Advanced Airway

- Endotracheal intubation or supraglottic advanced airway
- Waveform capnography or capnometry to confirm and monitor ET tube placement

Reversible Causes

- **H**ypovolemia
- **H**ypoxia
- **H**ydrogen ion (acidosis)
- **H**ypoglycemia
- **H**ypo-/hyperkalemia
- **H**ypothermia
- **T**ension pneumothorax
- **T**amponade, cardiac
- **T**oxins
- **T**hrombosis, pulmonary
- **T**hrombosis, coronary


Neonatal Resuscitation Algorithm
Antenatal counseling
Team briefing and equipment check
Birth
Term gestation?
Good tone?
Breathing or crying?
Yes
Infant stays with mother for routine care: warm and maintain normal temperature, position airway, clear secretions if needed, dry.
Ongoing evaluation
No
Warm and maintain normal temperature, position airway, clear secretions if needed, dry, stimulate
1 minute
Apnea or gasping?
HR below 100/min?
No
Labored breathing or persistent cyanosis?
Yes
Yes
PPV
SpO2 monitor
Consider ECG monitor
Position and clear airway
SpO2 monitor
Supplementary O2 as needed
Consider CPAP
HR below 100/min?
No
Postresuscitation care
Team debriefing
Yes
Check chest movement
Ventilation corrective steps if needed
ETT or laryngeal mask if needed
No
HR below 60/min?
Yes
Intubate if not already done
Chest compressions
Coordinate with PPV
100% O2
ECG monitor
Consider emergency UVC
HR below 60/min?
Yes
IV epinephrine
If HR persistently below 60/min
Consider hypovolemia
Consider pneumothorax
Targeted Preductal SpO2 After Birth
1 min 60%-65%
2 min 65%-70%
3 min 70%-75%
4 min 75%-80%
5 min 80%-85%
10 min 85%-95%
© 2020 American Heart Association

2. Myocardial Infarction/Acute Coronary Syndrome

Basics

- **Calm** and **reassure** patient – **minimize stress**, ensure **comfort.**
- Minimize **on-scene time**.
- Transport to appropriate **PCI** facility – **phone ahead**.
- Prepare for **resuscitation** (i.e. apply pads).
- History of **risk factors**: Age, Obesity, Smoking, Hypertension, Hypercholesterolaemia, Diabetes, Familial History.
- Identify **time** of symptom **onset**.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• Low flow	• Consult cardiology	• SpO2 ≥90%
Aspirin	• 162-325mg PO		• Known allergy • Active pathological bleeding • Children <18yrs • Pregnancy • Renal transplant or severe impairment
Clopidogrel	• 300mg PO		• Known allergy • Active pathological bleeding • Safety in pregnancy and children <18yrs unknown
Glyceryl Trinitrate	• 0.4mg SL every 5min (max 3 tablets or sprays)		• Known allergy • Children • Hypotension • Phosphodiesterase inhibitors in past 48hrs • Bradycardia/severe tachycardia • Right, inferior, ventricular MI (relative)
Morphine	• 2-4mg IV (repeat as needed)		• Known allergy
Fentanyl	• 1-2mcg/kg IV (repeat as needed)		• Known allergy
Entonox	• Inhaled via self-administration		• Neurologic impairment • Air entrapment • Hypotension
IV Nitrates*	• 10-20mcg/min IV infusion (consult only)		• As per GTN

Enoxaparin	• Unstable Angina/NSTE-ACS: 1mg/kg SC every 12 hours
	• STEMI:
	  ○ <75yrs: 30mg IV and 1mg/kg SC 15min after thrombolytic
	  ○ >75yrs: 0.75mg/kg SC
			• Known allergy
			• Active pathological bleeding
			• Heparin-induced or other thrombocytopenia
			• Severe hypertension
			• Hepatic disease
			• Haemophilia

Other relevant medications: **Benzodiazepines** (Cocaine ACS), **Heparin** (Enoxaparin Unavailable).			

Fluid Therapy

- Avoid routine fluid therapy.
- Warmed, crystalloid bolus(es) in right inferior ventricular infarcts with hypotension.

Procedures

- ABG – assess cTnT (normal = <0.01ng/ml), cTnI (normal = <0.04ng/ml).
- Repetitive 12-lead ECGs – add reverse and posterior leads.
- Auscultate heart sounds:
  - Aortic area: right, 2nd intercostal space, mid-clavicular line.
  - Pulmonary area: left, 2nd intercostal space, mid-clavicular line.
  - Mitral/Tricuspid area: left, 5th intercostal space, mid-clavicular line.
  - Apex: left, 4th or 5th intercostal space, 1cm medial to mid-clavicular line.
- Thrombolysis (see *Procedures* section).

3. Bradyarrhythmias

Basics

- **Pathological** or **Physiological**? HR usually **<50bpm** (adult) if bradyarrhythmia.
- **Stable** or **Unstable**? Monitor and observe if stable/asymptomatic.
- Treat the **underlying cause first!** (i.e. hypoxia, drugs/toxins, electrolyte imbalance, ACS).
- **Calm** and **reassure** patient if possible.
- Consult **cardiologist**.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• *Pro re nata*	• *Pro re nata*	• None
Atropine	• 1mg IV every 3-5min (max 3mg)	• 0.02mg/kg IV every 3-5min (max single dose 0.5mg, max total dose 1mg)	• Neonates • Second-degree type II and third-degree AV blocks
Adrenaline	• 0.1-1mcg/kg/min IV infusion • 2-10mcg/min IV infusion may be used initially	• 0.01mg/kg IV every 3-5min	• None
Other relevant medications: **Morphine** and **Midazolam** (analgesia and sedation for TCP).			

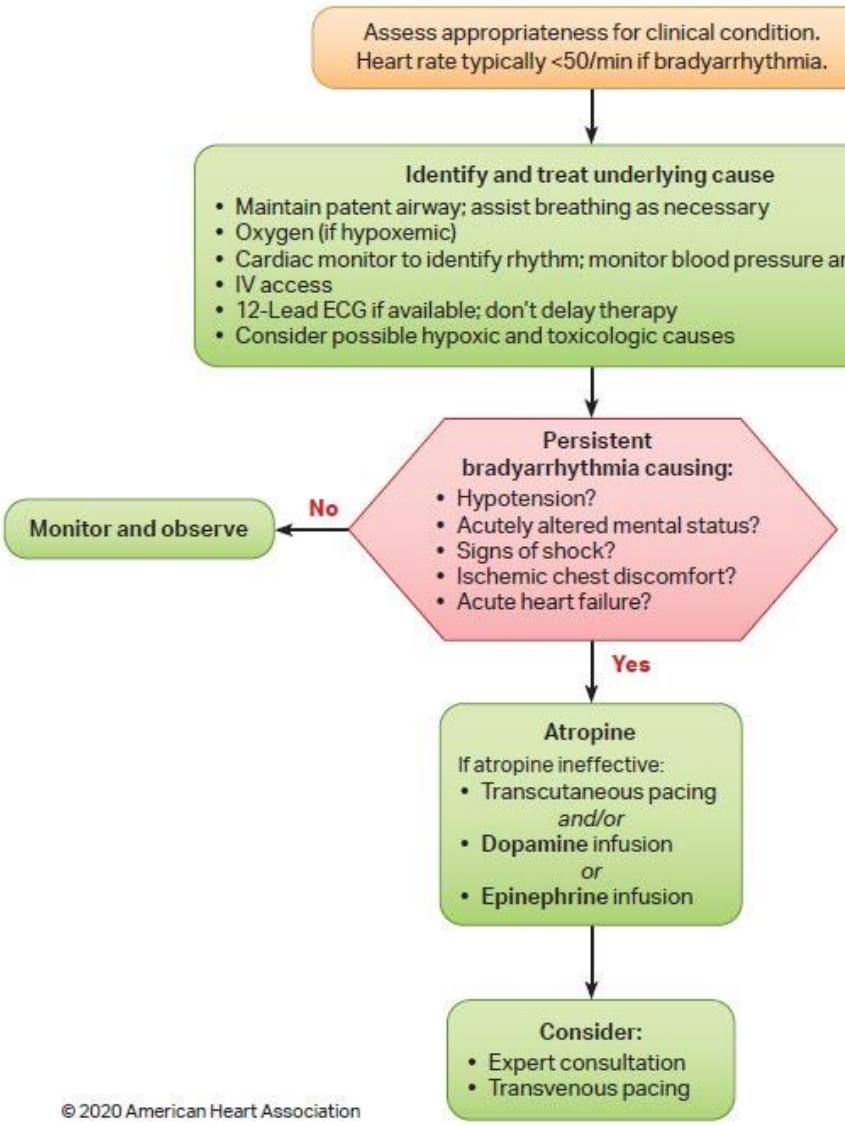
Fluid Therapy

- Warmed crystalloid in small aliquots may be considered depending on cause/comorbidities.

Procedures

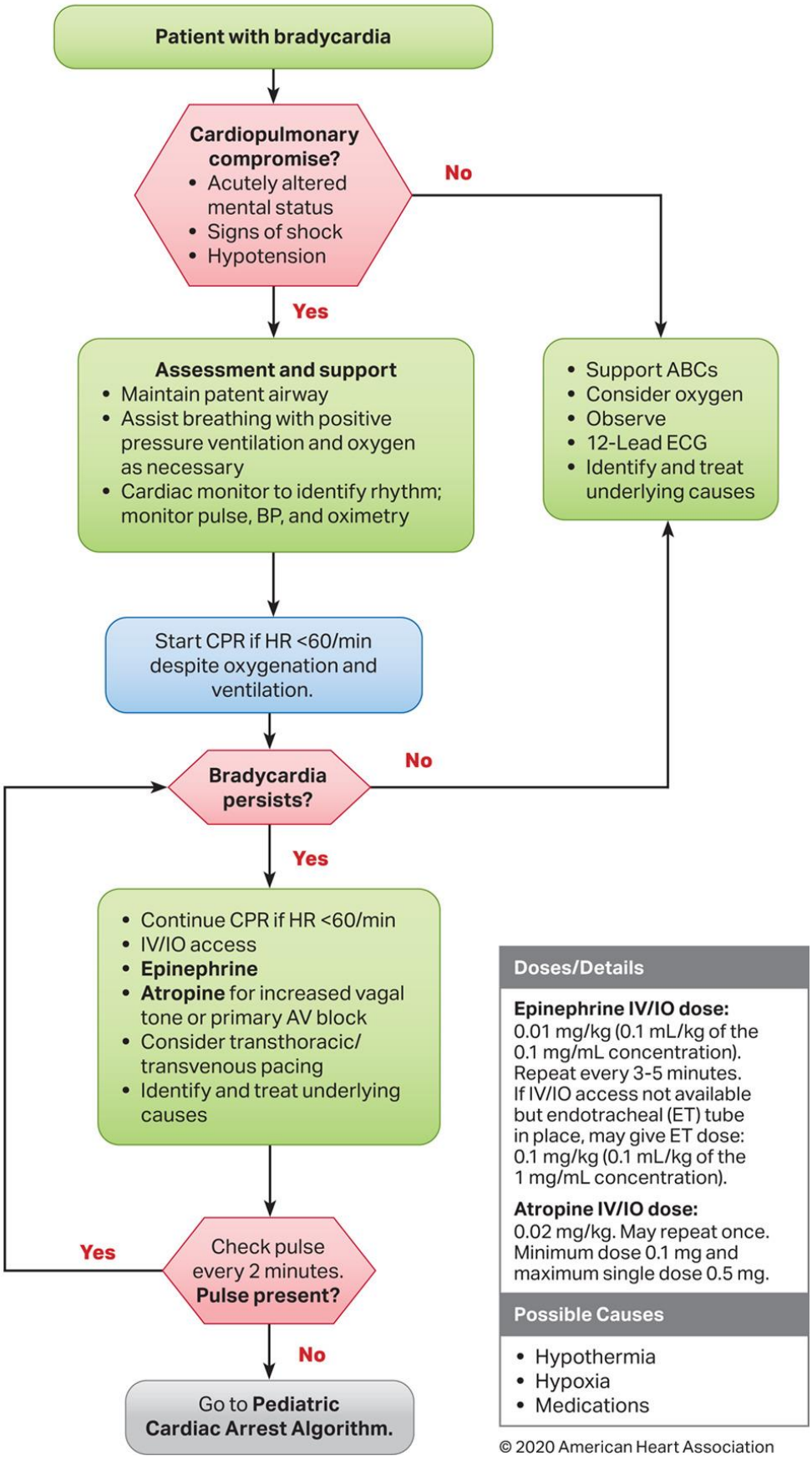
- 12-lead ECG before and after management.
- TCP (fixed or demand) – adrenaline may be used in conjunction if patient remains haemodynamically unstable.
- CPR in paeds with HR<60bpm.

Adult Bradycardia Algorithm



Doses/Details
Atropine IV dose: First dose: 1 mg bolus. Repeat every 3-5 minutes. Maximum: 3 mg.
Dopamine IV infusion: Usual infusion rate is 5-20 mcg/kg per minute. Titrate to patient response; taper slowly.
Epinephrine IV infusion: 2-10 mcg per minute infusion. Titrate to patient response.
Causes: • Myocardial ischemia/ infarction • Drugs/toxicologic (eg, calcium-channel blockers, beta blockers, digoxin) • Hypoxia • Electrolyte abnormality (eg, hyperkalemia)

Pediatric Bradycardia With a Pulse Algorithm



4. Tachyarrhythmias

Basics

- **Pathological** or **Physiological**? HR usually **>150bpm** (adult) if tachyarrhythmia.
- **Stable** or **Unstable**? Consider simply monitoring an asymptomatic patient.
- **Narrow** or **Wide** complex? Wide QRS complex: **>0.1sec** (100msec).
- Treat the **underlying cause first!** (i.e. hypoxia, drugs/toxins, electrolyte imbalance).
- **Calm** and **reassure** patient if possible.
- Consult **cardiologist**.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• *Pro re nata*	• *Pro re nata*	• None
Adenosine	• 6mg IV (may repeat twice: 12mg every 2min)	• 0.1mg/kg IV (may repeat: 0.2mg/kg)	• Known allergy • SSS and WPW • AV blocks • Drug/toxin induced tachycardia • Afib/Aflutter • Transplanted hearts • Unstable asthmatics
Amiodarone	• 150mg/10min IV, repeat as needed • 1mg/min IV maintenance infusion (for 6hrs)	• 5mg/kg IV over 20-60min • Expert consult advised	• AV block • Sino-atrial block • Iodine allergy • Lignocaine use • Prolonged QT
Lignocaine	• 1mg/kg IV (0.5mg/kg repeat dose) • 1-4mg/min IV maintenance infusion	• 1mg/kg IV (0.5mg/kg repeat dose) • 20-50mcg/kg/min IV maintenance infusion • Expert consult advised	• Known allergy • Amiodarone use • AV blocks • Hypotension not due to ventricular arrythmia • Sinus node dysfunction • Accelerated idioventricular rhythm
Sotalol*	• 100mg (1.5mg/kg) IV over 5min (consult only)	• N/A	• Asthma and Diabetes • AV blocks • SSS • LV hypertrophy/heart failure • Prolonged QT
Other relevant medications: **Morphine** and **Midazolam** (analgesia and sedation for Synchronised Cardioversion).			

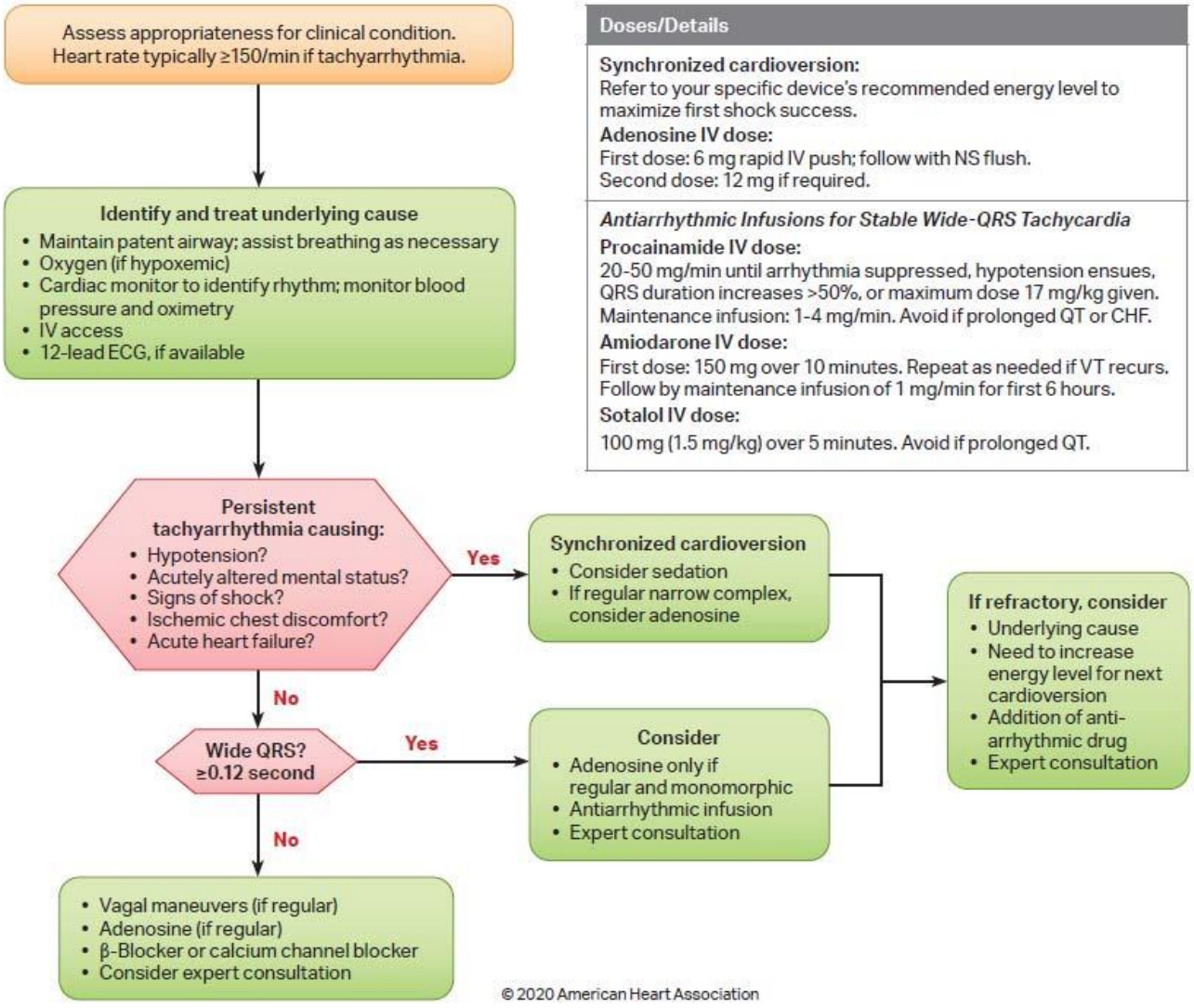
Fluid Therapy

- Warmed crystalloid in small aliquots may be considered depending on cause/comorbidities.

