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Current until May 2018
Emergency Protocols is a non-profit organisation dedicated to integrating and improving emergency medical guidelines.

These protocols are current at the time of publication, based on guidelines from peak medical organisations and published expert opinion. They do not replace clinical judgement, and should not be seen as inflexible authoritative statements but rather as cognitive aids to assist practitioners managing each individual situation. These protocols are not a substitute for seeking appropriate expert advice.

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Although every effort has been made to ensure that these protocols are accurate and current, Emergency Protocols shall not be responsible for any errors or omissions or for any consequences arising from the use of these protocols.

This edition is current as of May 2017, and should not be used after May 2018.

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We welcome any comments via e-mail: info@emergencyprotocols.org.au

Sources
Advanced Paediatric Life Support (www.apls.org.au)
Australia and New Zealand Emergency Department Airway Registry (www.airwayregistry.org.au)
Australian Resuscitation Council (www.resus.org.au)
Australian Society of Clinical Immunology (www.allergy.org.au)
Difficult Airway Society (www.das.uk.com)
Emergency Care Institute (www.ecinsw.org.au)
Newborn & Paediatric Emergency Transfer Service (www.nets.org.au)
NSW Health (www.health.nsw.gov.au)
Stanford Anesthesia Emergency Manual (www.emergencymanual.stanford.edu)

Do not use after May 2018
Open and clear the airway:
- head tilt and chin lift (unless cervical spine injury)
- jaw thrust
- suction

Assess for difficult bag-mask ventilation:
- Mask seal: beard, facial trauma, blood, vomit
- Obesity
- Age > 55 years
- No teeth
- Stiff ventilation: COPD, asthma, ARDS, term pregnancy

Insert oropharyngeal airway and/or nasopharyngeal airway (nasopharyngeal route relatively contra-indicated with facial or basal skull fractures)

Bag-mask ventilate with 100% oxygen

continued next page
Pre-oxygenate using **bag-mask ventilation** with 100% oxygen for **3 minutes**

Consider **high flow nasal oxygen**

---

**ASSESS FOR DIFFICULT AIRWAY**

Assess for **difficult intubation**:

- **Look externally**: obesity, short neck, facial or neck trauma

  **Evaluate**:
  
  - 3 fingers between incisors
  - 3 fingers under mandible
  - 2 fingers between mandible and larynx

**Mallampatti**:

- I
- II
- III
- IV

- **Obstruction**: soft tissue swelling, tumour, recent neck surgery, epiglottitis
- **Neck mobility**: cervical collar, elderly, rheumatoid arthritis

---

**IF PREDICTED DIFFICULT AIRWAY GO TO PAGE 9 (AIRWAY - DIFFICULT)**

If not predicted difficult airway then **continue on next page**
Draw up **induction** drug:

- IV ketamine **1.5 mg/kg** (preferred in sepsis, hypotension, asthma)
- IV thiopentone **3 mg/kg** (adult) or **1 to 2 mg/kg** (elderly)
- IV propofol **1.5 mg/kg**

Consider **lower dose** if shocked or elderly

Draw up **paralysis** drug:

- IV suxamethonium **1.5 mg/kg** of total body weight
  (increases serum potassium. Avoid in hyperkalaemia, recent burns, muscular dystrophy or other skeletal myopathy, or history of malignant hyperthermia)
- IV rocuronium **1.2 mg/kg** of ideal body weight
  (if suxamethonium contra-indicated, but paralysis lasts 10 to 40 minutes)
  Check if the rocuronium reversal agent **sugammadex** (Bridion®) is available
  (IV sugammadex dose 16 mg/kg, ie. 1200 mg for 75 kg patient)
**PRE-INTUBATION**

---

**TEAM**

**Team leader** identified

Everyone introduced, by name and role, and **each briefed in turn** by team leader

If **cervical spine injury** is suspected

then person doing in-line cervical spine immobilisation briefed?

Do you have enough help?

Predicted to be **difficult**?

**Verbalise** the **airway strategy**:

A. Initial tracheal intubation
B. Secondary tracheal intubation
C. Maintenance of oxygenation (LMA)
D. Surgical airway (cricothyroidotomy)

Anticipated **problems**?

Questions or **concerns**?

---

**PATIENT**

**Position**:

- sniffling
- **ramp** if obese

**Haemodynamics**:

- consider **fluid bolus**
  (IV normal saline)
- consider **pressors**
  (IV metaraminol 0.5 to 1 mg)

**Pre-oxygenation**:

- 3 minutes
- > 15 L/min O₂ via **mask**
  and 15 L/min via **nasal cannulae**

**Non-invasive ventilation** if:

- obese
- obstructive sleep apnoea
- sats < 95% despite O₂

**Monitoring equipment**:

- **end-tidal CO₂**
- **oxygen saturations**
- **ECG** monitoring
- **non-invasive BP**:
  - non-IV-fluid arm
  - 2 minute intervals
**DRUGS**

**First IV cannula** or intraosseous line:
- fluid running

**Second IV cannula** or intraosseous line

**Induction** drug:
- **ketamine** 1.5 mg/kg
  - or **thiopentone** 1 to 3 mg/kg
  - or **propofol** 1.5 mg/kg

**Paralysis** drug:
- **suxamethonium** 1.5 mg/kg
  - or **rocuronium** 1.2 mg/kg

**Vasopressor** drug:
- **metaraminol** 0.5 to 1 mg

**Post-intubation** drug:
- **propofol**
  - or **morphine & midazolam**
  - or other

**Draw up** drugs

**Draw up** normal saline flushes

**Label** drugs and flushes

Check drug **contra-indications**

Check **allergies**

---

**EQUIPMENT**

**Suction** working

**Oxygen**:
- bag-valve mask
- end-tidal CO₂ **connected**

Oropharyngeal airway

Nasopharyngeal airway

**Laryngoscopes x 2:**
- check **light**
- check **blade size**

**Endotracheal tubes x 2:**
- choose sizes
- **test cuffs** with **syringe**
- lubricate

**Bougie** or **stylet:**
- lubricate

Ventilator **settings** (see page 51)

Ventilator **circuit**

Tube **tie** or **tape**

**Magill’s** forceps

**Laryngeal mask airway**:
- check size

**Surgical airway** equipment:
- scalpel
- size 6.0 endotracheal tube
MAKE FIRST ATTEMPT YOUR BEST ATTEMPT

Verbalise the airway strategy:

- **Plan A**: initial tracheal intubation: **direct laryngoscopy** or **video laryngoscopy**, bougie or stylet, three attempts in 2 minutes, sats ≥ 90%
- **Plan B**: secondary tracheal intubation: **different blade** or **video laryngoscopy**, bougie or stylet, three attempts in 2 minutes, sats ≥ 90%
- **Plan C**: maintenance of oxygenation: **laryngeal mask airway**, three attempts in 2 minutes, sats ≥ 75%
- **Plan D**: surgical airway: scalpel-bougie-tube **cricothyroidotomy**

