



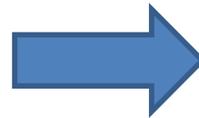
**London  
School of  
Paediatrics  
SIMULATION**

# **Assessing a patient in an Emergency – useful tips and drug doses**

## **2015-2016 Programme**

**Resuscitating a Patient in an Emergency: Immediate Actions to be taken**

Are there any signs of life?  
If No – commence BLS  
If Yes – assess as below



Is the child in respiratory failure?  
Is it affecting the upper or lower airways?  
Is there any effect on the Cardiovascular or Neurological system?  
Does the child need oxygen?  
Does the child need ventilation?  
Are the risks of aspiration addressed?

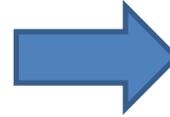


Whilst approaching the child: this should take 10 seconds  
What is the skin colour?  
Is the patient moving?  
Look at respiratory movements, including chest symmetry  
Look at the monitoring on the child – SpO<sub>2</sub>, FR, BP, ECG trace  
Feel for pulses  
Look at the pupils, Assess AVPU  
Glance at the abdomen – any evidence of distension, abnormality?



Immediate actions to be taken to stabilise ABCDE:

- AB Can you improve breathing by using airway opening manoeuvres?
- AB Does the child need Oxygen? If Yes – give 15l/min O<sub>2</sub> by face mask with reservoir bag
- AB Do you need to suction the airways/nostrils/mouth?
- AB Think about the stomach – is it empty? Will you need to insert an NG tube
- AB Do you need to commence bag-valve mask ventilation?
- C Do you need urgent iv or io access to give fluids/drugs?



Is the child responding to Oxygen?

- If not, does the child have a severe respiratory problem, severe haemodynamic instability, cyanotic congenital heart disease?
- Does the child have cardiac failure? Is the child in shock?
- Is there any neurological involvement? Primary? Secondary?
- Is there concern for raised intracranial pressure?



Detailed assessment of ABCDE, which organ systems are affected?

Rapid initial assessment – should take 10 seconds

Cardiovascular involvement?

Neurological involvement?

Metabolic involvement?

- C Can you feel pulses – central and peripheral? Do you need to start CPR?
- ABCD Does the child respond – to voice, to touch? AVPU score?
- CD What is the central temperature, are the peripheries cool?
- CD Measure the Capillary Refill Time
- BCD Feel the liver for hepatomegaly
- C Make sure the BP is monitored regularly
- D Feel the fontanelle – if age appropriate
- D Look at the pupils/eyes
- D Examine the abdomen – any distension, discolouration?
- D Examine the limbs if relevant
- BCD Check BM, Hb, Na<sup>+</sup>, K<sup>+</sup>, Ca<sup>2+</sup>, Lactate, Base Deficit, Cultures etc.

Next action steps

AB	Does the child need bag-valve mask ventilation? Suction? NGT? OGT? Intubation?
ABC	Is there a response in the SpO <sub>2</sub> to O <sub>2</sub> ? Does the child need nebulisers?
C	Access: iv/io
C	Immediate drugs? Intravenous fluids? Antibiotics etc?
C	Does the child need inotropes? Does the child need Prostin?
CD	Are there any acute electrolyte derangements that need urgent treatment? Na <sup>+</sup> , K <sup>+</sup> , Ca <sup>2+</sup> , glucose?
D	Do you need to manage raised intracranial pressure? Is 3% Saline or Mannitol required?
D	Do you need a surgeon? Neurosurgeon? General Surgeon? Orthopaedic Surgeon?



Next action steps:

Further Clinical Examination:

AB	Breathing sounds – stridor, wheeze
C	Heart sounds, Gallop? Murmur?
D	Abdominal sounds?



On-going stabilisation  
Further Diagnostic aids - Imaging  
Clinical Management

Other useful information:

- Approximate weight (kg):
- Previously advised formula (age + 4) x 2
- More accurately (APLS):
- <12 months: weight = (0.5 x age in months) + 4
- 12 months: weight = (0.5 x age in months) + 4
- 1-5 years: weight = (2 x age in years) + 8
- 6-12 years: weight = (3 x age in years) + 7

Cardiovascular:

Adrenaline 1/10,000 (=1mg/10ml) IV/IO for cardiac arrest: bolus; 0.1ml/Kg = 0.01mg/Kg = 10microgr/Kg; IV, IO.

Adrenaline/ Noradrenaline IV centrally including IO; Prepare 0.3mg/Kg in 50 ml syringe 0.9% saline; 0.1microgr/Kg/min= 1ml/hour; start at 0.1microgr/Kg/min, modify as need be. Infusions require continuous monitoring of SaO<sub>2</sub>, BP, ECG.

Dopamine IV peripherally or centrally including IO. Prepare 3mg/Kg in 50ml syringe 0.9% saline; 5microgr/Kg/min = 5ml/hour. Start at 5 microgr/Kg/min, increase as need be to 20microgr/Kg/min.

Duct dependant lesion: Dinoprostone PGE<sub>2</sub> (Prostin). Low dose: 3-10 nanogr/Kg/min if patient is not in shock & stable.