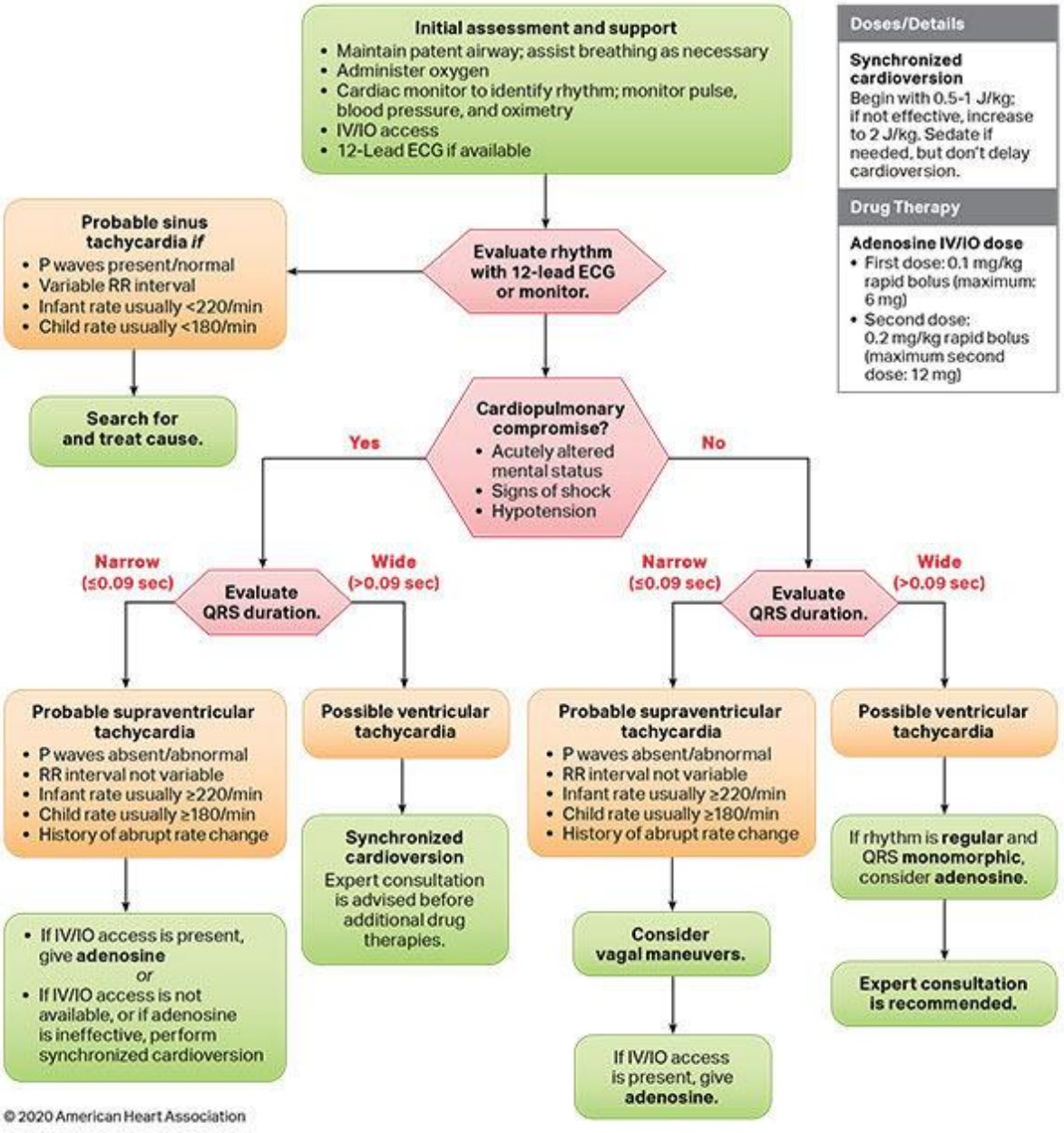
Procedures

- 12-lead ECG before and after management.
- Vagal Manoeuvres – modified Valsalva most effective.
- Synchronised Cardioversion (Initial: Adults 50-100J, Paeds 0.5-1J/kg, may increase to 2J/kg).
- *Stable, Narrow Complex:* Vagal Manoeuvres → Adenosine → Amiodarone.
- *Unstable, Narrow Complex:* Synchronised Cardioversion → Amiodarone.
- *Stable, Wide Complex:* Amiodarone/Procainamide/Sotalol.
- *Unstable, Wide Complex:* Synchronised Cardioversion → Amiodarone.
- *Life-threatening PVCs:* Lignocaine.

Adult Tachycardia With a Pulse Algorithm



Pediatric Tachycardia With a Pulse Algorithm



5. Hypertension

Basics

- Thorough **history** including duration and severity of hypertension.
- Identify likely **cause**: renal failure, toxins, genetics, medication default, etc.
- **Symptomatic**? (i.e. neurologic dysfunction, visual disturbances, pulmonary oedema, end-organ dysfunction).
- Measure BP **sitting**, **standing** and in **both arms**.
- Malignant Hypertension: **SBP ≥180mmHg** or **DBP ≥120mmHg**. These levels likely require management.
- Balance **benefit** of immediate decrease in BP against **risk** of decreasing end-organ perfusion.
- Education on **lifestyle changes** (i.e. if diet and exercise are causal).
- Consult **cardiologist** or other related specialist.
- **Calm** and **reassure** patient – minimize **stress**, ensure **comfort**.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Labetalol*	• 20mg/hr (may double dose every 30min, max 160mg/hr – consult only)	• Consult cardiology	• Asthma and Diabetes • Depression • AV blocks • Myasthenia Gravis • Bradycardia • Heart failure • Emphysema
Hydralazine*	• 10mg PO (consult only) • 5-10mg IV/IM followed by 0.5-10mg/hr IV infusion (consult only)		• Coronary Artery Disease • Stroke • Increased ICP • Decreased blood volume
Sotalol*	• 100mg (1.5mg/kg) IV over 5min (consult only)		• Asthma and Diabetes • AV blocks • SSS • LV hypertrophy/heart failure • Prolonged QT
Other relevant medications: **Nifedipine*** (primarily used in pregnancy – consult only).			

Fluid Therapy

- Avoid bolus dose fluid and fluid overload.

Procedures

- With an emergent condition (i.e. aortic dissection, severe preeclampsia, pheochromocytoma crisis), lower SBP to below 140mmHg during the first hour and to below 120mmHg in aortic dissection.
- Without an emergent condition, reduce SBP to a maximum of 25% within the first hour; then, if patient stable, lower BP to 160/110mmHg over the next 2-6 hours, and then cautiously to normal over the following 24-48 hours.

BLOOD PRESSURE CATEGORY	SYSTOLIC mm Hg (upper number)		DIASTOLIC mm Hg (lower number)
NORMAL	LESS THAN 120	and	LESS THAN 80
ELEVATED	120 – 129	and	LESS THAN 80
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 1	130 – 139	or	80 – 89
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 2	140 OR HIGHER	or	90 OR HIGHER
HYPERTENSIVE CRISIS (consult your doctor immediately)	HIGHER THAN 180	and/or	HIGHER THAN 120

B. Respiratory

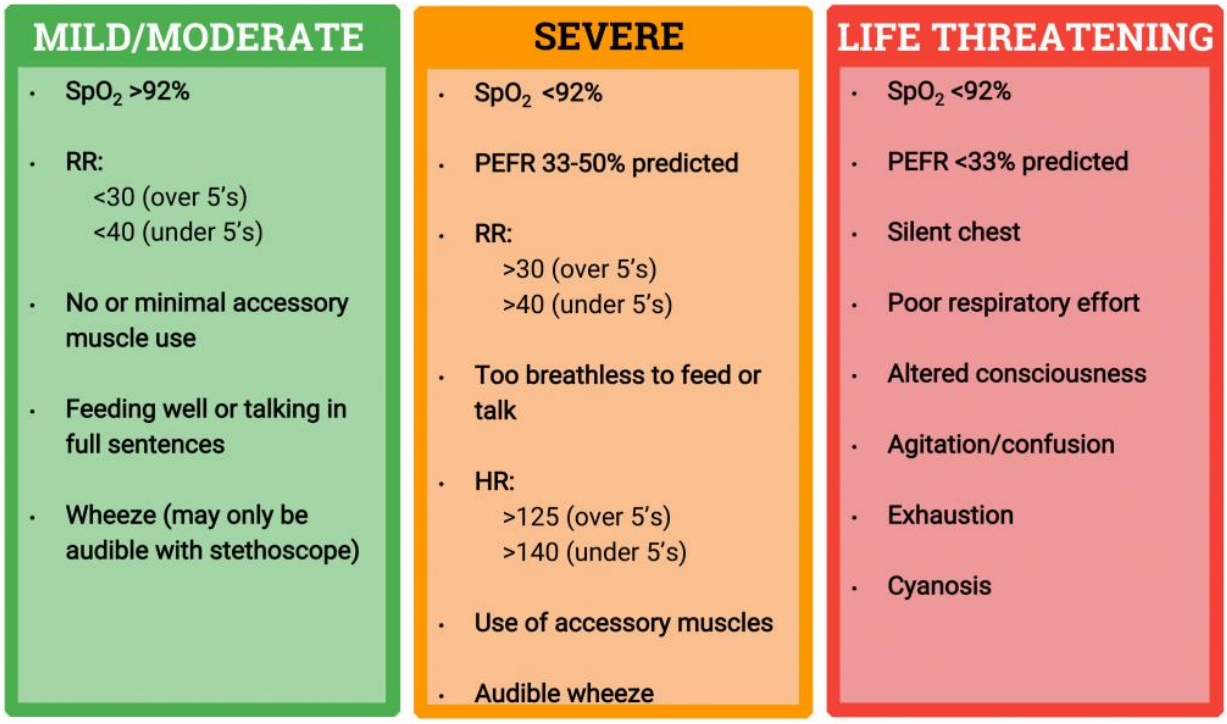
1. Asthma/COPD

Basics

- **Calm** and **reassure** patient while ensuring **comfortable** positioning (**avoid supine**).
- Remove **allergen** if still present.
- Encourage use of personal **pump/spacer** device.
- Assess **blood sugar** and **hydration** status.
- Determine **severity** (adult and paed):

Mild/Moderate	Severe	Life-Threatening
• PEF >50% predicted or personal best • Dyspnea limiting activity • Talks in phrases or sentences • Prefers sitting to lying • Possible Accessory Muscle use • SpO2 >90% on Room Air • Heart rate <120	• PEF ≤50% predicted or personal best • Dyspnea at rest • Sits hunched forward • Talks in words • Agitated, diaphoretic • Accessory Muscle use • SpO2 may be <90% on Room Air • Respiratory rate >30 • Heart rate >120	• PEF <25% predicted or personal best • Too dyspneic to speak • Depressed mental status • Cyanosis • Inability to maintain respiratory effort • Absent breath sounds • Minimal or no relief from frequent inhaled SABA • Bradycardia or Hypotension

Adapted from: References 1,3,4,6. PEF = Peak Expiratory Flow, SABA = Short Acting Beta Agonist



Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• Nebulised	• Nebulised	• None
β2 Stimulants	• Fenoterol: 1.25mg Neb (repeat continuously) • Salbutamol: 5mg Neb (repeat continuously)	• Fenoterol: 0.5mg Neb (repeat continuously)	• Known allergy • Neonates
Ipratropium Bromide	• 0.5mg Neb	• >5yrs: 0.5mg Neb • 1-5yrs: 0.25mg Neb • <1yr: 0.125mg Neb	• Known allergy
Corticosteroids	• Hydrocortisone: 5mg/kg IV (200-500mg) • Methylprednisolone: 125mg IV • Prednisolone: 1mg/kg PO	• Hydrocortisone: 5mg/kg IV (max 200mg) • Methylprednisolone: 1mg/kg IV (max 30mg) • Prednisolone: 1mg/kg PO	• None
Magnesium Sulphate	• 1-2g IV over 10-20min	• 25-50mg/kg IV over 10-20min (max dose 2g)	• None
Adrenaline	• 0.3-0.5mg IM/SC every 20min (max 3 doses)	• 0.01mg/kg IM/SC every 20min (max 0.3mg per dose, max 3 doses)	• None
Other relevant medications: **Morphine** (anxiolysis for dyspnoea).			

Fluid Therapy

- Only administer fluids if necessary – prolonged dyspnoea may result in dehydration.

Procedures

- Consider use of Peak Flow Meter in mild cases (see reference material).
- RSI as a last resort in severe cases.
- In-line nebulisation.

2. Pulmonary Oedema

Basics

- **Calm** and **reassure** patient while ensuring **comfortable** positioning (**avoid supine**).
- Identify likely **cause**: CHF, toxins, altitude changes, drowning, etc.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• High or low flow • CPAP	• High or low flow • CPAP	• CPAP: pneumothorax, severe nausea/vomiting/secretions, severe air trapping pathology, facial/oesophageal/gastric surgery
Glyceryl Trinitrate	• 0.4mg SL every 5min (max 3 tablets or sprays)	• N/A	• Known allergy • Children • Hypotension • Phosphodiesterase inhibitors in past 48hrs • Bradycardia/severe tachycardia • Right ventricular MI
Furosemide	• 0.5-1mg/kg IV	• 0.5-1mg/kg IV	• Known allergy • Hypotension, hypovolaemia, dehydration • Hypokalaemia
Morphine	• 0.025-0.05mg/kg IV	• 0.025-0.05mg/kg IV	• Known allergy
IV Nitrates*	• 50-200mcg/min IV infusion (consult only)	• (consult only)	• As per GTN
Other relevant medications: **Anti-hypertensives*** (should hypertension be causative), **Adrenaline** (decompensated CHF), **Midazolam** and **Morphine** (anxiolysis for dyspnoea/CPAP).			

Fluid Therapy

- Avoid bolus dose fluid and fluid overload. If hypotensive, a small 5ml/kg fluid challenge may be considered, however, use with caution.

Procedures

- Non-Invasive Ventilation: CPAP (delivery of PEEP highly beneficial).
- RSI with invasive ventilation as a last resort.
- ETT suctioning.
- Urinary catheterisation.

3. Pulmonary Embolism

Basics

- Consider presence of PE in **high-risk** patients: DVT, coagulopathies, pregnancy, post-operative, traumatic conditions, etc.
- **Rapid transport** to appropriate facility.
- Calculate probability (**Revised Geneva Score**):

Variable	Score
Age 65 years or over	1
Previous DVT or PE	3
Surgery or fracture within 1 month	2
Active malignant condition	2
Unilateral lower limb pain	3
Haemoptysis	2
Heart rate 75–94 beats per minute	3
Heart rate 95 or more beats per minute	5
Pain on deep palpation of lower limb and unilateral edema	4

0–3 Points indicates low probability.
4–10 Points indicates intermediate probability.
11 Points or more indicates high probability.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• High or low flow	• High or low flow	• None
Enoxaparin	• 1mg/kg SC every 12hrs	• Expert consult	• Known allergy • Active pathological bleeding • Heparin-induced or other thrombocytopenia • Severe hypertension • Hepatic disease • Haemophilia
Other relevant medications: **Analgesics** (pain/discomfort/anxiety).			

Fluid Therapy

- No specific indication.

Procedures

- 12-lead ECG.

4. Tuberculosis

Basics

- Extra **safety precautions**: PPE and well-ventilated space.
- Encourage **expectoration**.
- **Position** patient comfortably.
- Education regarding condition, management thereof and **lifestyle changes** if necessary.
- TB **not purely** a lung pathology and may be present elsewhere.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• High or low flow	• High or low flow	• None
Other relevant medications: **Analgesics** (pain/discomfort/pyrexia/anxiety).			

Fluid Therapy

- Only administer fluids if necessary – TB may present with dehydration of varying severities.

Procedures

- Airway management and mechanical ventilation only in severe cases.

5. Pneumonia

Basics

- Extra **safety precautions**: PPE and well-ventilated space.
- Encourage **expectoration**.
- **Position** patient comfortably.
- Education regarding condition, management thereof and **community acquired** pneumonia.
- May complicate with **pleural effusion**.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• High, low flow or Neb	• High, low flow or Neb	• None
Other relevant medications: **Analgesics** (pain/discomfort/pyrexia/anxiety), **β2 stimulants** and **Ipratropium Bromide** (bronchospasm).			

Fluid Therapy

- Only administer fluids if necessary – Pneumonia may present with dehydration of varying severities.

Procedures

- Airway management and mechanical ventilation only in severe cases.

C. Neurologic

1. Seizures/Convulsions

Basics

- **Protect** patient from **environment**.
- Turn lateral for **airway protection** (suctioning post-convulsion if necessary).
- Look for **causes**:
    - Hypoglycaemia
    - Hyperthermia
    - Hypoxia
    - Drugs/toxins
    - Trauma
    - Infection
    - Electrolyte imbalance
    - Medication default
    - Developmental pathology (e.g. cerebral palsy)
- Re-assess **primary survey** after each convulsion.
- **Calm** and **reassure** family members.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• High, low flow, BVM	• High, low flow, BVM	• None
Lorazepam	• 0.1mg/kg IV	• 0.05-0.1mg/kg IV	• Known allergy
Diazepam	• 5mg IV (max total 20mg)	• 0.05-0.1mg/kg IV (max single dose 5mg, may be repeated once)	• Known allergy
Midazolam	• 0.15mg/kg IV • 0.15-0.4mg/kg IM	• 0.15mg/kg IV/IM • 0.4mg/kg IN/Buccal	• Known allergy
Other relevant medications: **Ketamine** (refractory seizures), **Dextrose** (hypoglycaemia).			

Note: For febrile seizures, avoid immediate BZD use.

Fluid Therapy

- Only administer fluids if necessary – Seizures may be linked with dehydration.

Procedures

- RSI only as last resort.

2. Stroke

Basics

- **Calm** and **reassure** patient – ensure **comfort** and **communication**.
- Assess for **neurologic deficits**.
- May be elevated **ICP** – maintain adequate oxygenation, MAP, ETCO2.
- **Minimize** on-scene time.
- Transport to appropriate facility – **phone ahead**.
- Identify **time** of symptom **onset**.
- Cincinnati Prehospital **Stroke Scale** (abnormal finding = 72% increased likelihood of stroke):

Facial droop (the patient shows teeth or smiles)	
Normal	**Abnormal**
Both sides of the face move equally.	One side of the face doesn't move as well as the other.
Arm drift (the patient closes their eyes and extends both arms straight out for 10 seconds)	
Normal	**Abnormal**
Both arms move the same, or both arms don't move at all.	One arm either doesn't move, or one arm drifts down compared to the other.
Speech (the patient repeats "The sky is blue in Cincinnati")	
Normal	**Abnormal**
The patient says the correct phrase with no slurring of words.	The patient slurs words, says the wrong words or is unable to speak.

Pharmacotherapy

Medication	Adult	Paediatric	**Contra-Indications**
• None specific			
Relevant medications: **Oxygen** (hypoxaemia), **Benzodiazepines** (seizures), **Anti-hypertensives** (hypertension), **Analgesics** (pain/discomfort), **Dextrose** (hypoglycaemia).			

Fluid Therapy

- No specific indication.

Procedures

- 12-lead ECG.
- RSI if necessary.