**PLAN A: INITIAL TRACHEAL INTUBATION**

Give **induction** drug and flush

Give **paralysis** drug and flush

If cervical spine injury is suspected then use manual in-line immobilisation

**Direct laryngoscopy** or **video laryngoscopy**

**Bougie** or stylet

If poor view apply external laryngeal manipulation

Maximum of **three attempts** in **2 minutes**

If sats < 90% then re-insert **oropharyngeal airway** and/or nasopharyngeal airway and **bag-mask ventilate** using two pairs of hands

IF CANNOT OXYGENATE THEN GO TO PAGE 10 (AIRWAY - FAILED)

**continued next page**
If successful intubation then go to Ventilation (page 51)

CONSIDER WHAT OTHER HELP IS AVAILABLE

Optimise patient position (consider pillows or ramp)
Maximum head extension and jaw thrust
Consider bed tilt
Aim for face horizontal and ear canal level with sternal notch

PLAN B: SECONDARY TRACHEAL INTUBATION

Consider different laryngoscope
Consider different laryngoscope blade

Direct laryngoscopy or video laryngoscopy
Bougie or stylet
Avoid cricoid pressure
External laryngeal manipulation

Maximum of three attempts in 2 minutes
If sats < 90% then re-insert oropharyngeal airway and/or nasopharyngeal airway and bag-mask ventilate using two pairs of hands

IF UNSUCCESSFUL THEN GO TO PAGE 10 (AIRWAY - FAILED)

If successful intubation then go to Ventilation (page 51)
PATIENT UNRESPONSIVE AND NEAR DEATH

CALL FOR HELP  INFORM TEAM  CRASH CART

Maintain **oxygenation** and **optimise patient position**

**Attempt intubation.** If successful then go to **Ventilation** (page 51)

**Bag-mask ventilate** with 100% oxygen

IF UNABLE TO VENTILATE THEN GO TO PAGE 10 (AIRWAY - FAILED)

**IV suxamethonium 2 mg/kg**

**Attempt intubation.** If successful then go to **Ventilation** (page 51)

**Bag-mask ventilate** with 100% oxygen

IF UNABLE TO VENTILATE THEN GO TO PAGE 10 (AIRWAY - FAILED)

**Attempt intubation.** If successful then go to **Ventilation** (page 51)

**Bag-mask ventilate** with 100% oxygen

GO TO PAGE 10 (AIRWAY - FAILED)
If forced to act:

- give induction and paralysis **drugs** (see page 3)
- one best attempt
  - if **successful** then go to **Ventilation** (page 51)
  - if **failed** then go to **Airway - Failed** (page 10)

If any one of:

- bag-mask ventilation
- or laryngeal mask airway
- or intubation

are predicted to be unsuccessful then consider **awake technique** with:

- direct laryngoscopy
- or video laryngoscopy
- or intubating LMA
- or fibreoptic scope
- or blind intubation

}{ if **anaesthetist** and **equipment** available

otherwise use **RSI with double setup** (second airway doctor ready for surgical airway)

If **successful intubation** see **Ventilation** (page 51)

**IF UNSUCCESSFUL THEN GO TO NEXT PAGE (AIRWAY - FAILED)**
AIRWAY - FAILED

**CALL FOR HELP > INFORM TEAM > CRASH CART**

---

**“CAN’T INTUBATE”**

Cease external laryngeal manipulation
Insert *laryngeal mask airway* (LMA)

Maximum of *three attempts* with laryngeal mask airway
Consider *changing device* or *size*

If *successful oxygenation* then go to *Ventilation* (page 51)

---

**IF SATS < 90% THEN “FAILED LARYNGEAL MASK AIRWAY”**

Bag-mask ventilate using *two pairs of hands*

Optimise *patient position* (consider pillows or ramp)
Maximum *head extension* and *jaw thrust*

Oropharyngeal and/or *nasopharyngeal* airway

If *successful oxygenation* then calm down and *consider other options*

---

**IF SATS < 75% THEN “CAN’T INTUBATE, CAN’T OXYGENATE”**

---

**GO TO NEXT PAGE (AIRWAY - SURGICAL)**
Remove pillow and **extend neck**

Use non-dominant hand to **stabilise** the larynx

Locate **cricothyroid membrane**.
If cricothyroid membrane **not palpable** then make **vertical skin incision** of **8 to 10 cm** and **blunt dissect** with fingers of both hands

**Horizontal incision** through cricothyroid membrane

**Rotate blade** 90 degrees

Slide **bougie** along blade into trachea

Remove blade

Railroad **size 6.0 cuffed endotracheal tube** over bougie, directed down towards the lungs until the cuff disappears

Hold endotracheal tube securely while bougie is removed

See **Ventilation Guidelines** (page 51)
ANAPHYLAXIS

REMOVE ALLERGEN

CALL FOR HELP  INFORM TEAM  CRASH CART

Lie patient flat unless upright position needed to maintain airway

IM adrenaline 0.5 mg into mid-lateral thigh (0.5 mL of 1:1000 ampoule)

High-flow oxygen

Monitor respirations, oxygen saturations, heart rate, blood pressure and ECG

Repeat adrenaline dose every 5 minutes as needed

Intravenous or intraosseous access

If hypotensive give IV normal saline 20 mL/kg bolus

If multiple doses of adrenaline required, inadequate response or deterioration, then start an IV adrenaline infusion: 6 mL of 1:1000 adrenaline in normal saline 100 mL, start infusion at 7 mL/hour (= 0.1 micrograms/kg/minute for 70 kg patient). Titrate rate according to response. Use large vein if possible.

continued next page
If adrenaline infusion **ineffective or unavailable**, consider:

**for persistent hypotension/shock:**
- **give IV normal saline** (maximum 50 mL/kg in the first 30 minutes)
- in patients with cardiogenic shock (especially if taking beta-blockers) consider an **IV glucagon bolus** of 1 to 2 mg; this may be repeated or followed by an infusion of 1 to 2 mg/hour
- **IV metaraminol** (2 to 10 mg) or **IV vasopressin** (10 to 40 units) only after expert advice

**for upper airway obstruction:**
- **nebulised adrenaline** (5 mL, ie. 5 ampoules of 1:1,000)
- consider **intubation**

**for persistent wheeze:**
- bronchodilators: **salbutamol** 12 puffs of 100 micrograms via spacer or nebulised salbutamol 5 mg
- **PO prednisone** 50 mg or **IV hydrocortisone** 200 mg

---

**Observe for at least 4 hours after last dose of adrenaline**

**Educate patient**


**Consider script** for adrenaline auto-injector (EpiPen)

**Do not discharge at night** or if no responsible adult can care for patient at home
ASYSTOLE

CPR: 30 COMPRESSIONS : 2 BREATHS
100 TO 120 PER MINUTE
5 CM DEEP
ROTATE COMPRESSORS
MINIMISE INTERRUPTIONS

CALL FOR HELP  INFORM TEAM  CRASH CART

START CPR

Attach defibrillator or monitor
Pads or paddles in left midaxillary line over sixth intercostal space (under breast) and right parasternal area over second intercostal space. In patients with a PPM or ICD put pads at least 8 cm from the PPM or ICD.