High dose starting at 5 increasing up to 50 nanogrammes/Kg/min if in shock. Infusion of Dinoprostone (1mg/ml): 0.1ml x weight in Kg = ml of dinoprostone to be drawn up (= 100microgr x weight in Kg). Make up to 33ml of 0.9%saline or dextrose. 0.1ml/hour = 5 nanogrammes/Kg/min. Adverse effects: apnoea, bradycardia, hypotension, fever, hypoglycaemia. Monitoring of vital signs is essential. Bag/mask for ventilation must be ready before starting PGE<sub>2</sub>. Inotropes and resuscitation fluids should also be available.

Arrhythmia:

Atropine for bradycardia: 10-20 microgr/Kg, IV.

DC shock: cardioversion in SVT 1-2 J/Kg, Defibrillation 4J/Kg.

SVT: adenosine: 100microgr/Kg to 300microgr/Kg, up to 500microgr/Kg, very rapid bolus with 10ml normal saline.

Fluid boluses: 10-20 ml/Kg boluses (0.9% saline or 5% albumin).

Indication for fluid boluses is based on a complete clinical assessment: SaO<sub>2</sub>, pulses, CRT, HR, BP, liver, heart (gallop, murmur) + Blood gas: pH, lactate, base deficit.

Raised intracranial Pressure:

3%saline for IV: Take 36ml out of a 500ml bag 0.9% saline and replace with 36ml of 30% saline. Alternatively use ready made 2.7% saline bags. Give 3ml/Kg over 5-10min.

Mannitol 20%=20g/100ml; IV 0.25g/Kg over 15min (can be repeated) to 1g/Kg over 30 minutes.

Anticonvulsants:

Lorazepam 0.1mg/Kg, max 4 mg; IV/IO. Risks of respiratory depression.

Diazepam rectally, nn:1.25-2.5mg; 1m-2y: 5mg; 2-12y: 5-10mg. Given IV increases risks respiratory depression.

Midazolam buccal 0.3mg/Kg. Risks of respiratory depression.

**Maintenance daily fluid requirements:**

Neonates: 150ml/Kg/day. Infants 1-12m: 100ml/Kg/day

Older children:

up to 10Kg: 100mls/Kg/day

10-20Kg: add to previous 50mls/Kg/day for all additional Kg above 10Kg

20-30Kg: add to previous 20mls/kg/day for all additional Kg above 20Kg

> 50kg: 2-2.5 litres per day

**Antibiotics:**

Aciclovir: IV <3m: 20mg/Kg; 3m-12y: 500mg/m<sup>2</sup>;

>12y: 10mg/Kg

Azithromycin: PO 10mg/Kg, per dose

Cefotaxime: IV, IM 50mg/Kg per dose. Use if < 1m or if high bilirubin

Ceftriaxone: IV, IM 80mg/Kg per dose, if > 1m

Gentamicin: if > 1m: IV 7mg/Kg once a day

**IV bronchodilators:**

Salbutamol: Requires SaO<sub>2</sub>, BP, ECG monitoring

IV bolus: <2y: 5microgrammes/Kg, over 5-10min, >2y: 15microgr/Kg over 5-10min (max 250microgrammes)

Infusion: 10mg salbutamol (=10ml) added to 40ml 0.9% saline/ 5% dextrose, 1-5microgrammes/Kg/min = 0.3-1.5ml/Kg/h

Side effects: lactic/metabolic acidosis, tachycardia, arrhythmias, tremor, hypokalaemia, hyperglycaemia, hypophosphataemia

Magnesium sulphate 40mg/Kg over 20 min, max 2g. If using a 50% solution, dilute 5 x in 0.9% saline. A 10% solution (10g/100ml) can be neat. Beware of dropping BP.

Aminophylline: Requires SaO<sub>2</sub>, BP, ECG monitoring

Loading dose: IV 5mg/Kg (max 500mg) over 20 min. Do not give if already receiving theophylline. Infusion: <9y: 1mg/Kg/hour; 9-16y: 0.8mg/Kg/h. Prepare 50mg/Kg in 50ml syringe dextrose or 0.9%saline

1ml/h = 1mg/Kg/h. Can be used neat.

Side effects: arrhythmias, hypokalaemia, nausea, vomiting, dizziness.

**Saline concentration:**

0.9% saline = 0.9g/100ml = 150mmol/L of NaCl

1.8% saline = 1.8g/100ml = 300mmol/L of NaCl

2.7% saline = 2.7g/100ml = 460mmol/L of NaCl

3% saline = 3g/100ml = 513mmol/L of NaCl

Ringer lactate 130 mmol/L

**Nebulisers:**

Salbutamol: preschool, <2y: 2.5mg; Older: 5mg

Adrenaline 1/1000: nebulised: 0.4ml/Kg (max 5ml) in 3-5ml 0.9% saline

Atrovent (Ipratropium): >5y: 500microgrammes; 1-5y: 250microgr; <1y: 125microgrammes

**Hypomagnesaemia (Mg<sup>2+</sup> < 0.75mmol/L):**

Major signs: muscle weakness, arrhythmias, tetany, seizure. Often associated with hypokalaemia or hypocalcaemia.