D. Immunologic

1. Anaphylaxis

Basics

- **Calm** and **reassure** patient, ensuring comfortable **positioning** (avoid supine in case of dyspnoea).
- Remove **allergen** if still present.
- Encourage use of personal **pump/spacer** device and/or **epi-pen**.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• Neb	• Neb	• None
Adrenaline	• 0.5mg IM every 5-15min. • 1-4mg Nebulised (upper airway involvement)	• 0.01mg/kg IM every 5-15min (max single dose 0.5mg) • 1-4mg Nebulised (upper airway involvement)	• None
β2 Stimulants	• Fenoterol: 1.25mg Neb (repeat continuously) • Salbutamol: 5mg Neb (repeat continuously)	• Fenoterol: 0.5mg Neb (repeat continuously)	• Known allergy • Neonates
Ipratropium Bromide	• 0.5mg Neb	• >5yrs: 0.5mg Neb • 1-5yrs: 0.25mg Neb • <1yr: 0.125mg Neb	• Known allergy
Corticosteroids	• Hydrocortisone: 5mg/kg IV (200-500mg) • Methylprednisolone: 125mg IV • Prednisolone: 1mg/kg PO	• Hydrocortisone: 5mg/kg IV (max 200mg) • Methylprednisolone: 1mg/kg IV (max 30mg) • Prednisolone: 1mg/kg PO	• None
Promethazine	• 25mg IV/IM	• >12yrs: 25mg IV/IM • 6-12yrs: 12.5mg IV/IM • 2-5yrs: 6.25mg IV/IM	• Known allergy • Children <2yrs
Glucagon	• 1-2mg IV/IM every 5min	• 20mcg/kg IV/IM (max 1mg)	• Known allergy (includes: beef, pork) • Phaeochromocytoma • Unknown safety in pregnancy
Other relevant medications: **Anti-emetics** (persistent nausea/vomiting).			

Fluid Therapy

- Warmed 10ml/kg crystalloid bolus(es) for hypotension.

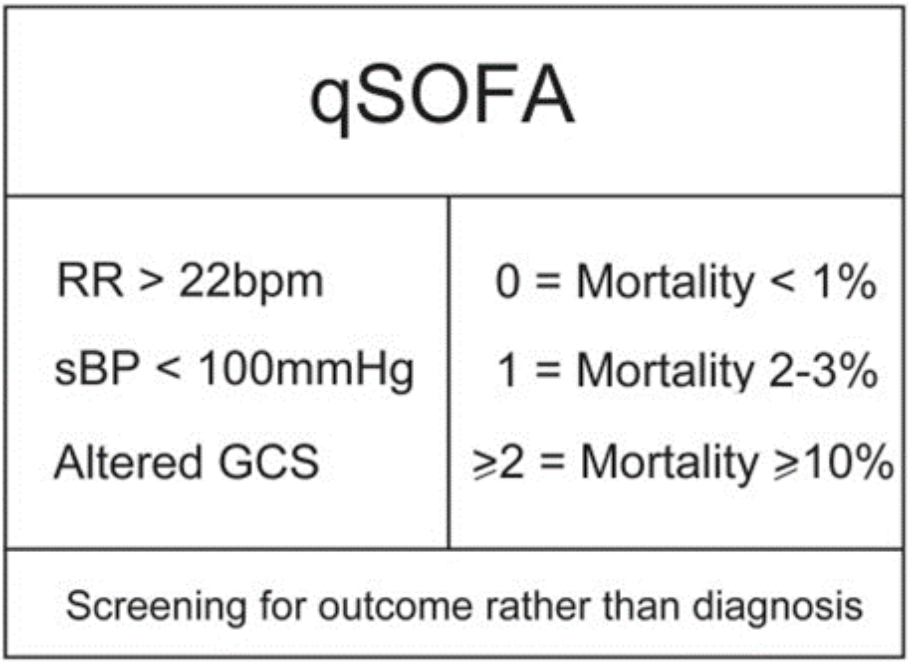
Procedures

- RSI if necessary.
- In-line nebulisation.

2. Sepsis

Basics

- Identify type and site of infection – **source control**.
- Thorough **history** (i.e. travel).
- **Antibiotics** asap – **minimize** on-scene time.
- Assess **blood glucose** and **temperature**.
- Maintain **sterility** where possible.



Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• High or low flow	• High or low flow	• None
Adrenaline	• 0.1-1mcg/kg/min IV infusion	• 0.1-1mcg/kg/min IV infusion	• None
Paracetamol	• 1g IV over 15-30min (max 3g/day)	• 15-20mg/kg IV over 15-30min (max 75mg/kg/day)	• Known allergy • Severe hepatic/renal impairment
Other relevant medications: **Dextrose** (hypoglycaemia).			

Fluid Therapy

- Individualize fluid therapy. Warmed 10ml/kg crystalloid bolus(es) for hypotension may be required.

Procedures

- Urinary catheterisation (aim for normal urine output: ≥0.5ml/kg/hr).
- ABG – identify lactate (normal = 0.5-2mmol/L).
- RSI and mechanical ventilation if necessary.

E. Endocrine/Metabolic

1. Diabetic Ketoacidosis/Hyperkalaemia

Basics

- **Kussmaul** breathing and 'fruity' **breath odour**.
- **Monitor** ECG, ETCO2 and blood glucose **continually**.
- Beware of **stroke risk**.
- Education regarding condition, management thereof and **lifestyle changes** if necessary.
- Normal **Potassium**: 3.5 - 5mmol/L.
- Normal **Blood Sugar**: 3.5 - 7.0mmol/L.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• *Pro re nata*	• *Pro re nata*	• None
β2 Stimulants	• Fenoterol: 5mg Neb • Salbutamol: 20mg Neb	• Fenoterol: 0.5mg Neb	• Known allergy • Neonates
Calcium Chloride	• 10ml of 10% solution IV over 10min	• 0.2ml/kg of 10% solution IV over 0.2ml/min	• Neonates
Other relevant medications: **Sodium Bicarbonate** (protracted PEA/shift), **Furosemide** (excrete).			

Note: only administer β2 Stimulants and Calcium Chloride if hyperkalaemic ECG changes are present (peaked T-waves, flattened P-waves, broadened QRS complexes) or if ABG results available. ***Protect:*** *Calcium Chloride.* ***Shift:*** *Insulin, Dextrose, β2 Stimulants, Sodium Bicarbonate.* ***Excrete:*** *Furosemide, Dialysis.*

Fluid Therapy

- Warmed 10ml/kg crystalloid bolus(es) for rehydration and renal protection.

Procedures

- ABG.
- Urinary catheterisation.
- RSI and mechanical ventilation (if this becomes necessary, avoid increases in ETCO2 and prolonged removal of compensatory respirations).

2. Hypoglycaemia

Basics

- Turn lateral for **airway protection** (suctioning if necessary).
- Identify **cause**.
- Provide **complex carbohydrate** to prevent **rebound hypoglycaemia**.
- Education regarding condition, management thereof and **lifestyle changes** if necessary.
- Sugar should be provided by **minimally invasive** means where possible (i.e. sugar water, coke).
- Normal **Blood Sugar**: 3.5-7.0mmol/L.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• High or low flow	• High or low flow	• None
Glucose	• 25g PO/Buccal (repeat as necessary)	• 25g PO/Buccal (repeat as necessary)	• None
Dextrose 50%	• 1ml/kg diluted to 10% solution IV (repeat as necessary)	• 1ml/kg diluted to 10% solution IV (repeat as necessary)	• None
Glucagon	• 1-2mg IM/IV/SC	• <20kg: 0.5mg IM/IV/SC • >20kg: 1mg IM/IV/SC	• Known allergy (includes: beef, pork) • Phaeochromocytoma • Unknown safety in pregnancy
Thiamine	• 100mg IM	• 25-50mg IM	• None

Fluid Therapy

- No specific indication, though dehydration may also be present.

Procedures

- None specific.
- NGT an option, however, not for routine or first-line use.

F. Toxicologic

1. Organophosphates

Basics

- **Cholinergic** toxidrome.
- Identify **causative agent** and **route of exposure**.
- Turn lateral for **airway protection** (suctioning as necessary).
- **Decontaminate** patient, equipment, yourself and others.
- Risk of **seizures** exists.
- **Signs**:
    - Diarrhoea, diaphoresis
    - Urination
    - Miosis
    - Bradycardia, bronchosecretions
    - Emesis
    - Lacrimation
    - Lethargy
    - Salivation
    - Tremors/Fasciculations
    - Hypotension
    - Unique odour

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• High flow, BVM	• High flow, BVM	• None
Atropine	• 2mg IV (repeat every 5min with doubling doses)	• <12yrs: 0.05mg/kg IV (repeat every 5min with doubling doses) • >12yrs: 1mg IV (repeat every 5min with doubling doses)	• Neonates • Second-degree type II and third-degree AV blocks
Other relevant medications: **Benzodiazepines** (seizures).			

Fluid Therapy

- Warmed 10ml/kg crystalloid bolus(es) for rehydration and correction of hypotension.

Procedures

- NGT.
- RSI in severe cases (avoid Succinylcholine).
- ETT suctioning.

2. BB/CCBs

Basics

- Identify **causative agent** and **route of exposure**.
- Turn lateral for **airway protection** (suctioning if necessary).
- **Signs:**
  - Bradycardia
  - Hypotension
  - Decreased LOC

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• Low or High flow	• Low or High flow	• None
Glucagon	• 3-5mg IV followed by 3mg/hr IV infusion	• 50-150mcg/kg IV followed by 50mcg/kg/hr IV infusion	• Known allergy (includes: beef, pork) • Phaeochromocytoma • Unknown safety in pregnancy
Calcium Chloride	• 10ml of 10% solution IV over 10min	• 0.2ml/kg of 10% solution IV over 0.2ml/min	• Neonates
Adrenaline	• 0.1-1mcg/kg/min IV infusion • 2-10mcg/min IV infusion may be used initially	• 0.1-1mcg/kg/min IV infusion	• None
Other relevant medications: **Activated Charcoal** (oral OD), **β2 Stimulants** (bronchospasm).			

Fluid Therapy

- No specific indication.

Procedures

- 12-lead ECG.
- NGT.

3. Opioids

Basics

- **Opioid** toxidrome.
- Identify **causative agent** and **route of exposure**.
- Turn lateral for **airway protection** (suctioning if necessary).
- Beware of **withdrawal reactions**.
- **Signs:**
    - Cardiovascular depression
    - Decreased LOC
    - Miosis
    - Respiratory depression
    - Vomiting

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• BVM/BVT	• BVM/BVT	• None
Naloxone	• 0.4mg IV/IM (repeat every 5min up to max 2mg)	• 0.1mg/kg IV/IM (repeat every 5min up to max 2mg)	• Known allergy
Other relevant medications: **Activated Charcoal** (oral OD).			

Fluid Therapy

- No specific indication.

Procedures

- None specific.
- ETI for airway protection may be required.
- NGT.

4. Benzodiazepines

Basics

- **Sedative/Hypnotic** toxidrome.
- Identify **causative agent** and **route of exposure**.
- Turn lateral for **airway protection** (suctioning if necessary).
- **Signs:**
  - Cardiovascular depression
  - Respiratory depression
  - Decreased LOC.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• BVM/BVT	• BVM/BVT	• None
Flumazenil	• 0.2mg IV (repeat 0.1mg every min up to max 1mg)	• >1yr: 0.01mg/kg IV (max single dose 0.2mg, repeat dose every min up to max 1mg)	• Known allergy • TCA or mixed drug OD • High risk of convulsions • Children <1yr
Other relevant medications: **Activated Charcoal** (oral OD).			

Note: In general, Flumazenil should be reserved for cases of pure BZD overdoses in BZD naïve patients or in iatrogenic causes of overdose.

Fluid Therapy

- No specific indication.

Procedures

- None specific.
- ETI for airway protection may be required.
- NGT.

5. Cocaine

Basics

- **Sympathomimetic** toxidrome.
- Identify **causative agent** and **route of exposure**.
- Beware of **ACS** risk.
- **Signs:**
  - Increased HR and BP
  - Increased RR
  - Mydriasis
  - Paranoia, agitation, aggression

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• Low flow	• Consult cardiology	• None
Aspirin	• 150-300mg PO		• Known allergy • Active pathological bleeding • Children <18yrs • Pregnancy • Renal transplant or severe impairment
Clopidogrel	• 300mg PO		• Known allergy • Active pathological bleeding • Safety in pregnancy and children <18yrs unknown
Glyceryl Trinitrate	• 0.4mg SL every 5min (max 3 tablets or sprays)		• Known allergy • Children • Hypotension • Phosphodiesterase inhibitors in past 48hrs • Bradycardia/severe tachycardia • Right ventricular MI
Midazolam	• 1-3mg IV (titrate to effect)		• Known allergy
Morphine	• 2-4mg IV (repeat as needed)		• Known allergy
Fentanyl	• 1-2mcg/kg IV (repeat as needed)		• Known allergy
Entonox	• Inhaled via self-administration		• Neurologic impairment • Air entrapment • Hypotension

IV Nitrates*	• 10-20mcg/min IV infusion (consult only)		• As per GTN
Other relevant medications: **Sodium Bicarbonate** (protracted PEA).			

Note: Management as per ACS recommendations should ischaemic chest pain be present, with the addition of a sedative/anxiolytic.

Fluid Therapy

- No specific indication.

Procedures

- 12-lead ECG.

6. Tricyclic Anti-Depressants

Basics

- **Sodium channel** blocking.
- Identify **causative agent** and **route of exposure**.
- Turn lateral for **airway protection** (suctioning if necessary).
- Beware of **seizures** and **arrythmias.**
- **Signs:**
    - Tachycardia
    - Broadened QRS complex, prolonged QT interval, tall R-waves in aVR.
    - Decreased LOC
    - Seizures
    - Hypotension
    - Mydriasis

Pharmacotherapy

Medication	Adult	Paediatric	**Contra-Indications**
Oxygen	• High flow, BVM/BVT	• High flow, BVM/BVT	• None
Sodium Bicarbonate	• 1ml/kg of 8.5% solution IV	• 1ml/kg of 8.5% solution IV	• Absence of effective ventilation and circulation
Other relevant medications: **Activated Charcoal** (oral OD), **Benzodiazepines** (seizures).			

*Note: **Avoid excessive Sodium Bicarbonate**. Aim is pH 7.5 – 7.55, narrowing of QRS complex (though this may take 24-48hrs) and maximum sodium of 155mmol/L.*

Fluid Therapy

- No specific indication.

Procedures

- 12-lead ECG.
- ABG.
- ETI for airway management with hyperventilation may be necessary to maintain blood pH.
- NGT.
- Urinary catheterisation – assess urine pH.

G. Obstetric

1. Normal Vaginal Delivery

Basics

- **Calm** and **reassure** patient, ensuring good **communication** and **privacy**.
- Thorough **obstetric history** (i.e. maternity card, gestational age, parity/gravidity, complications).
- Left-lateral **positioning**.
- Encourage maternal **breast-feeding** post-delivery**.**
- **Actively manage** third stage of labour, check for **PPH**.
- Be **prepared** for neonatal resuscitation.
- Risk of **pulmonary embolism**.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Entonox	• Inhaled via self-administration	• N/A	• Neurologic impairment • Air entrapment • Hypotension
Oxytocin	• 10IU IM		• Known allergy • Undelivered foetus • Within 6hrs of vaginal prostaglandin administration • Hypertonic uterine contractions • Uterine scar from major surgery
Other relevant medications: **Tranexamic Acid** (PPH).			

Fluid Therapy

- No specific indication.

Procedures

- APGAR Score – at 1 and 10min. (see reference material).
- Delayed cord clamping.

2. Prolapsed Cord

Basics

- **Calm** and **reassure** patient, ensuring good **communication** and **privacy**.
- Thorough **obstetric history** (i.e. maternity card, gestational age, parity/gravidity, complications).
- Coach patient to **pant** and **avoid bearing down** (unless delivery imminent).
- Use two fingers to **gently push** the presenting part off the cord.
- **Cover cord** with moist, sterile dressing.
- **Avoid** cord handling.
- Knee to chest or left lateral **positioning**.
- **Minimize** on-scene time.
- **Contact** receiving facility/obstetrician.
- Be prepared for **neonatal resuscitation** in case of delivery.
- Risk of **pulmonary embolism**.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Salbutamol	• 250mcg/10min IV • 10-45mcg/min IV maintenance infusion	• N/A	• Known allergy
Nifedipine*	• 30mg PO (consult only)		• Known allergy • STEMI • Heart failure • Severe hepatic impairment
Other relevant medications: **Oxytocin** (placenta delivery - should delivery occur), **Tranexamic Acid** (PPH), **Entonox** (analgesia).			

Note: Tocolysis only if delivery not imminent.

Fluid Therapy

- No specific indication.

Procedures

- Urinary catheterisation – infuse 300–500ml.
- Vaginal delivery if imminent or if foetal distress.
- APGAR Score if delivery (see reference material).

3. Premature Labour

Basics

- **Calm** and **reassure** patient, ensuring good **communication** and **privacy**.
- Thorough **obstetric history** (i.e. maternity card, gestational age, parity/gravidity, complications).
- Coach patient to **pant** and **avoid bearing down** (unless delivery imminent).
- Knee to chest or left lateral **positioning**.
- **Minimize** on-scene time.
- **Contact** receiving facility/obstetrician.
- Be prepared for **neonatal resuscitation**.
- Risk of **pulmonary embolism**.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Salbutamol	• 250mcg/10min IV • 10-45mcg/min IV maintenance infusion	• N/A	• Known allergy
Nifedipine*	• 30mg PO (consult only)		• Known allergy • STEMI • Heart failure • Severe hepatic impairment
Betamethasone*	• 12mg IM split between each buttock, followed by 12mg after 12-36hrs (consult only)		• None specific for this indication
Other relevant medications: **Oxytocin** (placenta delivery - should delivery occur), **Tranexamic Acid** (PPH), **Entonox** (analgesia).			

Notes: Tocolysis only if delivery not imminent. Steroid administration only in consultation with MO/receiving facility.

Fluid Therapy

- No specific indication.

Procedures

- Tocolysis if delivery not imminent.
- Vaginal delivery if imminent or foetal distress.
- APGAR Score if delivery (see reference material).

4. Breech

Basics

- **Calm** and **reassure** patient, ensuring good **communication** and **privacy**.
- Thorough **obstetric history** (i.e. maternity card, gestational age, parity/gravidity, complications).
- **Do not** apply traction to the newborn.
- Left lateral **positioning**.
- **Minimize** on-scene time.
- **Contact** receiving facility/obstetrician.
- Risk of **pulmonary embolism**.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
• None specific			
Other relevant medication: **Tranexamic Acid** (PPH), **Oxytocin** (placenta delivery), **Entonox** (analgesia).			

Fluid Therapy

- No specific indication.

Procedures

- APGAR Score (see reference material).
- Vaginal delivery:
    - **Løvset's Manoeuvre:** Support lower limbs and pelvis as delivered. Once umbilicus delivered and shoulders in AP position, apply gentle downward pressure until axilla visible. Deliver anterior arm, rotate and deliver posterior arm. Support body and neck and rotate so back is uppermost. Use **Mauriceau's Manoeuvre** to deliver head.