Consider airway adjuncts (oro- or naso-pharyngeal airway, and if skilled LMA or ETT)
High-flow oxygen
Intravenous or intraosseous access

IV adrenaline 1 mg followed by normal saline 20 mL flush
CPR 2 minutes
Look at the clock
Waveform capnography (end-tidal CO₂ monitoring)

If the rhythm is shockable (VF or pulseless VT) then shock using 200 J

continued on page 17
FIND AND TREAT CAUSE

OBTAIN BEDSIDE BLOODS AND CONSIDER CARDIAC ULTRASOUND

Consider myocardial infarct and pulmonary embolus (may require PCI or thrombolysis)

If hypoxia give high-flow oxygen, check connections, check for bilateral breath sounds, suction endotracheal tube and reconfirm placement, consider CXR

If hyperkalaemia:
- give IV calcium chloride 10% 10 mL bolus or IV calcium gluconate 10% 30 mL bolus
- give IV short-acting insulin 10 units with IV dextrose 50% 50 mL
- give nebulised salbutamol 10 to 20 mg

If hypokalaemia give IV potassium chloride 1 mmol/mL 5 mL bolus and IV magnesium sulphate 50% 2.5 mL bolus

If profound acidosis consider IV sodium bicarbonate 8.4% 1 mL/kg bolus on expert advice

If hypovolaemia give IV normal saline 20 mL/kg and check haemoglobin

If hypocalcaemia give IV calcium gluconate 10% 20 mL or IV calcium chloride 10% 10 mL

If hyperthermia consider sepsis, neuroleptic malignant syndrome, serotonin toxicity, malignant hyperthermia, heat stroke

If hypothermia use forced air blanket, warm IV fluids, raise room temperature

Consider toxins including medications, infusions, ingestions, and medication error

Consider tension pneumothorax. Check for signs and perform emergency needle decompression or finger thoracostomy. Call for CXR but do not delay treatment.

Consider cardiac tamponade especially if penetrating trauma or recent cardiac surgery
Simultaneously Find and Treat Cause (facing page)

Plan actions before interrupting compressions

CPR 2 minutes

Shockable? then shock using 200 J

IV adrenaline 1 mg
CPR 2 minutes

Shockable? then shock
After third shock give IV amiodarone 300 mg in dextrose 5% 20 mL

CPR 2 minutes

Shockable? then shock

IV adrenaline 1 mg
CPR 2 minutes

Shockable? then shock
After fifth shock consider IV amiodarone 150 mg in dextrose 5% 20 mL

CPR 2 minutes

Shockable? then shock

continued next page
**ASYSTOLE**

- **IV adrenaline 1 mg**
  - CPR 2 minutes

- **Shockable? then shock**

- If refractory pulseless VT or VF then consider **IV magnesium 50% 2.5 mL bolus**

- CPR 2 minutes

- **Shockable? then shock**

- **IV adrenaline 1 mg**
  - CPR 2 minutes

- **Shockable? then shock**

- CPR 2 minutes

- **CPR now exceeds 20 minutes**

---

**IF RETURN OF SPONTANEOUS CIRCULATION GO TO PAGE 25 (ROSC)**
BRADYCARDIA

COMPROMISED AND HEART RATE < 60

IF NO PULSE THEN GO TO PAGE 21 (PEA)

CALL FOR HELP  INFORM TEAM  CRASH CART

Maintain airway
Assist breathing as needed
High-flow oxygen

Monitor respirations, oxygen saturations, heart rate, blood pressure and ECG

Intravenous or intraosseous access

Prepare for transcutaneous pacing

IV atropine 0.5 or 0.6 mg
Repeat every 3 to 5 minutes to a total of 3 mg

Check electrolytes

Look for and treat possible causes (eg. IHD, hypokalaemia, drugs especially beta-blockers, calcium-channel blockers, digoxin and amiodarone)

continued next page
If **atropine ineffective** then seek **expert advice** and consider:

**Transcutaneous pacing** (see below)

**OR**

**IV adrenaline infusion:** 6 mL of 1:1000 adrenaline in normal saline 100 mL, start at 2 to 10 mL/h ( = 2 to 10 micrograms/minute). Titrate to clinical response. Use large vein if possible.

**OR**

**IV isoprenaline:** dilute 1 mg of isoprenaline in 50 mL normal saline, give **bolus** of 1 mL ( = 20 micrograms), repeat according to response, then start **infusion** at 3 to 12 mL/h ( = 1 to 4 micrograms/min) and titrate up to maximum of 60 mL/h ( = 20 micrograms/min)

---

**Transcutaneous pacing**

Clip hair and dry the skin

Put **negative pad** on **anterior chest** to the left of the lower third of the sternum (under the female breast)

Put **positive pad** on the **patient's back** to the left of the spine beneath the scapula

Consider **sedation** (eg. IV fentanyl 50 to 100 micrograms and IV midazolam 1 to 5 mg)

**Demand** pacing mode

Current **70 mA**

**Start pacing**

**Increase mA** until pacing captured on monitor (ie. pacer spike is immediately followed by a wide QRS complex and a broad T wave, with suppression of native QRS complexes). If pacing not captured at 130 mA then resite electrodes and repeat.

When pacing is captured, set current at **10 mA above threshold**

Ongoing **sedation** and **analgesia**
PULSELESS ELECTRICAL ACTIVITY

CPR: 30 COMPRESSIONS : 2 BREATHS

- 100 TO 120 PER MINUTE
- 5 CM DEEP
- ROTATE COMPRESSORS
- MINIMISE INTERRUPTIONS

CALL FOR HELP
INFORM TEAM
CRASH CART

START CPR

Attach defibrillator or monitor

Pads or paddles in left midaxillary line over sixth intercostal space (under breast) and right parasternal area over second intercostal space. In patients with a PPM or ICD put pads at least 8 cm from the PPM or ICD.

Consider airway adjuncts (oro- or naso-pharyngeal airway, and if skilled LMA or ETT)

High-flow oxygen

Intravenous or intraosseous access

IV adrenaline 1 mg followed by normal saline 20 mL flush

CPR 2 minutes

Look at the clock

Waveform capnography (end-tidal CO₂ monitoring)