Give 0.2mmol/Kg over 30min. Use 50% MgSO<sub>4</sub> IV centrally/IO or dilute 5 times in 0.9% saline if peripheral IV line used. The 10% solution can be used neat. Beware of dropping BP as a direct effect of Mg<sup>2+</sup>.

**NaCl for Hyponatraemia (<135mmol/L; Danger if <125mmol/L):**

-Knowing the underlying cause is essential: Hyponatraemia can be associated with hyper/normo/hypovolaemia.

-Major signs (seizure, confusion, coma, brain stem herniation) appear with a rapid fall of Na<sup>+</sup> level or when Na<sup>+</sup> < 125mmol/l.

-Treatment of symptomatic patients: 3% saline (or 2.7% saline pre-made bags if available), 3ml/Kg bolus, repeated until symptoms stop (usually this corresponds to a rise of Na<sup>+</sup> of 4-6mmol/L).

If asymptomatic and to increase Na<sup>+</sup> level to 125mmol/l, give IV Na<sup>+</sup>mmol = (125—serum Na<sup>+</sup>) x 0.3 x weight (Kg), over 30-60min.

If IV peripherally, use concentration of 1.8% saline. A rapid rise of Na<sup>+</sup> above 125mmol/l can cause demyelination.

If asymptomatic and/or Na<sup>+</sup>>125mmol/l, Na<sup>+</sup> rise must be < 8mmol/L/day.

Also treat volume changes: Give volume if hypovolaemia or fluid restrict/diuretics if hypervolaemia.

**Hyperkalaemia >5.5mmol/L (premature: >6.5mmol/L):**

Major symptoms: arrhythmias when severe; ECG: peaked T waves, wide QRS, sine pattern wave form.

Treatment:

1. Adequate volume expansion: 10-20mL/Kg 0.9% saline.
2. Stabilising myocardium: Calcium gluconate 10% 0.1mmol/Kg over 5-10min. (! Extravasation, arrhythmias).
3. Intracellular K<sup>+</sup> shift:
  - Sodium bicarbonate 1-2mmol/Kg, IV over 15-60min (not with calcium).
  - Insulin/dextrose: insulin 0.1units/Kg + glucose 0.5g/kg (= 5ml/Kg of 10%dextrose), over 30 min-2h. Monitor sugar level (may drop!).
  - Salbutamol nebuliser, 2.5mg or 5mg.
  - Salbutamol bolus IV. 4. Enhance body elimination: Calcium Resonium powder PO/PR. To use as second stage. PO 125-250mg/Kg (max 15g), 6-8hourly, with water. PR 125-250mg/Kg in 1-3mL/Kg methylcellulose solution or water, 3-4 hourly. Irrigate colon after 6-12 hours to remove resin.
  - Furosemide IV 0.5-1mg/Kg.
  - Haemodialysis/haemofiltration.

**Hypocalcaemia with ionised calcium <1mmol/L:**

Vitamin D deficiency, Hypoparathyroidism, low Ca<sup>++</sup> intake, low Mg<sup>++</sup>, Pseudohypoparathyroidism, Familial hypercalcyuric hypocalcaemia.

Major symptoms: seizures, cramps, arrhythmias.

Treatment: IV if symptomatic (oral if asymptomatic: see BNF for doses).

IV CaCl<sub>2</sub> 0.1mmol/Kg or IV Calcium gluconate 10% 0.1mmol/Kg.

Both over 5-10 min (max rate of 0.045mmol/Kg/hour).

If IV peripheral: Calcium gluconate 10% (= 0.225mmol Ca<sup>++</sup>/ml), dilute 5 times.

**Metabolic acidosis requiring Bicarbonate:**

-Volume (ml) to give IV of 8.4%NaHCO<sub>3</sub><sup>-</sup>: 0.3 x weight (in Kg) x base deficit/2, over 20min.

Neonates: Use 4.2% NaHCO<sub>3</sub><sup>-</sup>: 0.3 x weight (in Kg) x base deficit.

-Or give 1-2mmol/Kg, IV over 1h.

-Danger of extravasation injuries and hypernatraemia.

-Not to use in DKA nor cardiac arrest unless discussed with Intensivists.

**KCl for Hypokalaemia (<3.5mmol/L):**

Major signs: Cardiac arrhythmias, muscle weakness, hypotension, ileus.

Dose: 0.2-1mmol/Kg, at a rate of 0.2mmol/Kg/hour. A higher rate of 0.5mmol/Kg/h requires central IV/IO access and BP, ECG monitor.

- IV peripheral correction OVER 2 HOURS: use a 500ml bag with KCL at 20mmol KCL in 500ml 5%glucose and/or 500ml 0.9%saline. Give 10ml/Kg (OVER 2 HOURS) which will give 0.4mmol/Kg of K<sup>+</sup> OVER 2 HOURS.

-IV centrally including IO: Use bags with KCL 0.4mmolK<sup>+</sup>/ml (= 40mmol/100ml). Give KCL 0.2-1mmol/Kg, max rate of 0.5mmol/Kg/h and up to 40mmol/h.