- **Mauriceau's Manoeuvre**: Support baby on forearm, place index and ring fingers on zygomas and middle finger in mouth. Place other hand on shoulders with middle finger on occiput. Gently induce flexion of head to facilitate delivery.



5. Shoulder Dystocia

Basics

- **Calm** and **reassure** patient, ensuring good **communication** and **privacy**.
- Thorough **obstetric history** (i.e. maternity card, gestational age, parity/gravidity,complications).
- '**Turtle Sign'**.
- **Discourage** maternal pushing.
- **Avoid** use of **fundal pressure**.
- **Minimize** on-scene time.
- **Contact** receiving facility/obstetrician.
- Be prepared for **neonatal resuscitation**.
- Risk of **pulmonary embolism**.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
None specific			
• Other relevant medication: **Tranexamic Acid** (PPH), **Oxytocin** (placenta delivery), **Entonox** (analgesia).			

Fluid Therapy

- No specific indication.

Procedures

- Vaginal delivery:
  - Place patient supine, flex thighs towards chest and tilt pelvis forward with suprapubic pressure (**McRobert's Manoeuvre**).
  - Attempt to deliver anterior shoulder with gentle posterior head traction.
  - Attempt to deliver posterior shoulder with gentle anterior traction.
  - Delivery of shoulders may be assisted with 180º rotations.
  - Deliberate clavicle fracture as last result: press clavicle away from chest wall.
- APGAR Score (see reference material).

6. Pre-Eclampsia/Eclampsia

Basics

- **Calm** and **reassure** patient, ensuring good **communication** and **privacy**.
- Thorough **obstetric history** (i.e. maternity card, gestational age, parity/gravidity, complications).
- Search for signs of **end-organ dysfunction** (i.e. blurred vision, proteinuria).
- Left lateral **positioning**.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Magnesium Sulphate	• 4g IV over 10-20min • Additional 1-3g/hr IV infusion if prolonged transport	• N/A	•
Labetalol*	• 20mg/hr (may double dose every 30min, max 160mg/hr)		• Asthma and Diabetes • Depression • AV blocks • Myasthenia Gravis • Bradycardia • Heart failure • Emphysema
Nifedipine*	• 10mg PO (repeat once if hypertension persists – consult only)		• Known allergy • STEMI • Heart failure • Severe hepatic impairment
Hydralazine*	• 10mg PO (consult only) • 5-10mg IV/IM followed by 0.5-10mg/hr IV infusion (consult only)		• Coronary Artery Disease • Stroke • Increased ICP • Decreased blood volume
Sotalol*	• 100mg IV over 5min (consult only)		• Asthma and Diabetes • AV blocks • SSS • LV hypertrophy/heart failure • Prolonged QT
Other relevant medications: **Benzodiazepines** (active seizures or where Magnesium ineffective).			

Notes: Avoid mixing medications (i.e. Magnesium Sulphate + Nifedipine) without consultation. Reasonable to begin with benzodiazepine initially. Magnesium Sulphate acts as a tocolytic.

Fluid Therapy

- No specific indication.
- Avoid fluid boluses.

Procedures

- RSI and paralysis only as last resort.

7. Post-partum Haemorrhage

Basics

- **≥500ml** blood loss.
- **Calm** and **reassure** patient, ensuring good **communication** and **privacy**.
- Thorough **obstetric history** (i.e. maternity card, gestational age, parity/gravidity, complications).
- Encourage **breastfeeding** if possible.
- **Minimize** on-scene time.
- Focus is on **rapid transport**, identification of **cause** and bleeding **control**.
- Risk of **pulmonary embolism**.
- **Analgesia** if required.
- **Notify** receiving facility**.**

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• High or low flow	• N/A	• None
Oxytocin	• 10IU IM followed by 3-6IU/hr IV infusion (20-40IU in 1000ml at 150ml/hr)		• Known allergy • Undelivered foetus
Tranexamic Acid	• 1g IV followed by 1g/8hrs IV infusion		• Known allergy
Other relevant medications: **Analgesics** (pain).			

Fluid Therapy

- Permissive hypotension: avoid clear fluids unless radial pulses absent.
- If radial pulses absent, administer 200ml aliquots until radial pulses return.

Procedures

- Placenta delivery.
- Uterine massage/compression.
- ABG.

H. Trauma

1. Traumatic Brain Injury

Basics

- **GCS Severity**:
  - 13-15 Mild
  - 9-12 Moderate
  - ≤8 Severe
- Minimize **secondary brain injury**: Hypoxia, Hypotension, Increased ICP, Hyper/hypocapnia, Hypo/hyperthermia, Hypoglycaemia, Seizures, Pain.
- **CPP=MAP-ICP**.
- **Normal values**:
  - **CPP**: 60-80mmHg (minimum to prevent ischaemic brain injury: 55-60mmHg)
  - **MAP**: 93 (BP 120/80)
  - **ICP**: 5-15mmHg
- Remove **harmful immobilization** devices (C-collar, rigid backboard).
- **Elevate** head 30º (unless hypotensive).
- Aim for **ETCO2** 35-40mmHg.
- **Targeted temperature management**: 32-36ºC.
- **Spinal injuries** managed similarly as same **principles** apply.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• High or low flow, BVM/BVT	• High or low flow, BVM/BVT	• None
Analgesics	• (see pain section)	• (see pain section)	• (see pain section)
Other relevant medications: **Benzodiazepines** (seizures), **Ondansetron** (nausea/vomiting – may consider prophylactic use).			

Fluid Therapy

- Warmed 10ml/kg crystalloid bolus(es) titrated at normal MAP (80-90) to achieve adequate CPP.
- Permissive hypotension contra-indicated.

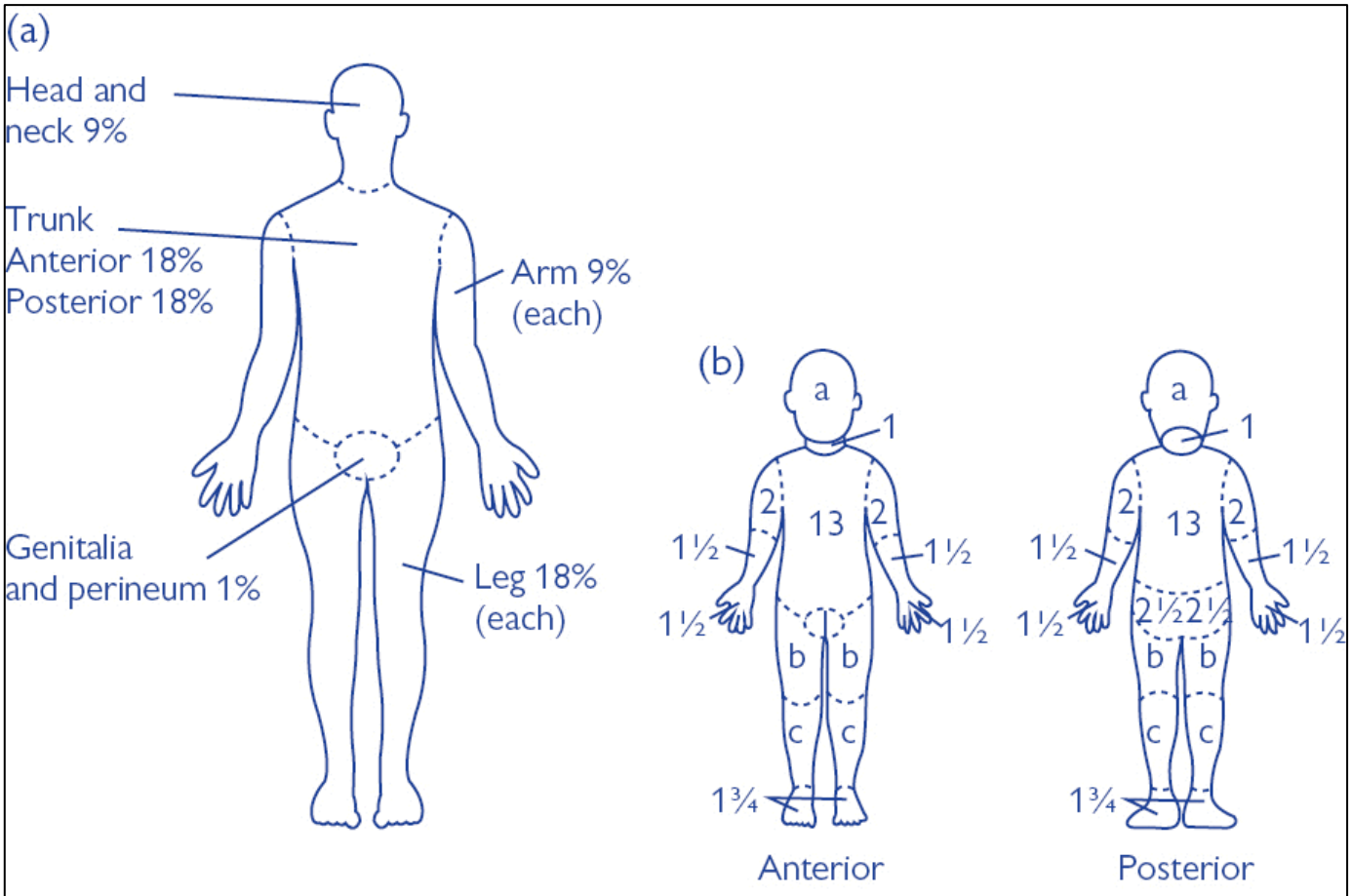
Procedures

- Spinal motion restriction.
- RSI if necessary – not indicated for all TBI patients.
- ABG.

2. Burns

Basics

- Identify **type** and **depth** (i.e. partial thickness thermal burns).
- **Remove source** (i.e. continual irrigation for chemicals).
- **Temperature** management.
- Maintain **sterility**.
- Apply **burnshield**.
- Risk of **arrythmias**: monitor ECG.
- Calculate **BSA%**:



Relative percentage of body surface area (% BSA) affected by growth

	Age				
Body part	0y	1y	5y	10y	15y
a = ½ of head	9½	8½	6½	5½	4½
b = ½ of one thigh	2¾	3¼	4	4¼	2½
c = ½ of one lower leg	2½	2½	2¾	3	3¼

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• Neb or high flow (inhalation burns)	• Neb or high flow (inhalation burns)	• None
Analgesics	• (see pain section)	• (see pain section)	• (see pain section)
Other relevant medications: **Adrenaline** (nebulised if upper airway oedema).			

Fluid Therapy

- Warmed 10ml/kg crystalloid bolus if initially hypotensive.
- Consensus formula:
    - 2-4ml/kg x BSA%
    - Administer first half in initial 8hrs and second half in next 16hrs.
- Avoid fluid overload.

Procedures

- Procedural sedation (see related section).
- RSI if necessary (i.e. inhalation burns).
- In-line nebulisation.
- ABG.

3. Haemorrhage

Basics

- **Traumatic coagulopathy** may be present.
- **Lethal triad**: coagulopathy, hypothermia, metabolic acidosis.
- Identify **source**.
- **Minimise** loss.
- Look for signs of early shock. **Shock index**: HR/SBP. If >1 indicates shock.
- **BP ≠ Perfusion**.
- **Minimize** on scene time. **Rapid transport** to surgical intervention/blood products crucial.
- **Avoid IV-line** placement on scene should this **prolong scene time**.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• High or low flow	• High or low flow	• None
Tranexamic Acid	• 1g IV followed by 1g/8hrs IV infusion	• <12yrs: 15mg/kg IV followed by 2mg/kg each hour for next 8hrs	• Known allergy
Other relevant medications: **Analgesics** (pain).			

Fluid Therapy

- Permissive hypotension: avoid clear fluids unless radial pulses absent.
- If radial pulses absent, administer 200ml aliquots until radial pulses return.

Procedures

- Bandaging/splinting.
- Tourniquet placement.
- Pelvic splinting.
- Traction splinting.
- Anti-shock garment.
- Haemostatic agent/bandage application.
- ABG.

4. Crush Injury/Rhabdomyolysis

Basics

- Ensure patient **safety** from environment.
- Treatment aimed at preserving **renal function**.
- **Analgesia** and **fluid therapy** may be necessary before extrication.
- Risk of **arrythmias** – continual ECG monitoring.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Oxygen	• High or low flow	• High or low flow	• None
Analgesics	• (see pain section)	• (see pain section)	• (see pain section)
Other relevant medications: **Tranexamic Acid** (severe haemorrhage), **β2 simulants**, **Calcium chloride** (hyperkalaemia).			

Fluid Therapy

- Warmed 10ml/kg crystalloid bolus(es) to assist renal perfusion.
- Aggressive fluid management where required.

Procedures

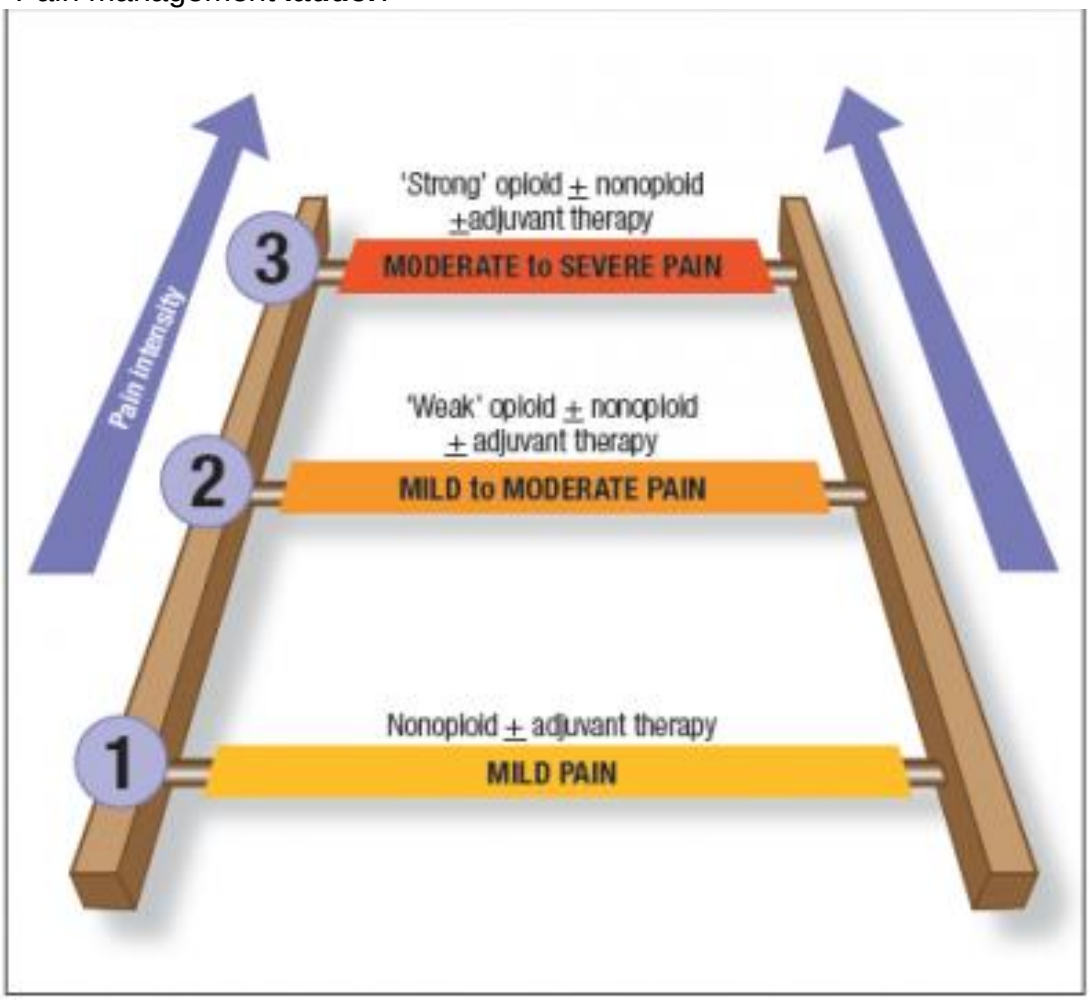
- ABG.
- Procedural sedation (see related section).
- As per relevant trauma guidelines.

I. Other

1. Pain

Basics

- Consider **total pain**: physical, emotional, mental, spiritual, social.
- Consider **type** of pain (i.e. musculoskeletal, visceral).
- **Acute** vs. **Chronic**?
- Use **pain scale**.
- Use **non-pharmacologic** methods (education, imagery, distraction, music, scents, communication, heat/cold application, counselling, positioning, bandaging/splinting).
- **Calm** and **reassure** patient, ensuring good **communication** and **sympathy**.
- **Multi-modal** analgesia recommended.
- **Sedatives** may work well in conjunction (i.e. anxiolysis).
- **Do not** leave pain untreated.
- Pain management **ladder**:



Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Entonox	• Inhaled via self-administration	• Inhaled via self-administration	• Neurologic impairment • Air entrapment • Hypotension
Methoxyflurane	• 3ml inhaled via self-administration (may repeat once)	• 3ml inhaled via self-administration	• Known allergy • Altered LOC • Severe hepatic/renal impairment • Malignant hyperthermia • <1yr old
NSAIDS	• **Aspirin:** 300-900mg PO (max 4g/day) • **Ibuprofen:** 200-400mg PO (max 1200mg/day)	• **Aspirin:** N/A • **Ibuprofen:** 4-10mg/kg (max single dose 400mg, max 40mg/kg/day)	• Known allergy • Active pathological bleeding • Children <18yrs (Aspirin) • Peptic ulcer and severe hepatic impairment (Ibuprofen) • Pregnancy • Renal transplant or severe impairment
Paracetamol	• 500-1000mg PO (max 4g/day) • 1g IV over 15-30min (max 3g/day)	• 15-20mg/kg IV/PO (over 15-30min IV, max 75mg/kg/day)	• Known allergy • Severe hepatic/renal impairment
Morphine	• 0.1-0.2mg/kg IV (repeat full or half dose as needed – no max)	• 0.1mg-0.2mg/kg IV (repeat full or half dose as needed – no max)	• Known allergy
Fentanyl	• 1-2mcg/kg IV/IN (repeat as needed – no max)	• 1.5mcg/kg IN • >3yrs: 1-2mcg/kg IV • <3yrs: 2-3mcg/kg IV	• Known allergy