If the rhythm is shockable (VF or pulseless VT) then shock using 200 J

continued on page 23
### Find and Treat Cause

<table>
<thead>
<tr>
<th>Condition</th>
<th>Treatment</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypocalcaemia</td>
<td>Give IV calcium gluconate 10% 30 mL bolus or IV calcium chloride 10% 10 mL bolus</td>
<td>Consider myocardial infarct and pulmonary embolus (may require PCI or thrombolysis)</td>
</tr>
<tr>
<td>Hyperkalaemia</td>
<td>Give IV calcium chloride 10% 10 mL bolus or IV calcium gluconate 10% 30 mL bolus, give IV short-acting insulin 10 units with IV dextrose 50% 50 mL, give nebulised salbutamol 10 to 20 mg</td>
<td>If hypoxia give high-flow oxygen, check connections, check for bilateral breath sounds, suction endotracheal tube and reconfirm placement, consider CXR</td>
</tr>
<tr>
<td>Hypokalaemia</td>
<td>Give IV potassium chloride 1 mmol/mL 5 mL bolus and IV magnesium sulphate 50% 2.5 mL bolus</td>
<td>If hypovolaemia give IV normal saline 20 mL/kg and check haemoglobin</td>
</tr>
<tr>
<td>Hypovolaemia</td>
<td>Give IV normal saline 20 mL/kg and check haemoglobin</td>
<td>If hypocalcaemia give IV calcium gluconate 10% 20 mL or IV calcium chloride 10% 10 mL</td>
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<tr>
<td>Hyperthermia</td>
<td>Consider sepsis, neuroleptic malignant syndrome, serotonin toxicity, malignant hyperthermia, heat stroke</td>
<td>If hypoxia give high-flow oxygen, check connections, check for bilateral breath sounds, suction endotracheal tube and reconfirm placement, consider CXR</td>
</tr>
<tr>
<td>Hypothermia</td>
<td>Use forced air blanket, warm IV fluids, raise room temperature</td>
<td>If hypothermia use forced air blanket, warm IV fluids, raise room temperature</td>
</tr>
<tr>
<td>Toxins</td>
<td>Consider toxins including medications, infusions, ingestions, and medication error</td>
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</tr>
<tr>
<td>Tension Pneumothorax</td>
<td>Consider tension pneumothorax. Check for signs and perform emergency needle decompression or finger thoracostomy. Call for CXR but do not delay treatment.</td>
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</tr>
<tr>
<td>Cardiac Tamponade</td>
<td>Consider cardiac tamponade especially if penetrating trauma or recent cardiac surgery</td>
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</tr>
</tbody>
</table>
Simultaneously **Find and Treat Cause** (facing page)

**Plan actions** before interrupting compressions

**CPR** 2 minutes

**Shockable?** then **shock** using **200 J**

**IV adrenaline 1 mg**
**CPR** 2 minutes

**Shockable?** then **shock**
After third shock give **IV amiodarone 300 mg** in dextrose 5% 20 mL

**CPR** 2 minutes

**Shockable?** then **shock**

**IV adrenaline 1 mg**
**CPR** 2 minutes

**Shockable?** then **shock**
After fifth shock consider **IV amiodarone 150 mg** in dextrose 5% 20 mL

**CPR** 2 minutes

**Shockable?** then **shock**

**continued next page**
IV adrenaline 1 mg
CPR 2 minutes

Shockable? then shock

If refractory pulseless VT or VF then consider IV magnesium 50% 2.5 mL bolus

CPR 2 minutes

Shockable? then shock

IV adrenaline 1 mg
CPR 2 minutes

Shockable? then shock

CPR 2 minutes

CPR now exceeds 20 minutes

IF RETURN OF SPONTANEOUS CIRCULATION GO TO PAGE 25 (ROSC)
<table>
<thead>
<tr>
<th>Step</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Re-evaluate ABCDE and re-assess all tubes and lines</td>
<td></td>
</tr>
<tr>
<td>Cervical collar if required</td>
<td></td>
</tr>
<tr>
<td>12-lead ECG, CXR, IDC, and nasogastric tube</td>
<td></td>
</tr>
<tr>
<td>Temperature probe in nasopharynx, oesophagus or bladder</td>
<td></td>
</tr>
<tr>
<td>Assess for injuries from resuscitation</td>
<td></td>
</tr>
<tr>
<td>Treat precipitating causes</td>
<td></td>
</tr>
<tr>
<td>Aim for sats 94 to 98% (or if at risk of hypercapnic respiratory failure aim 88 to 92%)</td>
<td></td>
</tr>
<tr>
<td>Maintain normal PaCO₂</td>
<td></td>
</tr>
<tr>
<td>Consider an anti-arrhythmic drug infusion (eg. amiodarone 0.6 mg/kg/h in dextrose 5%, for 12 to 24 h, maximum 1200 mg/24 hours)</td>
<td></td>
</tr>
<tr>
<td>Prevent and manage fever but do not cool below 36 °C</td>
<td></td>
</tr>
<tr>
<td>Consider emergency cardiac catheterisation (especially if STEMI or new LBBB)</td>
<td></td>
</tr>
</tbody>
</table>
Open and clear the airway:
- head tilt and chin lift
- jaw thrust
- suction
- consider oropharyngeal or nasopharyngeal airway

High-flow oxygen
Consider recovery position to avoid aspiration

Check blood glucose
Take blood for venous gas, EUC, CaMgPh and anticonvulsant levels

If alcohol withdrawal cannot be excluded give IV/IM thiamine 100 mg

If this is eclampsia give IV magnesium sulphate 50% 8 mL (equal to 4 g) in 50 mL normal saline over 10 minutes, then IV magnesium sulphate 50% 4 mL/hour and seek expert advice. Can use IV diazepam 10 mg over 5 minutes while the magnesium is being prepared.

For status epilepticus give:
- IV/IM midazolam 5 to 10 mg
- IV diazepam 10 to 20 mg
- IV clonazepam 1 mg

continued next page
The benzodiazepines have a short duration of anticonvulsant effect, so should be followed immediately by:

**IV phenytoin 15 to 20 mg/kg** at a rate not exceeding 50 mg/minute with ECG and BP monitoring. Do not use phenytoin if overdose with cardiotoxic drugs such as tricyclics is suspected.

**OR**

**IV levetiracetam 20 mg/kg** over 15 minutes

**OR**

**IV sodium valproate 10 mg/kg** (maximum 800 mg) over 3 to 5 minutes then

**IV sodium valproate 1 to 2 mg/kg/hour** (maximum 2500 mg in 24 hours)

**OR**

**IV phenobarbitone 10 to 20 mg/kg** at a rate not exceeding 100 mg/minute

---

**If seizures continue then seek expert advice**

If **seizures continue** then 15 minutes after the first dose of benzodiazepines give a second dose:

**IV/IM midazolam 5 to 10 mg**

**OR**

**IV diazepam 10 to 20 mg**

**OR**

**IV clonazepam 1 mg**

---

If **seizures continue** then:

consider **intubation** and **general anaesthesia**

consider **infusion** of clonazepam, midazolam, propofol or thiopentone

consider **overdose** (eg. tricyclics, tramadol)

consider **pseudoseizures** (especially if venous gas remains normal)

arrange **ICU transfer**
SUPRAVENTRICULAR TACHYCARDIA

IF NO PULSE THEN GO TO PAGE 21 (PEA)

IF HYPOTENSION, SEVERE CHEST PAIN OR DECREASED LEVEL OF CONSCIOUSNESS THEN GO TO PAGE 29 (TACHYCARDIA)

CALL FOR HELP INFORM TEAM CRASH CART

SINUS TACHYCARDIA IS NOT SVT

Monitor respirations, oxygen saturations, heart rate, blood pressure and ECG

Have defibrillator at bedside

Attempt vagal manoeuvres:

Valsalva manoeuvre with head-down tilt

carotid sinus massage unless elderly

If unsuccessful then while recording ECG rhythm strip, give:

IV adenosine 6 mg bolus (using cubital fossa cannula with three-way tap, flush immediately with normal saline 20 mL)

If unsuccessful give IV adenosine 12 mg bolus

If unsuccessful give IV adenosine 18 mg bolus

OR

IV verapamil 1 mg/minute up to 15 mg with blood pressure monitoring.