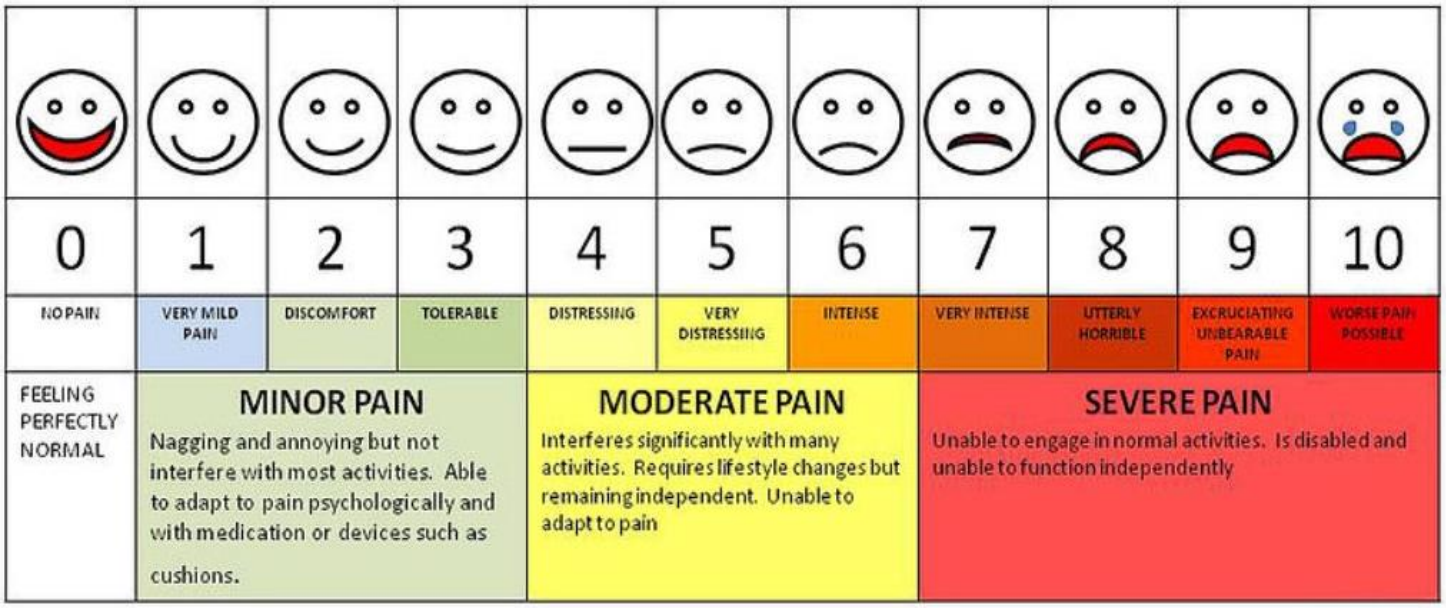
Ketamine	• Sub-dissociative:
	  ○ 0.1-0.3mg/kg IV
	  ○ 1-2mg/kg IM
	  ○ 0.2-1mg/kg IN
	• Dissociative:
	  ○ 1-2mg/kg IV
	  ○ 3-6mg/kg IM
		• Sub-dissociative:
		  ○ 0.1-0.3mg/kg IV
		  ○ 1-2mg/kg IM
		  ○ 0.2-1mg/kg IN
		• Dissociative:
		  ○ 1-2mg/kg IV
		  ○ 3-6mg/kg IM
			• Known allergy
			• Coronary artery disease (ACS)
			• <3months old
			• Maximal sympathetic stimulation/compensation

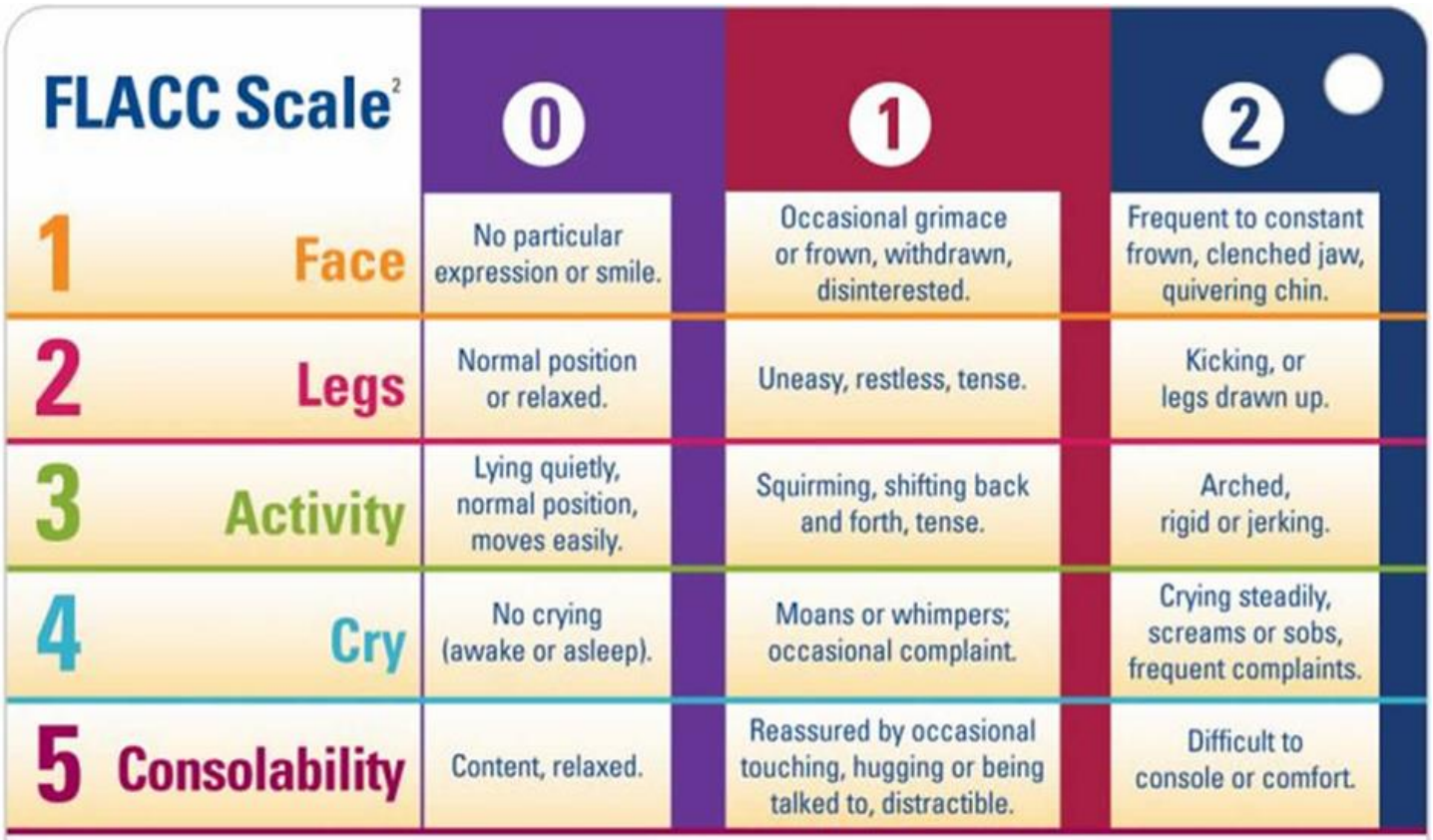
Fluid Therapy

- No specific indication.

Procedures

- Procedural sedation (see related section).





Neonatal/Infant Pain Scale (NIPS) under 3 months

Assessment	Score = 0	Score = 1	Score = 2
Facial expression	Relaxed muscles (Restful face, neutral expression)	Grimace (Tight facial muscles; furrowed brow, chin, jaw)	
Cry	No cry (Quiet, not crying)	Whimper (Mild moaning, Intermittent)	Vigorous cry (Loud scream; rising, shrill, continuous)
Breathing patterns	Relaxed (usual pattern for this infant)	Change in breathing (In-drawing, irregular, faster than usual; gagging; breath holding)	
Arms	Relaxed/restrained (No muscular rigidity; occasional random movements of arms)	Flexed/extended (Tense, straight legs; rigid and/or rapid extension, flexion)	
Legs	Relaxed/restrained (No muscular rigidity; occasional random leg movement)	Flexed/extended (Tense, straight legs; rigid and/or rapid extension, flexion)	
Arousal	Sleeping/awake (Quiet peaceful sleeping or alert random leg movement)	Fussy (Alert, restless, and thrashing)	

NIPS interpretation – add the scores from each of the 6 assessments for a score of 0 – 7

0 = No pain, 1-2 = Mild pain, 3-4 = Moderate pain, 5-7 = Severe pain

2. Nausea/Vomiting/Cramping

Basics

- Identify **source/cause** and remove.
- Inhaled **isopropyl alcohol** as alternative (alcohol swab).
- Ensure patent **airway** and avoid **aspiration**.
- Avoid excess **stimulation** (i.e. movement, noise).
- Risk of **dehydration/electrolyte** imbalances.

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Metoclopramide	• >60kg: 10mg IV/IM • <60kg: 5mg IV/IM	• N/A	• Known allergy • Epilepsy • GIT haemorrhage, obstruction, perforation, post-operative • Concurrent use of Cyclizine or Hyoscine Butylbromide • Children
Ondansetron	• 4-8mg IV/PO	• >40kg: 4mg IV • ≤40kg: 0.1mg/kg IV • >4yrs: 4mg PO	• Known allergy • Concurrent Apomorphine or SSRI use
Cyclizine	• 50mg IV (max 200mg/day)	• N/A	• Known allergy • Alcohol intoxication • Concurrent use of Metoclopramide • Children <6yrs
Hyoscine Butylbromide*	• 20mg PO (max 80mg/day) • 20-40mg IV/IM/SC (max 100mg/day)	• >6yrs: 20mg PO (max 80mg/day) • >12yrs: 20-40mg IV/IM/SC (max 100mg/day) • <12yrs: 0.3-0.6mg/kg IV/IM/SC (max 1.2mg/kg/day)	• Known allergy • Myasthenia gravis • Paralytic ileus • GIT mechanical stenosis • Megacolon • Tachycardia (Parenteral admin.) • Urinary retention (Parenteral admin.)
Other relevant medications: **Promethazine** (motion-sickness).			

Fluid Therapy

- Consider warm crystalloid fluids if hypovolaemia and/or dehydration present.

Procedures

- Suctioning: Oropharyngeal/ETT.

3. Palliative/End-of-Life Situations

Basics

- **Aim** is improved **quality of life** and **relief of suffering** for both **patients** and **families**: physical, emotional, mental, spiritual, social.
- Aim is **NOT** prolonging life at all costs or shortening life.
- Take steps to ensure **patient autonomy**.
- Establish desired patient/family **care goals**.
- Avoid **unnecessary** transport (meet patient wishes).
- Avoid **futile interventions** and manage **supportively** with aim of relieving suffering.
- Avoid any procedures which will **unnecessarily** cause discomfort.
- **Multi-disciplinary** approach: consult and involve necessary individuals (i.e. MO, psychologist, counsellor, family members, social worker etc.).
- Ensure thorough, compassionate, honest **communication** and **education** regarding condition.
- Ask about **legal documentation** (Living Wills, Advance Directives, DNRs)

Pharmacotherapy

Condition	Medications
Pain	• **Analgesics:** (see pain section)
Dyspnoea	• **Oxygen:** High, low flow or nebulised • **Morphine:** 1-5mg IV/SC (titrate to effect) • **Midazolam:** 1mg IV (titrate to effect)
Convulsions	• **Benzodiazepines:** (see seizure section)
Anxiety	• **Midazolam:** 1mg IV (titrate to effect)
Nausea/Vomiting	• **Anti-Emetics:** (see nausea/vomiting section)
GIT Cramping	• **Hyoscine Butylbromide*:** 20mg PO (max 80mg/day), 20-40mg IV/IM/SC (max 100mg/day)

Notes: Administration of medications should not automatically result in patient transport. When in doubt, consult.

Fluid Therapy

- Dependant on patient condition.
- Oral fluids preferred if possible to avoid IV placement.

Procedures

- Communication (**SILVER**):
  - **S**eeks **I**nformation (baseline function, history)
  - **L**ife **V**alues (personality, culture, religion, beliefs)
  - **E**ducate/**E**xtend (provide info on condition and management)
  - **R**espond (solicit questions, offer support)
- Breaking bad news (**SPIKES**):

SA Supportive and Palliative Care Indicators Tool (SPICT™-SA)

SPICT™-SA is a generic tool to help identify adults with advanced life-limiting illnesses when the best available and appropriate treatment has been given and their condition continues to deteriorate. These people benefit from a palliative care approach as well as ongoing care by their current clinician or team. SPICT™ is designed for South Africa and similar middle income countries and settings.

Look for disease specific indicators:

Cancer

- Cancer not amenable to curative treatment.
- Progressive or metastatic cancer with symptoms.
- Too frail for oncological interventions.

Haematological Disease

- Haematological cancer with recurrent bleeding or infection or needing repeated transfusions.
- Any haematological condition or cancer with deteriorating clinical condition and not responding to best available treatment.

Infectious Disease

HIV

HIV with deteriorating clinical condition and not responding to best available treatment.

TB

TB with deteriorating clinical condition and not responding to best available treatment.

Other

Other infections with deteriorating clinical condition and not responding to best available treatment.

Kidney Disease

- Stage 4 or 5 chronic kidney disease with deteriorating health.
- Stopping or not starting dialysis.
- Kidney disease complicating other life-limiting conditions or treatments.

Lung Disease

- Patients on long term oxygen.
- Breathlessness at rest or on minimal effort between exacerbations.

Heart / Vascular Disease

- Heart failure or extensive, untreatable coronary artery disease with breathlessness or chest pain at rest or on minimal exertion.
- Severe, inoperable peripheral vascular disease.

Liver Disease

Cirrhosis with one or more complication in the past year:

- Diuretic resistant ascites
- Hepatic encephalopathy
- Hepatorenal syndrome
- Bacterial peritonitis
- Variceal bleeds

Neurological Disease

- Progressive deterioration in physical and/or cognitive function.
- Increasing difficulty communicating and/or progressive difficulty with swallowing.
- Stroke with significant loss of function, and ongoing disability and dependency.
- Recurrent pneumonia, breathlessness or respiratory failure.

Dementia / Frailty

- Unable to dress, walk or eat without help.
- No longer able to communicate using verbal language; little social interaction.
- Recurrent febrile episodes or infections.
- Fractured femur (hip).
- Swallowing difficulties and/or significant reduction in oral intake.

Trauma

- Severe burns (ABSI score >10).
- Brain injury with clinical deterioration and no benefit from surgical intervention.

Other Diseases

- Any deteriorating clinical condition not responding to best available or appropriate treatment.

Look for one or more general indicators of deteriorating health:

- Two or more unplanned health care facility visits within a period of 3 months with deteriorating life-limiting illness despite best available or appropriate treatment.
- Performance status is poor or deteriorating, with limited reversibility e.g. the person stays in bed or in a chair for more than half the day.
- Dependent on others for care due to increasing physical, and/or emotional, and/or mental health problems.
- The person's carer needs more help and support in caring for the patient.
- Progressive weight loss over the last few months, or remains underweight, or has low muscle mass.
- Persistent symptoms despite best available or appropriate treatment of the underlying condition(s).
- The person (or family) ask for palliative care; chooses to reduce, stop or not have treatment; wishes to focus on quality of life.

Review supportive and palliative care and care planning

- Review current treatment and medication so the patient receives best available or appropriate care.
- Consider referral for specialist assessment if symptoms or needs are complex and difficult to manage.
- Agree current and future care goals, and a care plan with the patient and family.
- Plan ahead if the patient is at risk of loss of capacity.
- Record, communicate and coordinate the care plan.

4. Psychiatric/Mental Disturbances

Basics

- Ensure **safety** for crew, family, patient and bystanders.
- Ensure thorough, compassionate and honest **communication**.
- Attempt **basic methods** to calm patient before using pharmacological interventions.
- Involve **police** where appropriate.
- **Consultation** and thorough **documentation** crucial.
- Rule out **other causes** (i.e. toxins/substances).

Pharmacotherapy

Medication	Adult	Paediatric	Contra-Indications
Midazolam	• 15mg IM	• 0.025-0.05mg/kg IM	• Known allergy
Ketamine	• 4-6mg/kg IM	• 4-6mg/kg IM	• Known allergy • Coronary artery disease (ACS) • Maximal sympathetic stimulation/compensation

Note: Other routes of administration may be used if the scenario allows.

Fluid Therapy

- No specific indication.

Procedures

- Procedural sedation (see related section).

Procedures

A. Procedural Sedation

Indications

- Reduction of stress, anxiety and pain to facilitate **procedural interventions**:
    - **Diagnostic Interventions** (i.e. lumbar puncture, vascular access, urinary catheters, sexual assault exams).
    - **Therapeutic Interventions** (i.e. splinting, laceration repair, dislocation reductions, burn wound irrigation).

Preparation

- **Explain** procedure to patient and ensure **consent**.
- Ensure **adequate personnel** – brief before performing procedure.
- Attach **monitoring devices** and continually monitor SpO2, ETCO2, RR, ECG, HR, BP.
- Ensure **oxygenation** by placing nasal cannula for duration of procedure (unless high flow device indicated).
- Perform **Mallampati** and other **airway assessments** in case of airway compromise.
- Ensure adequate **vascular access**.
- **Position** patient appropriately (may require sedation prior to this).
- **Set up** necessary equipment for procedure.
- Have **resuscitation equipment** on standby: BVM, AED/defibrillator, adrenaline, suction.
- Consider **fluid bolus** prior to medication administration.

Medications

Medication	Adult	Paediatric	Contra-Indications
Analgesics			
Entonox	• Inhaled via self-administration	• Inhaled via self-administration	• Neurologic impairment • Air entrapment • Hypotension
Methoxyflurane	• 3ml inhaled via self-administration (may repeat once)	• 3ml inhaled via self-administration	• Known allergy • Altered LOC • Severe hepatic/renal impairment • Malignant hyperthermia • <1yr old
Paracetamol	• 1g IV (max 3g/day)	• 15-20mg/kg IV (max 75mg/kg/day)	• Known allergy • Severe hepatic/renal impairment
Morphine	• 0.1-0.2mg/kg IV (repeat full or half dose as needed – no max)	• 0.1-0.2mg/kg IV (repeat full or half dose as needed – no max)	• Known allergy
Fentanyl	• 1-2mcg/kg IV/IN (repeat as needed – no max)	• 1.5mcg/kg IN • >3yrs: 1-2mcg/kg IV • <3yrs: 2-3mcg/kg IV	• Known allergy

Ketamine	• Sub-dissociative:
	  ○ 0.1-0.3mg/kg IV
	  ○ 1-2mg/kg IM
	  ○ 0.2-1mg/kg IN
	• Dissociative:
	  ○ 1-2mg/kg IV
	  ○ 3-6mg/kg IM
		• Sub-dissociative:
		  ○ 0.1-0.3mg/kg IV
		  ○ 1-2mg/kg IM
		  ○ 0.2-1mg/kg IN
		• Dissociative:
		  ○ 1-2mg/kg IV
		  ○ 3-6mg/kg IM
			• Known allergy
			• Coronary artery disease (ACS)
			• <3months old
			• Maximal sympathetic stimulation/compensation

Sedatives			
Midazolam	• 0.15mg/kg IV/IM (or titrate to effect)	• 0.15mg/kg IV/IM (or titrate to effect)	• Known allergy
Etomidate	• 0.2-0.4mg/kg IV	• >10yrs: 0.2-0.4mg/kg IV	• Known allergy • Sepsis • <10yrs old
Other relevant medications: **Naloxone**, **Flumazenil** (reversal agents).			

Notes:

- *Procedural sedation may be performed with a combination of analgesics or combined analgesics and sedatives. Whichever medication(s) chosen there should always be elements of sedation, anxiolysis and analgesia present.*
- *The above medications should be titrated to effect based on the scenario.*

<u>Considerations</u>

- Beware of complications from unfasted/full stomachs. NGT may be required.
- Ensure continued monitoring and supportive care post-procedure.
- Levels of sedation:

	MINIMAL	MODERATE	DEEP	GENERAL ANESTHESIA
Responsiveness	Alert/Awake	Responds to Verbal Stimuli	Responds to Painful Stimuli	Unresponsive
Ventilation	Unaffected	Adequate	Maybe Inadequate	Frequently Inadequate
Airway	Unaffected	No Intervention	Intervention Maybe Needed	Intervention Often Required
Cardiovascular	Unaffected	Maintained	Usually Maintained	Maybe Impaired

Emergency Department Procedural Sedation and Analgesia Physician Checklist

[patient label]

Pre-Procedure Assessment

- ☐ Past medical history (note history of OSA) _____
- ☐ Prior problems with sedation/anesthesia _____
- ☐ Allergies to food or medications _____
- ☐ Procedure _____
- ☐ Dentures none / upper / lower [should remain in during PSA unless intubation required]
- ☐ Cardiorespiratory reserve no or mild impairment / moderate impairment / significant impairment
- ☐ Difficult airway features none / mild concern / significant concern
- ☐ Last oral intake (see fasting grid on reverse) _____
- ☐ Will delay procedure until _____
- ☐ Weight (kg) _____
- ☐ Benefits of proceeding with PSA exceed risks

Difficult Airway Features

Difficult Laryngoscopy:	**L**ook externally, **E**valuate 3-3-2 rule, **M**allampati score, **O**bstruction, **N**eck Mobility
Difficult BVM Ventllation:	**B**eard, **O**bese, **N**o teeth, **E**lderly, **S**leep Apnea / Snoring
Difficult LMA:	**R**estricted mouth opening, **O**bstruction, **D**istorted airway, **S**tiff lungs or c-spine
Difficult Cricothyroidotomy:	**S**urgery, **H**ematoma, **O**besity, **R**adiation distortion or other deformity, **T**umor*

☐ Is this patient a good candidate for ED procedural sedation and analgesia?

The less **cardiorespiratory reserve**, the more **difficult airway features**, and the less **procedural urgency**, the more likely the patient should not receive PSA in the emergency department. If not a good candidate for ED-based PSA, other options include regional or local anesthetic; PSA or GA in the operating room; or endotracheal intubation in the ED.

Pre-procedure Preparation

- ☐ Analgesia - maximal patient comfort prior to PSA
- ☐ Informed consent for PSA and procedure
- ☐ Patient on monitor: telemetry, NIBP, SpO_2, $EtCO_2$
- ☐ Oxygenate with NC O_2 **and** high flow face mask O_2
- ☐ Select and draw up PSA agent(s)
- ☐ Reversal agents and paralytic vials at bedside
- ☐ Prepare for endotracheal intubation

Airway Equipment

- ☐ Ambu bag connected to **oxygen**
- ☐ Laryngoscopy handles and blades
- ☐ Suction, oral & nasal airways
- ☐ Endotracheal tubes & stylets
- ☐ LMA with lubricant and syringe
- ☐ Colorimetric capnometer
- ☐ Bougie & difficult airway equipment

Agent	Dose*	Contraindications	Comments
Propofol	0.5-1 mg/kg IV, then 0.5 mg/kg q1-2 min prn	Egg or soy allergy	Preferred for shorter procedures and where muscle relaxation is of benefit; avoid if hypotension is a concern
Ketamine	1-2 mg/kg IV over 30-60 sec or 4-5 mg/kg IM, repeat half dose prn	**Absolute:** age < 3 months, schizophrenia **Relative:** major posterior oropharynx procedures; history of airway instability, tracheal surgery, or tracheal stenosis; active pulmonary infection or disease; cardiovascular disease; CNS masses, abnormalities, or hydrocephalus	Preferred for longer procedures; avoid if hypertension/tachycardia is a concern; have midazolam available to manage emergence distress; muscle tone is preserved or increased; post-procedure emesis may be mitigated by prophylactic ondansetron
Etomidate	0.1-0.15 mg/kg IV, then 0.05 mg/kg q2-3 min prn		Intra-procedure myoclonus or hypertonicity, as well as post-procedure emesis, are common
Fentanyl	1-2 mcg/kg IV, then 1 mcg/kg q3-5 min prn		Comparatively delayed onset of action; do not re-dose too quickly
Midazolam	.05 mg/kg IV, then .05 mg/kg q3-5 min prn	Pregnancy, allergy to benzyl alcohol	Comparatively delayed onset of action; do not re-dose too quickly
Pentobarbital	1 mg/kg IV, then 1 mg/kg q3-5 min prn	Pregnancy, porphyria	Use for painless procedures where analgesia is not needed
Reversal Agent	**Dose**		**Caution**
Naloxone	0.01-0.1 mg/kg IV or IM (typical adult dose 0.4 mg), max 2 mg		
Flumazenil	0.01 mg/kg IV (typical adult dose 0.2 mg) over 20 seconds, max 1 mg		Only use in benzodiazepine naïve patient

***All doses should be reduced in the elderly and in patients with marginal hemodynamics**

R. Strayer / P. Andrus emupdates.com 11.28.2013

B. Rapid Sequence Intubation

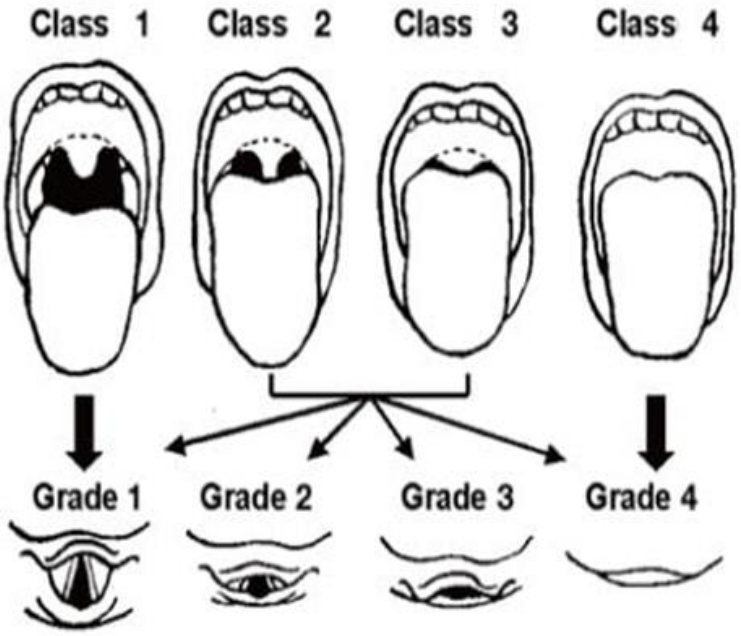
Indications

- Airway **protection/maintenance**.
- Correction of **gaseous exchange**.
- **Predicted** clinical **deterioration**.

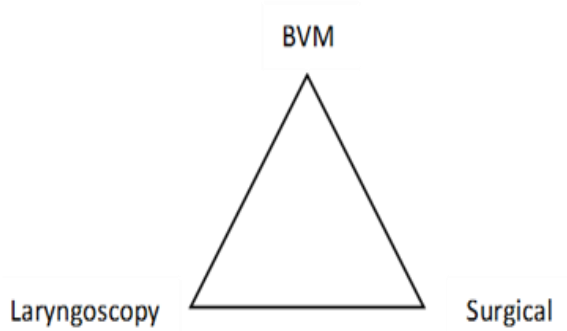
Preparation

- Assess for **physiologic difficulty**–haemodynamics. Correct before RSI.
- Assess **airway for difficulty** and plan accordingly:

BVM	Laryngoscopy	SGA	Surgical
B – Beard **O** – Obese **O** – Old **T** – Teeth **S** – Sounds/Stridor	**M** – Mallampati **M** – Measurements (3-3-1) **A** – Atlanto-occipital extension **P** – Pathology	**MO** – Mouth Opening **O** – Obstruction **D** – Distortion **S** – Sounds/Stridor	**S** – Surgery **H** – Haematoma **O** – Obesity **R** – Radiation **T** – Tumor



Decision-making: if two points of the triangle are predicted **difficult**, consider **alternatives** to RSI:



Equipment Set Up		
S – Suction **T** – Tubes **O** – Oxygen (BVM and apnoeic oxygenation) **P** – Pharmaceuticals	**I** – IV access **C** – Connections/CO2 (monitors)	**B** – Blades/Bougie **A** – Alternative strategy (i.e. Video laryngoscopy) **R** – Rescue device (i.e. SGAs) **S** – Surgical airway (i.e. Cric.)

- **Pre-load** with fluid bolus and **pre-oxygenate.**
- Draw up all **medications**: induction agent, paralytic, post-intubation sedation/analgesia/paralysis, adrenaline if necessary.
- **Brief team** members before procedure.
- **ELM use** effective for improving view of glottis.
- Use **bougie** as first line – aim is for success on first attempt.
- For difficult airway, most **experienced** provider should perform laryngoscopy.
- Ensure beneficial patient **positioning**: waist height, sniffing position (ramp).

Medications

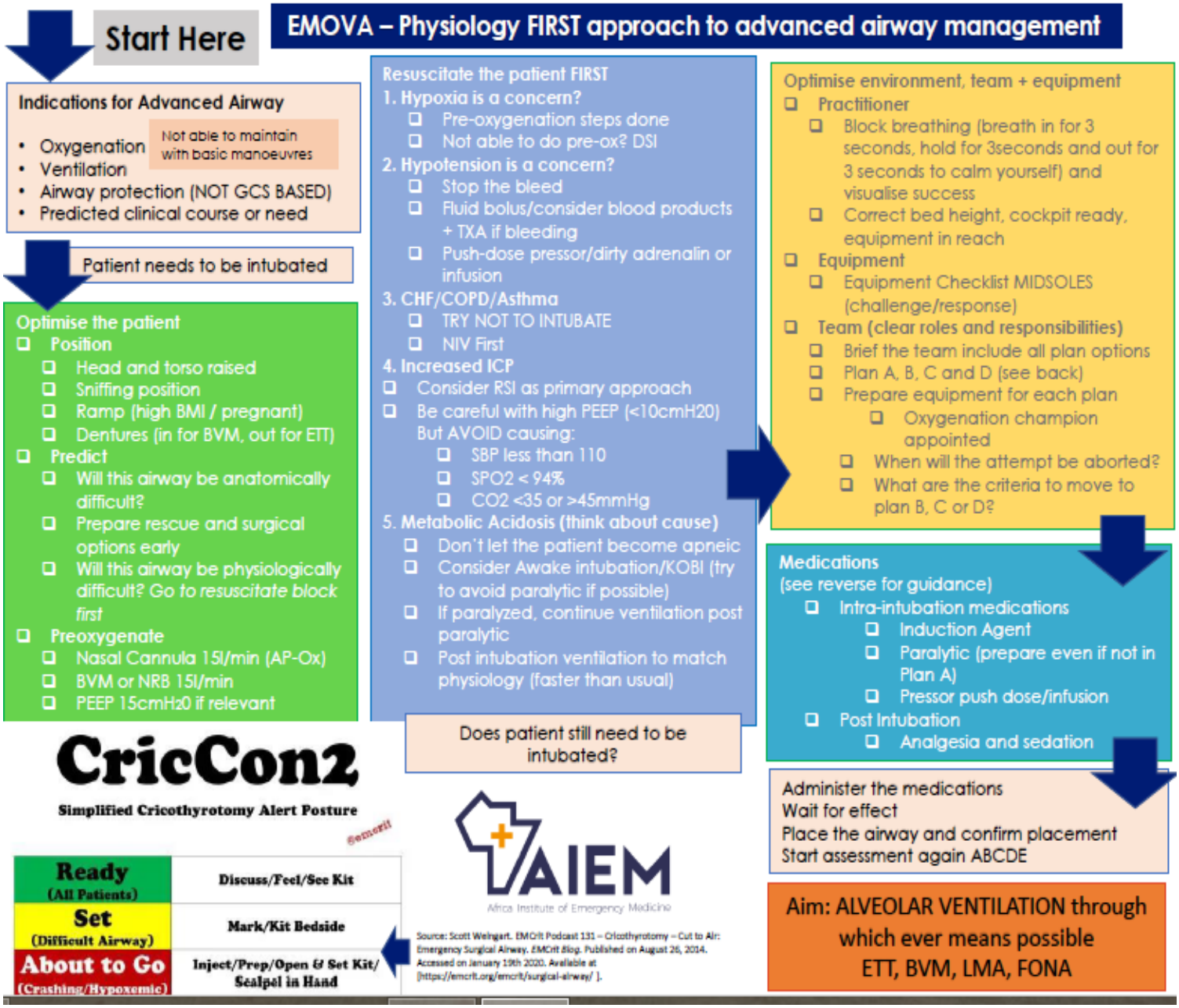
Medication	Adult	Paediatric	Contra-Indications
Induction Agents			
Ketamine	• 1.5-2mg/kg IV	• 1.5-2mg/kg IV	• Known allergy • Coronary artery disease (ACS) • <3months old • Maximal sympathetic stimulation/compensation
Etomidate	• 0.2-0.4mg/kg IV	• >10yrs: 0.2-0.4mg/kg IV	• Known allergy • Sepsis • <10yrs old
Fentanyl	• 2-10mcg/kg IV	• 2-10mcg/kg IV	• Known allergy
Paralytic Agents			
Succinylcholine	• 1-2mg/kg IV	• 1-2mg/kg IV	• Known allergy • Hyperkalaemia • Malignant hyperthermia • 24hrs post-burn or denervation injury
Rocuronium	• 1-1.2mg/kg IV	• 1-1.2mg/kg IV	• Known allergy
Vecuronium	• 0.1-0.2mg/kg IV	• 0.1-0.2mg/kg IV	• Known allergy
Reversal Agents			
Suggamadex	• 4-16mg/kg IV	• ≥2yrs: 4mg/kg IV	• Known allergy
Neostigmine	• 0.03-0.07mg/kg IV (max 5mg)	• 0.03-0.07mg/kg IV (max 5mg)	• Known allergy • Peritonitis • Intestinal or urinary tract obstruction
Other relevant medications: **Morphine**, **Midazolam** (post-procedure analgesia and sedation), **Lignocaine Spray** (topical anaesthesia), **Adrenaline** (inotropic support).			

Note: In cases of haemodynamic instability, induction doses should be halved.

Considerations

- **Post-intubation** care:
    - Check **cuff pressure**.
    - Confirm placement with **ETCO2**, auscultation.
    - **Secure** ETT making use of bite-block.
    - Re-assess **haemodynamics**.
    - Ensure adequate **sedation** and **analgesia**.
    - Place on **mechanical ventilation**.
    - Consider **NG tube** placement.
    - Beware of **complications** from positive pressure ventilation and be prepared to manage (i.e. tension pneumothorax).
- In general, prehospital RSI should **not be performed** if transport time to definitive care is less than 20-30min.
- A ‘delayed sequence’ (**DSI**) approach (procedural sedation) may be considered for **preoxygenation**.

Procedure


Start Here
EMOVA – Physiology FIRST approach to advanced airway management
Indications for Advanced Airway
Not able to maintain with basic manoeuvres
• Oxygenation
• Ventilation
• Airway protection (NOT GCS BASED)
• Predicted clinical course or need
Patient needs to be intubated
Optimise the patient
Position
Head and torso raised
Sniffing position
Ramp (high BMI / pregnant)
Dentures (in for BVM, out for ETT)
Predict
Will this airway be anatomically difficult?
Prepare rescue and surgical options early
Will this airway be physiologically difficult? Go to resuscitate block first
Preoxygenate
Nasal Cannula 15l/min (AP-Ox)
BVM or NRB 15l/min
PEEP 15cmH20 if relevant
Resuscitate the patient FIRST
1. Hypoxia is a concern?
Pre-oxygenation steps done
Not able to do pre-ox? DSI
2. Hypotension is a concern?
Stop the bleed
Fluid bolus/consider blood products + TXA if bleeding
Push-dose pressor/dirty adrenalin or infusion
3. CHF/COPD/Asthma
TRY NOT TO INTUBATE
NIV First
4. Increased ICP
Consider RSI as primary approach
Be careful with high PEEP (<10cmH20)
But AVOID causing:
SBP less than 110
SPO2 < 94%
CO2 <35 or >45mmHg
5. Metabolic Acidosis (think about cause)
Don't let the patient become apneic
Consider Awake intubation/KOBI (try to avoid paralytic if possible)
If paralyzed, continue ventilation post paralytic
Post intubation ventilation to match physiology (faster than usual)
Optimise environment, team + equipment
Practitioner
Block breathing (breath in for 3 seconds, hold for 3seconds and out for 3 seconds to calm yourself) and visualise success
Correct bed height, cockpit ready, equipment in reach
Equipment
Equipment Checklist MIDSOLES (challenge/response)
Team (clear roles and responsibilities)
Brief the team include all plan options
Plan A, B, C and D (see back)
Prepare equipment for each plan
Oxygenation champion appointed
When will the attempt be aborted?
What are the criteria to move to plan B, C or D?
Medications
(see reverse for guidance)
Intra-intubation medications
Induction Agent
Paralytic (prepare even if not in Plan A)
Pressor push dose/infusion
Post Intubation
Analgesia and sedation
Administer the medications
Wait for effect
Place the airway and confirm placement
Start assessment again ABCDE
Aim: ALVEOLAR VENTILATION through which ever means possible
ETT, BVM, LMA, FONA
Does patient still need to be intubated?
CricCon2
Simplified Cricothyrotomy Alert Posture
Ready (All Patients) — Discuss/Feel/See Kit
Set (Difficult Airway) — Mark/Kit Bedside
About to Go (Crashing/Hypoxemic) — Inject/Prep/Open & Set Kit/ Scalpel in Hand
AIEM
Africa Institute of Emergency Medicine
Source: Scott Weingart. EMCrit Podcast 131 – Cricothyrotomy – Cut to Air: Emergency Surgical Airway. EMCrit Blog. Published on August 26, 2014. Accessed on January 19th 2020. Available at (https://emcrit.org/emcrit/surgical-airway/).

C. Thrombolysis

Indications and Contra-indications

- **Indications:**
  - STEMI <12hrs from onset.
- **Absolute Contra-indications:**
  - Any known history of stroke
  - Any known structural damage to the central nervous system
  - Major surgery
  - Substantial trauma within 2 months
  - Any head injury or other trauma occurring after onset of current myocardial infarction
  - Gastrointestinal bleed within the last month
  - Known bleeding disorder
  - Aortic dissection
  - Non-compressible puncture (e.g. liver biopsy, lumbar puncture)
- **Relative Contra-indications:**
  - Current treatment with oral anticoagulants
  - Pregnancy or within 1-week post-partum
  - Uncontrolled hypertension [systolic blood pressure of more than 180mmHg, diastolic blood pressure of more than 110 mmHg on repeated measurements]
  - Advance liver disease
  - Infective endocarditis
  - Active peptic ulcer
  - Sustained cardiopulmonary resuscitation of more than 10 minutes duration

Preparation

- **Calm**, **reassure** and place patient in a **comfortable** position.
- **Explain** procedure and gain informed **consent**.
- Undertake a full **clinical assessment** of the patient.
- Perform **12 lead ECG** within 10 minutes; thereafter every 15 minutes for the first hour.
- Manage according to **ACS** recommendations (aspirin, etc.).
- Ensure adequate **IV access**.
- Have **resuscitation equipment** on standby: BVM, AED/defibrillator, adrenaline, suction.
- **Consult** MO/receiving facility.