Avoid in heart failure, hypotension, and beta-blocker usage.
SYMPTOMATIC TACHYCARDIA WITH PULSE
THAT IS NOT SINUS TACHYCARDIA

IF NO PULSE THEN GO TO PAGE 65 (PULSELESS VT)

Assess and support airway and breathing
High-flow oxygen
Monitor respirations, oxygen saturations, heart rate, blood pressure and ECG
Intravenous or intraosseous access
Look for and treat possible causes

If patient UNSTABLE: (altered conscious state, chest pain or hypotension)
- Give IV sedation as required. Be prepared to support airway.
- Ensure the defibrillator is synchronised
- Perform synchronised DC cardioversion 100 to 200 J (if obese start at 200 J)
- If shock fails to deliver:
  - try a different lead
  - check cables and power supply
  - consider unsynchronised DC shock if disorganised rhythm
- Repeat shock up to three attempts (may need to press synchronise each time)
- IV amiodarone 300 mg in dextrose 5% 100 mL over 10 to 20 minutes
- Repeat shock if required
- IV amiodarone 900 mg over 24 hours

continued next page
If patient **STABLE:**

- **QRS < 0.12 s** then go to next page (*Stable Narrow Complex Tachycardia*)
- **QRS ≥ 0.12 s** then go to page 32 (*Stable Wide Complex Tachycardia*)

0.12 seconds is three small squares on ECG
If the diagnosis is not clear then to differentiate and potentially revert:

- attempt vagal manoeuvres (eg. Valsalva with head-down tilt)
- If the rhythm reverts then it is probably re-entry SVT. Observe for recurrence.
- If the rhythm does not revert then consider adenosine and seek expert advice.
STABLE WIDE COMPLEX TACHYCARDIA

REGULAR:

Most likely to be VT (monomorphic)
Other possibilities include atrial flutter or aberrant conduction in SVT
If VT then go to page 63 (Ventricular Tachycardia)
If the diagnosis is not clear then presume VT until proven or advised otherwise. Seek expert advice. Consider:

- semi-elective cardioversion
- IV amiodarone 150 to 300 mg over 20 to 30 minutes
Check electrolytes and troponin

IRREGULAR:

VT can be irregular (polymorphic)
Other possibilities include:
- Wolff-Parkinson-White with atrial fibrillation
- aberrant conduction with atrial fibrillation
- aberrant conduction with atrial flutter and variable block
- aberrant conduction with multifocal atrial tachycardia
If the diagnosis is not clear then seek expert advice

TORSADES:

Go to next page (Torsades de Pointes)
Cease any drugs that may be causing torsades (eg. neuroleptics, macrolides, sotalol)
Check serum potassium

If underlying bradycardia give IV atropine 0.5 or 0.6 mg and repeat as necessary

Consider:

Temporary overdrive pacing at 90 to 100/minute (see page 20)

OR

IV magnesium sulphate 50% 4 mL (equal to 2 g) over 10 to 15 minutes then IV magnesium sulphate 50% 1 to 1.5 mL per hour for 12 to 24 hours

OR

IV isoprenaline: dilute 1 mg of isoprenaline in 50 mL normal saline, give bolus of 1 mL (= 20 mcg), repeat according to response, then start infusion at 3 to 12 mL/h (= 1 to 4 mcg/min) and titrate up to maximum of 60 mL/h (= 20 mcg/min)

OR

IV lignocaine 1 to 1.5 mg/kg (usually 75 to 100 mg) over 1 to 2 minutes then IV lignocaine 4 mg/minute for 1 hour then IV lignocaine 1 to 3 mg/minute

Avoid amiodarone, disopyramide, flecainide and sotalol
TREAT THE PERSON, NOT THE POISON

See also:  
- Beta blockers page 38  
- Calcium channel blockers page 40  
- Tricyclics page 42  
- Paracetamol page 44

RESUSCITATION

Airway

Breathing

Circulation

DETECT AND CORRECT

If blood glucose < 4 mmol/L then give IV dextrose 50% 50 mL. Check blood glucose again in five minutes.

If seizures give:
- IV/IM midazolam 5 to 10 mg
- IV diazepam 5 to 10 mg

Do not use phenytoin. If seizures from tricyclic overdose then go to page 42

continued next page
If hyperthermia > 38.5 °C then cool (eg. ice packs, cold IV fluids)
If hyperthermia > 39.5 °C then paralyse, intubate and ventilate (see page 1)

**EMERGENCY ANTIDOTE ADMINISTRATION**

If alcohol withdrawal cannot be excluded give IV/IM thiamine 100 mg

If opiate overdose (pin-point pupils, respiratory depression) then give:

- IV naloxone 100 micrograms and repeat every 30 to 60 seconds
- OR
- IM or SC naloxone 400 micrograms (in arrest give IV or IM naloxone 800 micrograms)

Seek expert toxicology advice if other antidotes required

If sodium channel blocker overdose (eg. tricyclic antidepressants such as dothiepin or amitriptyline, local anaesthetics, cocaine, propranolol, flecainide, carbamazepine, quinine) then see page 42

If beta blocker overdose (eg. atenolol, metoprolol, sotalol) then see page 38

If calcium channel blocker overdose (eg. verapamil, diltiazem) then see page 40

If digoxin overdose then consider digoxin-specific antibodies (eg. Digibind, DigiFab)

If organophosphate poisoning then give IV atropine 2 mg and repeat every 15 minutes until respiratory secretions dry and oxygenation restored

continued next page
RISK ASSESSMENT

Stop and think about:

agent(s): ask ambulance officers or family to search
  ask family about agents potentially available
  count missing tablets
  check records for previous prescriptions

dose(s)
time since ingestion
clinical features and expected clinical course
patient factors (including weight and co-morbidities)

SUPPORTIVE CARE

Supportive care (e.g., fluids, sedation or seizure control using IV benzodiazepines)

Monitoring (respirations, O₂ sats, heart rate, BP, temperature, end tidal CO₂)
Document the criteria for changing management

INVESTIGATIONS

Blood glucose

Paracetamol level

12-lead ECG

continued next page
In the 12-lead ECG look for:
- rate
- rhythm
- PR interval
- QRS duration in lead II
- QT interval
- dominant R’ wave in aVR

If dominant R’ wave in aVR then see Tricyclic Overdose (page 42)

If paracetamol overdose then see page 44

Call Poisons: Australia 131 126, NZ 0800 764 766, or local toxicologist

DECONTAMINATION

Seek expert advice from Poisons Information Centre before starting decontamination as risks frequently outweigh benefits. For severe toxicity experts may advise:

- if conscious and cooperative: PO activated charcoal 1 g/kg to maximum of 50 g
- if intubated: NG activated charcoal 1 g/kg to maximum of 50 g
- if extended release tablets: PO or NG whole bowel irrigation with polyethylene glycol electrolyte solution at 2 L/hour

DISPOSITION

Disposition is based on risk assessment and psychosocial assessment
**BEtA BlOCKER OVERdOsE**