Medications

Medication	Dosing
Thrombolytics	
Tenecteplase	• <60kg: 6000IU (30mg) IV • 60-69kg: 7000IU (35mg) IV • 70-79kg: 8000IU (40mg) IV • 80-89kg: 9000IU (45mg) IV • ≥90kg: 10 000IU (50mg) IV
Streptokinase	• 1 500 000IU IV over 60min
Anti-Coagulants	
Enoxaparin	• 30mg IV followed by 1mg/kg SC 15min after thrombolytic administration.
Heparin	• <67kg: 4000IU IV • ≥67kg: 5000IU IV

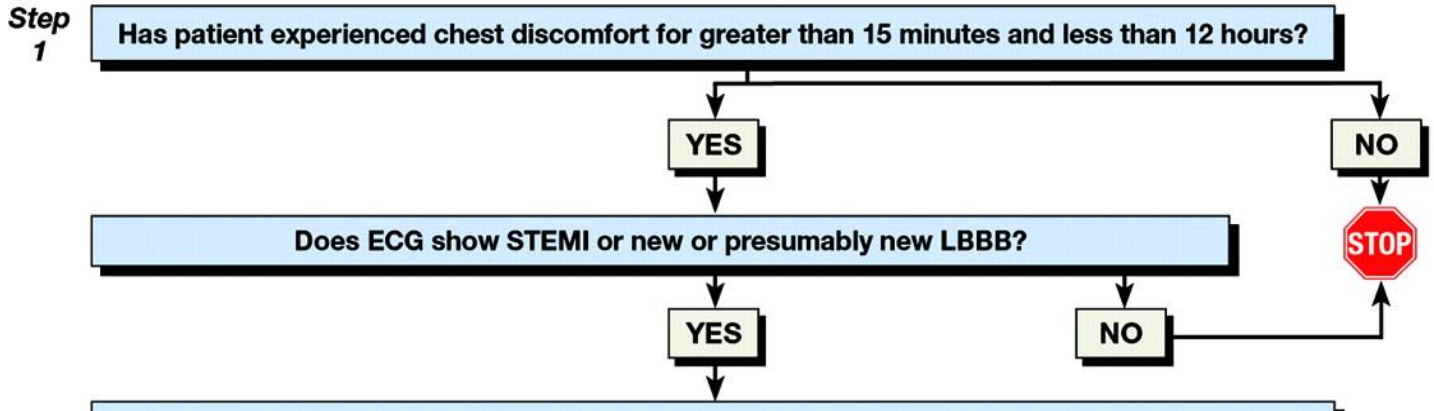
Notes: Administer an anti-coagulant in conjunction with a thrombolytic. Contra-indications as per thrombolytic checklist.

Considerations

- Time to nearest **PCI facility**.
- **Bypass** other facilities and transport directly to PCI facility if feasible.

Procedure

Prehospital Fibrinolytic Checklist*



Systolic BP >180 to 200 mm Hg or diastolic BP >100 to 110 mm Hg	○ **YES**	○ NO
Right vs left arm systolic BP difference >15 mm Hg	○ **YES**	○ NO
History of structural central nervous system disease	○ **YES**	○ NO
Significant closed head/facial trauma within the previous 3 months	○ **YES**	○ NO
Stroke >3 hours or <3 months	○ **YES**	○ NO
Recent (within 2-4 weeks) major trauma, surgery (including laser eye surgery), GI/GU bleed	○ **YES**	○ NO
Any history of intracranial hemorrhage	○ **YES**	○ NO
Bleeding, clotting problem, or blood thinners	○ **YES**	○ NO
Pregnant female	○ **YES**	○ NO
Serious systemic disease (eg, advanced cancer, severe liver or kidney disease)	○ **YES**	○ NO

Step 3 — **Is patient at high risk?**
If ANY one of the following is checked YES, consider transfer to PCI facility.

Heart rate ≥100/min AND systolic BP <100 mm Hg	○ **YES**	○ NO
Pulmonary edema (rales)	○ **YES**	○ NO
Signs of shock (cool, clammy)	○ **YES**	○ NO
Contraindications to fibrinolytic therapy	○ **YES†**	○ NO
Required CPR	○ **YES**	○ NO

*Contraindications for fibrinolytic use in STEMI are viewed as advisory for clinical decision making and may not be all-inclusive or definitive. These contraindications are consistent with the 2004 ACC/AHA Guidelines for the Management of Patients With ST-Elevation Myocardial Infarction.

†Consider transport to primary PCI facility as destination hospital.

PATIENT CONSENT

NOTE:

Many patients with acute myocardial infarction (AMI) may not be legally 'competent' to give informed consent, and the EMERGENCY CARE PRACTITIONER must act in the individual patient's best interest. Prior to administration, you must ensure the patient understands the risk and benefits of thrombolysis, as set out below.

Initial Consent

"It is likely that you are having a heart attack and the best treatment available to you is a clot dissolving drug called **Tenecteplase/Streptokinase**. The quicker you receive this drug, the lower the risks of a heart attack, which is why doctors recommend that the treatment is started as soon as possible. These drugs can cause serious side effects in a small minority of patients, which I can explain to you in more detail if you so wish; but the risks attached to this treatment are very much less than the likely benefit. Would you like me to give you the injection or would you prefer to be given more details?"

I hereby consent to the treatment:

_____	_____/_____	_____
Name of patient	Date / Time	Signature / Thumbprint

Reference Material

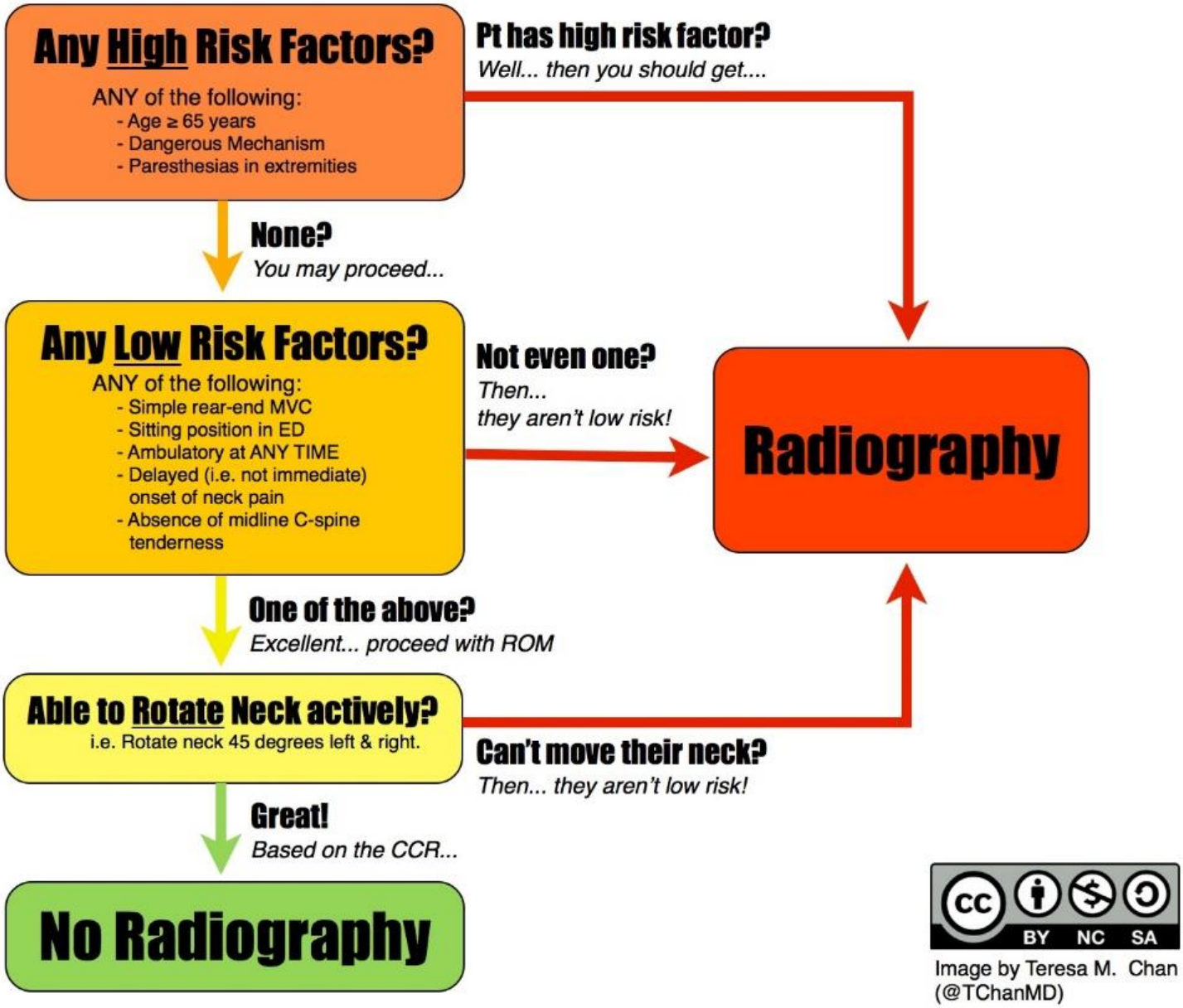
1. GCS:

Score*	Adult	Children aged 1–5	Infants
Best eye response			
1	No eye opening	No eye opening	No eye opening
2	Eye opening to pain	Eye opening to pain	Eye opening to pain
3	Eye opening to voice	Eye opening to voice	Eye opening to voice
4	Eyes open spontaneously	Eyes open spontaneously	Eyes open spontaneously
Best verbal response[†4]			
1	No response	No response	No response
2	Incomprehensible sounds	Incomprehensible, restless, unaware	Moans to pain
3	Inappropriate words	Inappropriate words, inconsolable, unaware	Cries to pain
4	Confused	Disoriented, consolable, aware	Irritable cry
5	Oriented	Oriented, social, interactive	Coos, babbles
Best motor response			
1	No response	No response	No response
2	Decerebrate posturing	Decerebrate posturing	Decerebrate posturing
3	Decorticate posturing	Decorticate posturing	Decorticate posturing
4	Withdraws from pain	Withdraws from pain	Withdraws from pain
5	Localizes pain	Localizes pain	Withdraws to touch
6	Follows commands	Normal spontaneous movement	Normal spontaneous movement

2. APGAR:

Indicator		0 Points	1 Point	2 Points
A	Activity (muscle tone)	Absent	Flexed arms and legs	Active
P	Pulse	Absent	Below 100 bpm	Over 100 bpm
G	Grimace (reflex irritability)	Floppy	Minimal response to stimulation	Prompt response to stimulation
A	Appearance (skin color)	Blue; pale	Pink body, Blue extremities	Pink
R	Respiration	Absent	Slow and irregular	Vigorous cry

3. Canadian C-spine Rule:



4. Neonatal Resources:

Incubator Temperatures:

Neutral Thermal Environment (NTE) – Neonates Days 1-5				
	1000-1200g (+/- 0.5ºC)	1201-1500g (+/- 0.5ºC)	1501-2500g (+/- 1.0ºC)	>2500g/>36weeks
0-12hrs	35.0ºC	34.0ºC	33.3ºC	32.8ºC
12-24hrs	34.5ºC	33.8ºC	32.8ºC	32.4ºC
24-96hrs	34.5ºC	33.5ºC	32.3ºC	32.0ºC

Neutral Thermal Environment (NTE) – Neonates >5 Days			
	<1500g	1501-2500g	>2500g />36weeks
5-14 days	33.5ºC	32.1ºC	32.0ºC
14-21 days	33.1ºC	31.7ºC	30.0ºC

DDx:

DIFFERENTIAL DIAGNOSIS: THE CRITICALLY ILL INFANT			
T	Trauma	M	Metabolic
H	Heart Disease	I	Inborn Errors of Metabolism
E	Endocrine	S	Sepsis
		F	Formula
		I	Intestinal
		T	Toxins
		S	Seizures

5. Paediatric Rehydration:

Clinical Findings	Degree of Dehydration		
	None (<5%)	**Some (5-10%)**	**Severe (>10%)**
General Appearance	Well, Alert	Restless, Irritable	Lethargic or Unconscious
Eyes	Normal	Sunken	Sunken
Thirst	Drinks Normally, Not Thirsty	Drinks Eagerly, Thirsty	Drinks Poorly or is Unable to Drink
Skin Turgor/Pinch	Returns Quickly	Returns Slowly	Returns Very Slowly
Estimated Fluid Deficit	<50ml/kg	50-100ml/kg	>100ml/kg

Rehydration			
Degree of Dehydration	**None (<5%)**	**Some (5-10%)**	**Severe (>10%)**
Replacement Fluids	None.	15-20ml/kg/hour for first 4 hours.	20ml/kg/hour for first 4 hours.
Maintenance Fluids	Guided by patient thirst and/or observation.	• 0-3months: 150ml/kg/day • 3-12months (<10kg): 120ml/kg/day • 10-20kg: 1000ml + 50ml/kg over 10kg/day • >20kg: 1500ml + 20ml/kg over 20kg/day • Ongoing Losses: additional10-15ml/kg/day per stool/vomit	
Hospital Admission	No	Yes	Yes

6. Lung Protective Ventilation:

Principles:

- **Open** the lung and **keep it open** while ventilating with **minimal** alveolar stress.
- Avoid de-recruitment of alveoli: optimize **PEEP**.
- Avoid **hyperoxia**: FiO2 should drop below .5 within 24hrs where possible.
- May allow **permissive hypercapnia**: this limits volutrauma, barotrauma and atelectrauma.
- Consider **recruitment manoeuvres**: prone positioning, incremental PEEP increase).
- **Limit pressures**. *Driving pressure = plateau pressure – PEEP*. Limit driving pressure to 13-15cmH2O.

Initial Settings:

- **Tidal Volume**: 4-6ml/kg.
- **RR:** 12-20bpm.
- **Inspiratory Flow:** 60L/min (standard) – increase to 80-100L/min to improve patient comfort.
- **FiO2:** 1.0 and rapidly titrate down.
- **PEEP:** 5-7 cmH2O and titrate.
- **Plateau Pressure:** <30cmH2O.

7. ICU Resources:

Formulas:

- PF ratio = PaO_2 / FiO_2 = >300 (<300 = acute lung injury, <200 = ARDS)
- $\text{Pmean} = \frac{\text{PiP+PEEP}}{2}$
- $\text{OI} = \frac{(\text{FiO}_2 \times \text{MAP}) \times 100}{\text{PaO}_2}$ = normal of 2.1 (13 safe cut off, >20 unsafe)
- MAP = [(sys+dias)/3] + dias
- $\text{TPR} = \frac{\text{MAP} - \text{CVP}}{\text{CO}} \times 80$

Normal ABG Values:

pH	7.35 – 7.45
PaO_2	80 – 100mmHg
$PaCO_2$	35 – 45mmHg
HCO_3^-	22 – 26mmol/L
BE	- 2 – + 2
Na^+	135 – 145mEq/L
K^+	3.5 – 5 mEq/L
Cl^-	98 – 110 mEq/L
Ca^+	1.15 – 1.29 mEq/L
Lactate	0.5 – 1.2mmol/L
Fe-shunt	1-5%
CRP	<5
Urea	1.7 – 8.3
BUN	8 - 23
Creatinine	49 - 90

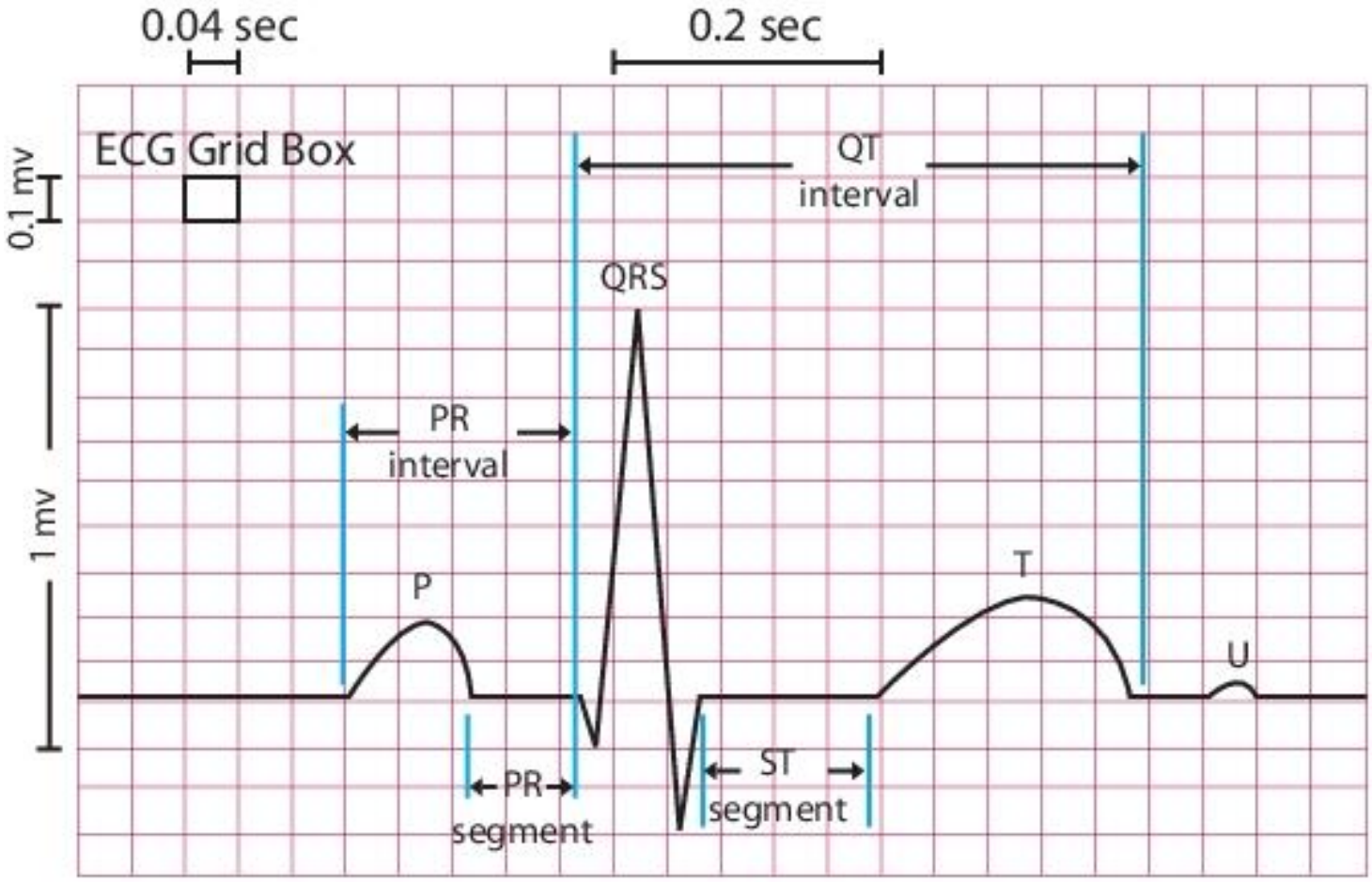
Blood Measurements:

Test	About	Range
WBC	White blood count – high count can signify presence of infection.	4,300-10,800 cmm
WBC Differential count	Irregularities could indicate infection, inflammation, anemia etc.	Neutrophils 40% Lymphocytes 20-40% Monocytes 2-8% Eosinophils 1-4% Basophils 0.5-1%
RBC	Red blood cell count – if irregularities arise, other tests are needed for diagnosis.	4.2-5.9 million cmm
Hematocrit	Measures total blood volume of red blood cells. Values are typically higher for men.	Men: 45-52% Women: 37-48%
Hemoglobin	Low levels may indicate anemia.	Men: 13-18 g/dL Women: 12-16 g/dL
MCV	Mean corpuscular volume – measures the average volume of red blood cells (RBCs).	80-100 femtolitres
MCH	Mean corpuscular haemoglobin – measures average conc. of haemoglobin in RBCs.	27-32 picograms
MCHC	Measures average conc. of haemoglobin in a specific amount of red blood cells.	28-36%
RCDW	Red cell distribution width – offers an idea of the shape and size of red blood cells.	11-15%
Platelet count	Platelets are involved in the clotting process.	150k-400k mL
MPV	Mean platelet volume – calculates the average size of platelets. High MPV can increase risk of stroke or heart attack.	7.5-11.5 femtolitres

8. ECG:

Interpretation:

- Rate?
- Regular or Irregular?
- Regularly Irregular or Irregularly Irregular?
- P-waves before every QRS complex?
- QRS complex after every P-wave?
- PR interval?
- QRS duration?
- QT interval?
- ST segment changes?



PR Interval	0.12–0.20 sec
QRS Interval	0.06–0.10 sec
QT Interval	Less than half of the R-R interval

SITE	FACING	RECIPROCAL
SEPTAL	V1, V2	NONE
ANTERIOR	V3, V4	NONE
ANTEROSEPTAL	V1, V2, V3, V4	NONE
LATERAL	I, aVL, V5, V6	II, III, aVF
ANTEROLATERAL	I, aVL, V3, V4, V5, V6	II, III, aVF
INFERIOR	II, III, aVF	I, aVL
POSTERIOR	NONE	V1, V2, V3, V4

9. Adrenaline Infusions

AIEM

ADRENALINE DOSING (3mg in 50ml N/S) with syringe driver

	WEIGHT												
→	Range	55kg	60kg	65kg	70kg	75kg	80kg	85kg	90kg	95kg	100kg		
Dose/min	Unit	ml/hr	ml/hr	ml/hr	ml/hr	ml/hr	ml/hr	ml/hr	ml/hr	ml/hr	ml/hr		
		5,5-55	6-60	6,5-65	7-70	7,5-75	8-80	8,5-85	9-90	9,5-95	10-100		
0,1	ug/kg/min	5,5	6	6,5	7	7,5	8	8,5	9	9,5	10		
0,2	ug/kg/min	11	12	13	14	15	16	17	18	19	20		
0,3	ug/kg/min	16,5	18	19,5	21	22,5	24	25,5	27	28,5	30		
0,4	ug/kg/min	22	24	26	28	30	32	34	36	38	40		
0,5	ug/kg/min	27,5	30	32,5	35	37,5	40	42,5	45	47,5	50		
0,6	ug/kg/min	33	36	39	42	45	48	51	54	57	60		
0,7	ug/kg/min	38,5	42	45,5	49	52,5	56	59,5	63	66,5	70		
0,8	ug/kg/min	44	48	52	56	60	64	68	72	76	80		
0,9	ug/kg/min	49,5	54	58,5	63	67,5	72	76,5	81	85,5	90		
1	ug/kg/min	55	60	65	70	75	80	85	90	95	100		

10. Major Incident Reminders:

- Mobilize **relevant resources** (i.e. fire, rescue, medical, HEMS, HAZMAT, law enforcement/security).
- Set up **incident command** area.
- Appoint **officers** (i.e. triage, logistics, communications, safety, medical, rescue, fire, media).
- Set up **staging areas**: equipment, patients based on triage.
- **Notify** nearby receiving medical facilities in advance.
- Search scene for **hidden patients** (walk-around).
- **Reports** and **documentation**.
- **Debrief**.

11. Other/Troubleshooting:

Causes of Coma:

T – Trauma

I – Infection

P – Psychiatric

S – Stroke/Space occupying lesion

A – Alcohol (other drugs/toxins)

E – Endocrine/Environment

I – Insulin (hypo/hyperglycaemia)

O – Oxygen (hypoxia)

U – Uraemia

Ventilation Problems:

D – Displacement of ETT

O – Obstruction of ETT

P – Pneumothorax

E – Equipment failure

S – Stacked breaths

12. CPG Capabilities List

Approved PBEC-CPD Activity without formal assessment. Where a skill is involved, this may involve practical performance of the skill.

Approved PBEC-CPD Activity with formal assessment. Where a skill is involved, this may involve practical performance of the skill.

CAPABILITY	CATEGORY OF REGISTRATION					
AIRWAY MANAGEMENT	BAA	AEA	ECT	ECA	ANT	ECP
Basic manual airway manoeuvres	x	x	x	x	x	x
Suctioning of the airway – upper	x	x	x	x	x	x
Suctioning of the airway – (endotracheal)					x	x
Suctioning of the airway – (extraglottic)			x	x	x	x
Manual airway obstruction manoeuvres (conscious choking patient)	x	x	x	x	x	x
Use of Magill's forceps/equivalent			x	x	x	x
Oropharyngeal airway insertion	x	x	x	x	x	x
Nasopharyngeal tube airway insertion	x	x	x	x	x	x
Endotracheal intubation facilitated by induction, neuromuscular blockade, mechanical ventilation and airway adjuncts						x
Endotracheal Intubation - non-drug facilitated or via deep sedation techniques	NOT TO BE PERFORMED					
Video Laryngoscopy						x
Supraglottic/extraglottic airway devices insertion (CA - Cardiac Arrest)			x	x (CA)	x	x
Oro/nasogastric tube insertion			x		x	x
Needle cricothyroidotomy		x	x	x	x	x
Surgical cricothyroidotomy (adolescent/adult) – Commercial Device Recommended			x		x	x

OXYGENATION AND VENTILATION	CATEGORY OF REGISTRATION					
	BAA	AEA	ECT	ECA	ANT	ECP
Oxygen administration	x	x	x	x	x	x
Nebulization of medications on scope of practice	x	x	x	x	x	x
Use of pulse oximetry	x	x	x	x	x	x
Needle thoracentesis (Adult and paediatric)		x	x	x	x	x
Needle thoracentesis (Neonate)						x
Bag-valve mask manual ventilation	x	x	x	x	x	x
Bag-valve tube manual ventilation	x	x	x	x	x	x
Interfacilty Mechanical Ventilation (Paediatric and Adult - without cardiovascular support)					x	x
Mechanical Ventilation (Neonate)					x	x
Non-invasive ventilation with Mechanical Ventilator					x	x
Non-invasive ventilation – oxygen driven (without mechanical ventilator)			x	x	x	x
Mechanical Infant Resuscitator			x	x	x	x
Use of capnography/capnometry – via endotracheal tube/extraglottic device			x	x	x	x
Use of capnography/capnometry - via facemask/nasal cannula		x	x	x	x	x
Humidification					x	x

CIRCULATORY MANAGEMENT	CATEGORY OF REGISTRATION					
	BAA	AEA	ECT	ECA	ANT	ECP
Blood pressure measurement including the use of NIBP (automated).	x	x	x	x	x	x
Peripheral intravenous cannulation as per relevant protocol – limbs and hands (All ages >1year old)		x	x	x	x	x
Peripheral intravenous cannulation as per relevant protocol – limbs and hands (<1year old)					x	x
Peripheral intravenous cannulation as per relevant protocol – (Infant scalp)					x	x
External jugular vein cannulation					x	x
Intra-osseous insertion All Ages			x		x	x
Intra-osseous insertion – Adult			x	x	x	x
Umbilical vein cannulation			x		x	x
Intravenous fluid therapy (for purposes other than drug administration - Adult)		x	x	x	x	x
Intravenous fluid therapy (for purposes other than drug administration – Infant and Paediatric)			x		x	x
Oral rehydration	x	x	x	x	x	x
Oral Rehydration via NGT					x	x
Intravenous/intraosseous drug administration as per scope of practice		x	x	x	x	x
Subcutaneous drug administration as per scope of practice		x	x	x	x	x
Intramuscular drug administration as per scope		x	x	x	x	x

CIRCULATORY MANAGEMENT	CATEGORY OF REGISTRATION					
	BAA	AEA	ECT	ECA	ANT	ECP
Endotracheal drug administration					x	x
Use of intravenous infusion devices including pressure infuser, volumetric infusion pump and syringe driver			x		x	x
External haemorrhage control including use of tourniquet	x	x	x	x	x	x
Topical Haemostatic Agents	x	x	x	x	x	x
Use of pneumatic anti-shock garment		x	x	x	x	x
Use of non-pneumatic anti-shock garment		x	x	x	x	x
Automated external defibrillation	x	x	x	x	x	x
Manual defibrillation (asynchronous)		x	x	x	x	x
Precordial thump	x	x	x	x	x	x
Synchronised cardioversion					x	x
Vagal manoeuvres					x	x
Central line management of lines in-situ					x	x
Transcutaneous cardiac pacing					x	x
3-Lead ECG monitoring and diagnosis as per scope of practice		x	x	x	x	x
12-Lead ECG Diagnosis						x
Fibrinolysis (With documented telemetry or equivalent)						x
Targeted Temperature Management (inter-facility transfer and where capabilities exist)						x

OBSTETRIC MANAGEMENT	CATEGORY OF REGISTRATION					
	BAA	AEA	ECT	ECA	ANT	ECP
Normal vaginal delivery as per scope of practice	x	x	x	x	x	x
Prolapsed cord management as per scope of practice	x	x	x	x	x	x
Breech delivery management as per scope of practice	x	x	x	x	x	x
Mal-presentations management as per scope of practice	x	x	x	x	x	x
Preterm labour management as per scope of practice	x	x	x	x	x	x
Obstructed labour management as per scope of practice	x	x	x	x	x	x
Post-partum haemorrhage management as per scope of practice	x	x	x	x	x	x
DIAGNOSTIC AND CLINICAL AIDS	**CATEGORY OF REGISTRATION**					
	BAA	**AEA**	**ECT**	**ECA**	**ANT**	**ECP**
Use of ultrasound					x	x
Fundoscopy						x
Use of an otoscope						x
Use of a Snellen Chart						x
Arterial blood gas sampling and analysis						x

GENERAL	CATEGORY OF REGISTRATION					
	BAA	AEA	ECT	ECA	ANT	ECP
Cardiac arrest management (adult, child, infant & neonate) as per scope of practice	x	x	x	x	x	x
Clinical assessment (as per level of care)	x	x	x	x	x	x
Vital Sign Assessment	x	x	x	x	x	x
Finger prick and blood glucose measurement (manual and electronic)	x	x	x	x	x	x
Peak flow measurement and interpretation		x	x	x	x	x
Point of Care Blood Sampling (Capillary)					x	x
Cervical spinal clearance		x	x	x	x	x
Spinal Movement Restriction[1]	x	x	x	x	x	x
Application of limb splints	x	x	x	x	x	x
Application of pelvic binding devices	x	x	x	x	x	x
Application of vacuum mattress	x	x	x	x	x	x
Urinary catheterization					x	x
Emergency wound care as per scope of practice	x	x	x	x	x	x
Suturing						x
Withdrawal of resuscitation efforts		x	x	x	x	x
Withholding resuscitation[2]	x[2]	x	x	x	x	x
On-scene discharge[3]						x
Inter-facility transfer as per relevant scope of practice	x	x	x	x	x	x
Use of an incubator	x	x	x	x	x	x

LIST OF MEDICATIONS (ROUTE OF ADMINISTRATION)	BAA	AEA	ECT	ECA	ANT	ECP
Acetyl Salicylic Acid (Oral)	x	x	x	x	x	x
Activated Charcoal (Lavage)	x	x	x	x	x	x
Adenosine (Intravenous)					x	x
Adrenaline – use in anaphylaxis and cardiac arrest (Intramuscular and Intravenous)		x	x	x	x	x
Adrenaline other than anaphylaxis and cardiac arrest (Inhaled, Subcutaneous, Intramuscular and Intravenous)			x*		x	x
Amiodarone Hydrochloride (Intravenous)			x		x	x
Atropine Sulphate - use in toxidrome (Intramuscular and Intravenous)			x	x	x	x
Atropine Sulphate (Intravenous)			x		x	x
Balanced Salt Solution	For AEA, ECT, ECA, ANT and ECP - Not to be prescribed/supplied unless through direct Medical Practitioner prescription/supply. All other professional registration categories, not permitted. Currently undergoing review.					
Betamethasone (Intravenous)						x*
Calcium Chloride/Calcium Gluconate (Intravenous)					x	x
Clopidogrel (Oral)					x	x
Cyclizine (Intravenous)					x	x
Hydrocortisone (Intravenous or Intramuscular)		x	x	x	x	x
Dextran (Intravenous)		x	x	x	x	x
Dextrose Intravenous (Adult and Paediatric)		x	x	x	x	x
Dextrose Intravenous (Neonate)					x	x

ADMINISTRATION)	BAA	AEA	ECT	ECA	ANT	ECP
Dopamine (Intravenous)	Not to be prescribed/supplied					
Diazepam (All routes)			x	x	x	x
Dobutamine (Intravenous)	Not to be prescribed/supplied					
Enoxaparin (Subcutaneous)						x
Etomidate (Intravenous)						x
Fenoterol (inhaled)	x	x	x	x	x	x
Fentanyl (Intravenous)	For ECP and ANT - Not to be prescribed/supplied unless through direct Medical Practitioner prescription/supply. All other professional registration categories, not permitted. Currently undergoing review.					
Fentanyl (Intranasal)						
Flumazenil (Intravenous - only in cases of iatrogenic benzodiazepine overdose)			x	x	x	x
Flumazenil (Intravenous)						x
Furosemide (Intravenous)					x	x
Glucagon (Intramuscular and Intravenous)		x*	x	x	x	x
Glyceryl Trinitrate (Sublingual)			x		x	x
Heparin Sodium (Subcutaneous and Intravenous)						x
Hydralazine (Oral)						x*
Hyoscine Butylbromide (Oral and Intravenous)						x*
Ibuprofen (Oral)					x*	x
Ipratropium Bromide	x	x	x	x	x	x
Isosorbide Trinitrate (Intravenous)						x*

ADMINISTRATION)	BAA	AEA	ECT	ECA	ANT	ECP
Ketamine (Intravenous)					x	x
Ketamine (Intramuscular)					x	x
Ketamine (Intranasal)					x	x
Labetalol (Intravenous)						x*
Lignocaine hydrochloride (IO Flush – Local Anaesthetic)			x	x	x	x
Lignocaine hydrochloride (Intravenous – arrhythmia management)					x	x
Lorazepam (Intramuscular and Intravenous)			x	x	x	x
Magnesium Sulphate (Intramuscular)		x*	x	x	x	x
Magnesium Sulphate (Intravenous)			x		x	x
Medical oxygen	x	x	x	x	x	x
Methylprednisole (Intravenous or Intramuscular)		x	x	x	x	x
Metoclopramide monohydrochloride (Intramuscular and Intravenous)			x		x	x
Methoxyflurane (Inhaled)	x	x	x	x	x	x
Midazolam (All routes)			x	x	x	x
Morphine Sulphate (Intravenous)			x*		x	x
Naloxone hydrochloride (All routes)		x*	x	x	x	x
Neostigmine (Intravenous)						x
Nifedipine (Oral)	For ECP - Not to be prescribed/supplied unless through direct Medical Practitioner prescription/supply. All other professional registration categories, not permitted. Currently undergoing review.					
Nitrous oxide (Inhaled)	x	x	x	x	x	x
Ondanseteron (Intravenous)						x

LIST OF MEDICATIONS (ROUTE OF ADMINISTRATION)	CATEGORY OF REGISTRATION					
	BAA	AEA	ECT	ECA	ANT	ECP
Oral glucose powder/gel	x	x	x	x	x	x
Oxytocin (Intramuscular and Intravenous)			x*		x*	x
Paracetamol (Oral)					x	x
Paracetamol (Intravenous)					x*	x
Prednisolone (Oral)			x		x	x
Promethazine (Intramuscular and Intravenous)			x		x	x
Ringer's Lactate (Intravenous)		x	x	x	x	x
Rocuronium (Intravenous)						x
Salbutamol (Inhaled)	x	x	x	x	x	x
Salbutamol (Intravenous)			x		x	x
Sodium Bicarbonate 8.5% (Intravenous)					x	x
Sodium Chloride Solution (Intravenous)		x	x	x	x	x
Sotalol (Intravenous)						x*
Sugammadex (Intravenous)						x
Streptokinase (Intravenous)						x
Suxamethonium Chloride (Intravenous)						x
Tenecteplase (Intravenous)						x
Thiamine (Intramuscular)		x	x	x	x	x
Tranexamic Acid (Intravenous)					x	x
Vecuronium (Intravenous)						x

LIST OF MEDICATIONS (ROUTE OF ADMINISTRATION)	CATEGORY OF REGISTRATION					
	BAA	AEA	ECT	ECA	ANT	ECP
Water for Injection (Intravenous)		x	x	x	x	x
Water for Injection (Inhaled)	x	x	x	x	x	x
Cyanide antidotes (within occupational health and safety system)					x	x

IMPORTANT ADDITIONAL NOTES (also see superscripts)

1. Includes the use of all evidence-based spinal motion restriction devices.
2. In the context of decapitation, mortal disfigurement, post-mortem lividity and putrefaction.
3. This implies that a formal clinical assessment and patient information session including subsequent referral/re-entry into the health system has been discussed with the patient. This process does not refer to a "refusal of hospital transport (RHT)" scenario.
Where additional skills/medications not previously on the scope of practice, have formed part of a Higher Education Institution PBEC-approved curriculum (including a formal assessment of such skills/medications) a PBEC-approved CPD activity is not mandatory. This is still, however, recommended.
All interventions and medications are to be performed and administered within the Clinical Practice Guidelines and a locally relevant standard of care. Clinical governance structures shall support these guidelines.
Where the list of capabilities indicates "…within scope of practice", this implies in relation to the medications available to the category of registration and related PBEC- approved education/training.
In relation to PBEC - approved CPD activities - where skills are concerned, the content of the activity must include indications, contraindications, risks, benefits and a description (either diagrammatic and/or demonstation) of the skill.
In relation to PBEC - CPD activities - where medications are concerned, the content of the activity must include the class of drug, schedule of drug, packaging of drug, storage of drug, mechanism of action, indications, contraindications, side-effects, technique/route of administration and recommended dosing range.