---

**Poisons Information Centre:** Australia 131 126, NZ 0800 764 766

---

**IF PROPRANOLOL OVERDOSE THEN GO TO PAGE 42 (TRICYCLICS)**

---

**IF SOTALOL OVERDOSE HAS CAUSED TORSADES THEN GO TO PAGE 33**

---

**Signs:**
- BRADYCARDIA
- HYPOTENSION

---

**PR interval > 0.20 s** (five small squares on ECG)
- ANY BRADYARRHYTHMIA

---

**CALL FOR HELP**
- INFORM TEAM
- CRASH CART

---

**If hypotension**
- give IV normal saline 500 to 1000 mL boluses to a maximum of 20 mL/kg

---

**If bradycardia:**
- give IV atropine 1 mg
- repeat twice if needed
- if bradycardia continues then consider **isoprenaline infusion** (see page 20)

---

**If hypotension** persists then start IV **adrenaline infusion** using adrenaline 6 mg in dextrose 5% 100 mL, start at 2 mL/h and titrate up rapidly to systolic 100 mmHg

---

continued next page
If refractory **hypotension** then **seek expert advice**, which may include high-dose insulin therapy for inotropic support:

**IV dextrose 50%** 50 mL bolus (unless BSL > 22 mmol/L)
followed by **IV short-acting insulin** 1 unit/kg bolus then, if advised by expert:

**IV short-acting insulin** infusion using short-acting insulin 50 units in normal saline 50 mL, start at 0.5 units/kg/hour, titrated every 30 minutes to maximum of 5 units/kg/hour

**IV dextrose 50%** 50 mL/hour infusion, preferably through central line, titrated to maintain normal blood glucose

Monitor **blood glucose** every 20 minutes for first hour, then every hour
Monitor **serum potassium** but only replace if < 2.5 mmol/L and there is a source of potassium loss

If severe toxicity and intubated then give **NG activated charcoal 1 g/kg** to a maximum of 50 g

**COMPLETE ALL STEPS IN TOXICOLOGY (PAGE 34)**

**Call Poisons: Australia 131 126, NZ 0800 764 766, or local toxicologist**
CALCIUM CHANNEL BLOCKER OVERDOSE

Signs: BRADYCARDIA or FIRST DEGREE HEART BLOCK
HYPOTENSION
RAPID DETERIORATION
ISCHAEMIA (MYOCARDIAL, CEREBRAL, MESENTERIC)

PR interval > 0.20 s (five small squares on ECG)
ANY BRADYARRHYTHMIA

If hypotension give IV normal saline 500 to 1000 mL boluses to a maximum of 20 mL/kg

If hypotension or bradycardia give:

IV calcium gluconate 10% 60 mL bolus

OR

IV calcium chloride 10% 20 mL bolus (through central line)

Repeat intravenous calcium up to three times
Consider calcium infusion to keep serum calcium > 2.0 mmol/L

If bradycardia give IV atropine 0.5 or 0.6 mg every two minutes to a maximum of 1.8 mg

continued next page
If refractory hypotension then seek expert advice, which may include high-dose insulin therapy for inotropic support:

**IV dextrose 50%** 50 mL bolus (unless BSL > 22 mmol/L)
followed by **IV short-acting insulin** 1 unit/kg bolus
then, if advised by expert:

**IV short-acting insulin** infusion using short-acting insulin 50 units in normal saline 50 mL, start at 0.5 units/kg/hour, titrated every 30 minutes to maximum of 5 units/kg/hour

**IV dextrose 50%** 50 mL/hour infusion, preferably through central line, titrated to maintain normal blood glucose

Monitor **blood glucose** every 20 minutes for first hour, then every hour
Monitor **serum potassium** but only replace if < 2.5 mmol/L and there is a source of loss

Catecholamines are rarely effective in calcium channel blocker poisoning

If severe toxicity then:

if intubated give **NG activated charcoal 1 g/kg** to maximum of 50 g
if **extended release** tablets consider **whole bowel irrigation** with PO or NG polyethylene glycol electrolyte solution at 2 L/hour

If hypotension or bradycardia continues then seek expert advice and consider:

- transvenous **pacing**
- intra-aortic balloon pump
- cardiopulmonary bypass
- extracorporeal membrane oxygenation

COMPLETE ALL STEPS IN TOXICOLOGY (PAGE 34)

Call Poisons: Australia 131 126, NZ 0800 764 766, or local toxicologist
TRICYCLIC OVERDOSE

**Poisons Information Centre: Australia 131 126, NZ 0800 764 766**

**Signs:**
- Rapid deterioration within 1 to 2 hours of ingestion
- Initial agitation then confusion and coma
- Dilated pupils and warm dry skin
- Initial sinus tachycardia and mild hypertension
- Subsequent hypotension and arrhythmias
- Seizures or cardiac arrest

**R' wave > 3 mm in aVR**
- QRS > 0.10 predicts seizures
- QRS > 0.16 predicts ventricular arrhythmias
- Normal QRS is 0.08 to 0.10 s (two to two-and-a-half small squares on ECG)

**CALL FOR HELP ► INFORM TEAM ► CRASH CART**

**If ventricular tachycardia or ventricular fibrillation then:**
- IV sodium bicarbonate 8.4% 1 to 2 mL/kg bolus
- Repeat every 1 to 2 minutes until return of perfusing rhythm
- DC shocks for cardioversion or defibrillation are unlikely to be successful
- Avoid procainamide, amiodarone and beta-blockers

**If CNS depression (GCS < 12) then:**
- Give IV sodium bicarbonate 8.4% 1 to 2 mL/kg to prevent metabolic acidosis
- Intubate (see page 1)
- Insert nasogastric tube and give NG activated charcoal 1 g/kg to maximum 50 g

*continued next page*
If seizure then:
- **intubate** (see page 1)
- **benzodiazepines** if prolonged (eg. IV diazepam 5 to 10 mg)
- **IV sodium bicarbonate 8.4% 1 to 2 mL/kg** bolus
- avoid phenytoin

If QRS > 0.10 s then:
- **IV sodium bicarbonate 8.4% 1 to 2 mL/kg** bolus
- **repeat** every 3 to 5 minutes
- **titrate** until QRS < 0.10 s

**AND**
- **hyperventilate** if intubated (aim for pH 7.50 to 7.55)

If hypotension then:
- give **IV normal saline 10 to 20 mL/kg** as initial bolus
- if remains hypotensive give **IV sodium bicarbonate 8.4% 1 to 2 mL/kg** bolus
- if remains hypotensive consider **IV noradrenaline infusion** using noradrenaline 6 mg in dextrose 5% 100 mL, start at 1 mL/h, titrate to maximum 20 mL/h

If severe toxicity and **intubated** then give **NG activated charcoal 1 g/kg** to a maximum of 50 g

**COMPLETE ALL STEPS IN TOXICOLOGY (PAGE 34)**

Call Poisons: Australia 131 126, NZ 0800 764 766, or local toxicologist
Call Poisons Information Centre or local toxicologist if:

- > 50 g or > 1 g/kg ingestion
- paracetamol level is double the nomogram line (page 45)
- intravenous paracetamol error or overdose
- hepatotoxicity (eg. ALT > 1000)
- any concerns

**TIME OF INGESTION**

**Single ingestion:**
- If < 8 hours ago then go to page 46
- If > 8 hours ago then go to page 47

**Multiple ingestions within 8 hour period:**
- If < 8 hours since first dose then go to page 46
- If > 8 hours since first dose then go to page 47

**Multiple ingestions over longer than 8 hour period:**
- Go to page 48

**Unknown time of ingestion:**
- Go to page 47
**Paracetamol Treatment Nomogram**

**NAC Infusion**

<table>
<thead>
<tr>
<th>Weight</th>
<th>First Bag</th>
<th>Second Bag</th>
<th>Third Bag</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>dextrose 5% 200 mL over 60 minutes (acetylcysteine)</td>
<td>dextrose 5% 500 mL over 4 hours (acetylcysteine)</td>
<td>dextrose 5% 1000 mL over 16 hours (acetylcysteine)</td>
</tr>
<tr>
<td>41 - 50 kg</td>
<td>7.5 g = 37.5 mL</td>
<td>2.5 g = 12.5 mL</td>
<td>5 g = 25 mL</td>
</tr>
<tr>
<td>51 - 60 kg</td>
<td>9 g = 45 mL</td>
<td>3 g = 15 mL</td>
<td>6 g = 30 mL</td>
</tr>
<tr>
<td>61 - 70 kg</td>
<td>10.5 g = 52.5 mL</td>
<td>3.5 g = 17.5 mL</td>
<td>7 g = 35 mL</td>
</tr>
<tr>
<td>71 - 80 kg</td>
<td>12 g = 60 mL</td>
<td>4 g = 20 mL</td>
<td>8 g = 40 mL</td>
</tr>
<tr>
<td>81 - 90 kg</td>
<td>13.5 g = 67.5 mL</td>
<td>4.5 g = 22.5 mL</td>
<td>9 g = 45 mL</td>
</tr>
<tr>
<td>91 - 100 kg</td>
<td>15 g = 75 mL</td>
<td>5 g = 25 mL</td>
<td>10 g = 50 mL</td>
</tr>
<tr>
<td>≥ 101 kg</td>
<td>16.5 g = 82.5 mL</td>
<td>5.5 g = 27.5 mL</td>
<td>11 g = 55 mL</td>
</tr>
</tbody>
</table>

First bag: acetylcysteine 150 mg/kg in dextrose 5% 200 mL over 60 minutes
Second bag: acetylcysteine 50 mg/kg in dextrose 5% 500 mL over 4 hours
Third bag: acetylcysteine 100 mg/kg in dextrose 5% 1000 mL over 16 hours
Concentration of acetylcysteine is 200 mg/mL
## PARACETAMOL OVERDOSE

### INGESTION < 8 HOURS AGO

<table>
<thead>
<tr>
<th>Risk of Hepatotoxicity If &gt; 10 g OR &gt; 200 mg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>If <strong>massive ingestion</strong> ( &gt; 30 g or &gt; 500 mg/kg) then go to page 50</td>
</tr>
<tr>
<td>If <strong>modified release</strong> (eg. Panadol Osteo) ingestion then go to page 49</td>
</tr>
<tr>
<td>If &lt; 2 hours since ingestion then give PO activated charcoal 50 g</td>
</tr>
<tr>
<td>Measure <strong>paracetamol level</strong> 4 to 8 hours after ingestion</td>
</tr>
<tr>
<td>If paracetamol level is <strong>double nomogram line</strong> (page 45) then go to page 50</td>
</tr>
<tr>
<td>If paracetamol level is above <strong>nomogram line</strong> then <strong>start NAC infusion</strong> (page 45)</td>
</tr>
<tr>
<td>If paracetamol level unavailable within 8 hours then <strong>start NAC infusion</strong> (page 45)</td>
</tr>
<tr>
<td>If NAC infusion is started within 8 hours and the three bag NAC infusion protocol is completed, then no further blood tests are required</td>
</tr>
</tbody>
</table>
INGESTION > 8 HOURS AGO

RISK OF HEPATOTOXICITY IF > 10 g OR > 200 mg/kg

If massive ingestion ( > 30 g or > 500 mg/kg) then go to page 50

If modified release (eg. Panadol Osteo) ingestion then go to page 49

Start NAC infusion (page 45)

Measure paracetamol level and ALT

If paracetamol level is double nomogram line (page 45) then go to page 50

If paracetamol level is under nomogram line (page 45) and ALT < 50 then cease NAC infusion. No further treatment is required unless abdominal pain, nausea or vomiting.

After the third bag of the NAC infusion measure ALT

If ALT > 50 then continue NAC infusion with another bag of acetylcysteine 100 mg/kg in dextrose 5% 1000 mL over 16 h (same as the third bag, see page 45)
MULTIPLE INGESTIONS OVER > 8 HOURS

RISK OF HEPATOTOXICITY IF:

- > 10 g or 200 mg/kg in a single 24 hour period
- OR
- > 6 g or > 150 mg/kg per 24 hour period for the preceding 48 hours
- OR
- > 4 g/day or > 100 mg/kg/day for > 48 hours in patient with abdominal pain, nausea or vomiting

Measure paracetamol level and ALT

If paracetamol level < 20 mg/L ( < 132 µmol/L) and ALT < 50 then no further treatment is required

If paracetamol level ≥ 20 mg/L ( ≥ 132 µmol/L) and/or ALT ≥ 50 then start NAC infusion (see page 45).

Take blood in 8 hours:

If paracetamol level < 10 mg/L ( < 66 µmol/L) and ALT < 50 or unchanged then cease NAC infusion and no further treatment is required

otherwise continue NAC infusion and check ALT every 12 hours
MODIFIED RELEASE INGESTION

Modified release brand names: PANADOL OSTEO
  PANADOL EXTEND
  DUATROL SR
  OSTEOMOL 665 mg
  OSTEO PARACETAMOL 665 mg

If severe toxicity:
  if conscious and cooperative give PO activated charcoal 1 g/kg to maximum of 50 g
  if intubated give NG activated charcoal 1 g/kg to maximum of 50 g

If ingestion > 10 g or 200 mg/kg then start NAC infusion (page 45)

Measure paracetamol level at 4 to 8 hours and repeat 4 hours later
If either level is above nomogram line (page 45) then continue NAC infusion
If both levels are below nomogram line and decreasing then cease NAC infusion

If paracetamol level is double nomogram line (page 45) then go to page 50

After the third bag of the NAC infusion measure paracetamol level and ALT
If paracetamol level > 10 mg/L ( > 66 µmol/L) or ALT > 50 and increasing then continue NAC infusion with acetylcysteine 100 mg/kg in dextrose 5% 1000 mL over 16 hours (ie. same as the third bag, page 45)
MASSIVE INGESTION ( > 30 g OR > 500 mg/kg)

If < 4 hours since ingestion:
- if conscious and cooperative give **PO activated charcoal 1 g/kg** to maximum of 50 g
- if intubated give **NG activated charcoal 1 g/kg** to maximum of 50 g

If **modified release** (eg. Panadol Osteo) ingestion then give **PO/NG activated charcoal** even if beyond 4 hours, and measure paracetamol level in 4 hours

Start **NAC infusion** with **double dose** in **third bag** (ie. 200 mg/kg in 16 h bag)

<table>
<thead>
<tr>
<th>Weight</th>
<th>First Bag</th>
<th>Second Bag</th>
<th>Third Bag (DOUBLE DOSE FOR MASSIVE INGESTION ONLY)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>dextrose 5% 200 mL over 60 minutes (acetylcysteine)</td>
<td>dextrose 5% 500 mL over 4 hours (acetylcysteine)</td>
<td>dextrose 5% 1000 mL over 16 hours (acetylcysteine)</td>
</tr>
<tr>
<td>41 - 50 kg</td>
<td>7.5 g = 37.5 mL</td>
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<td>14 g = 70 mL</td>
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<tr>
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<td>16 g = 80 mL</td>
</tr>
<tr>
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<td>18 g = 90 mL</td>
</tr>
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<td>91 - 100 kg</td>
<td>15 g = 75 mL</td>
<td>5 g = 25 mL</td>
<td>20 g = 100 mL</td>
</tr>
<tr>
<td>≥ 101 kg</td>
<td>16.5 g = 82.5 mL</td>
<td>5.5 g = 27.5 mL</td>
<td>22 g = 110 mL</td>
</tr>
</tbody>
</table>

Call Poisons: Australia 131 126, NZ 0800 764 766, or local toxicologist

After the third bag of the NAC infusion measure **paracetamol level** and **ALT**
If paracetamol level > 10 mg/L ( > 66 µmol/L) or ALT increasing then **continue NAC infusion**
Inflate cuff to 20 to 30 cmH₂O

Check tube placement:

- **end-tidal CO₂** (if using colourimeter then “go for gold” within six breaths)

  ![Graph of end-tidal CO₂](image)

- **look** for symmetric chest expansion
- **auscultation** (check both axillae and over stomach)

Secure tube

Record position at incisor teeth (approximately 21 cm in females, 23 cm in males)

---

**IF ASTHMA OR COPD THEN GO TO PAGE 55 (OBSTRUCTIVE STRATEGY)**

---

**INITIAL VENTILATOR SETTINGS FOR LUNG-PROTECTIVE STRATEGY**

**Mode** VC-SIMV

![Ventilator modes](image)

continued next page
VENTILATION

VT 6 mL/kg of ideal body weight

<table>
<thead>
<tr>
<th>Height</th>
<th>5’ 153 cm</th>
<th>5’2” 156 cm</th>
<th>5’4” 163 cm</th>
<th>5’6” 168 cm</th>
<th>5’8” 173 cm</th>
<th>5’10” 178 cm</th>
<th>6’ 183 cm</th>
<th>6’2” 188 cm</th>
<th>6’4” 193 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>VT male</td>
<td>305</td>
<td>320</td>
<td>360</td>
<td>385</td>
<td>415</td>
<td>440</td>
<td>470</td>
<td>490</td>
<td>520</td>
</tr>
<tr>
<td>VT female</td>
<td>275</td>
<td>295</td>
<td>330</td>
<td>360</td>
<td>385</td>
<td>415</td>
<td>440</td>
<td>470</td>
<td>490</td>
</tr>
<tr>
<td>VT pregnant</td>
<td>370</td>
<td>390</td>
<td>440</td>
<td>480</td>
<td>510</td>
<td>550</td>
<td>585</td>
<td>625</td>
<td>650</td>
</tr>
</tbody>
</table>

RR 16 /min

![RR 16/min Chart]

Pmax 35 cmH₂O

![Pmax 35 cmH₂O Chart]

FiO₂ start at FiO₂ 100% and PEEP 5, then titrate to saturations 88 to 95%

<table>
<thead>
<tr>
<th>FiO₂ (%)</th>
<th>40</th>
<th>40</th>
<th>50</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>70</th>
<th>70</th>
<th>80</th>
<th>90</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEEP (cmH₂O)</td>
<td>5</td>
<td>8</td>
<td>8</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>14</td>
<td>14</td>
</tr>
</tbody>
</table>

continued next page
If hypertensive **acute pulmonary oedema** then start PEEP at 10 cmH$_2$O and titrate up while titrating IV GTN, aiming for systolic ≤ 140 mmHg

If **cardiogenic shock** then avoid high PEEP

If **head injury** then use PEEP 5 cmH$_2$O and aim for ETCO$_2$ in low end of normal range

In patients with “sick lungs” ETCO$_2$ may differ from $P_YCO_2$ or $P_ACO_2$

Insert **nasogastric** or orogastric tube

Maintain **sedation:**

Mix **morphine 50 mg** and **midazolam 50 mg** and make up to **50 mL** with **normal saline**. Each 1 mL contains morphine 1 mg and midazolam 1 mg. Give **loading dose** of **2 to 10 mL**, and **start infusion at 2.5 to 5 mL/hour**.

**OR**

**IV propofol 10 mg/mL** (neat solution) at **3 to 5 mL/hour**

and

**IV fentanyl 50 micrograms/mL** (neat solution) **loading dose** of **2 to 4 mL**

(= 100 to 200 micrograms) then **0.4 to 4 mL/hour** (= 20 to 200 micrograms/hour)

Check portable **CXR**

Insert urinary **IDC**

continued next page
**VENTILATION**

**Raise** head of bed to 45° (or higher if obese)

If **complications** on the ventilator then **call for help** and check:

- **Obstruction**: check for high peak inspiratory pressure, **suction** secretions
- **Dislodgement**: check end-tidal CO₂ waveform, repeat laryngoscopy
- **Equipment failure**: disconnect from ventilator, **bag** patient, check all connections in circuit, check gas supply
- **Pneumothorax**: check breath sounds, lung sliding on **ultrasound**, repeat CXR
- **Stacking breaths**: **bag** slowly, push on chest to assist

---

Never ignore a ventilator alarm

If **Pmax alarms**:

the Oxylog 3000 displays ✗ ✗ ✗ Paw high

check for **patient agitation** and **tube obstruction**

if not agitation or obstruction then press and hold **Insp Hold**

![Graph showing Pplat]

If Pplat > 30 then **decrease VT** in 1 mL/kg steps to a minimum of 4 mL/kg
INITIAL VENTILATOR SETTINGS FOR OBSTRUCTIVE STRATEGY

**Mode** VC-SIMV

**VT** 6 mL/kg of ideal body weight

<table>
<thead>
<tr>
<th>Height</th>
<th>5' 153 cm</th>
<th>5'2&quot; 156 cm</th>
<th>5'4&quot; 163 cm</th>
<th>5'6&quot; 168 cm</th>
<th>5'8&quot; 173 cm</th>
<th>5'10&quot; 178 cm</th>
<th>6' 183 cm</th>
<th>6'2&quot; 188 cm</th>
<th>6'4&quot; 193 cm</th>
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</thead>
<tbody>
<tr>
<td>VT male</td>
<td>305</td>
<td>320</td>
<td>360</td>
<td>385</td>
<td>415</td>
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<td>490</td>
<td>520</td>
</tr>
<tr>
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<td>275</td>
<td>295</td>
<td>330</td>
<td>360</td>
<td>385</td>
<td>415</td>
<td>440</td>
<td>470</td>
<td>490</td>
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<tr>
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<td>440</td>
<td>480</td>
<td>510</td>
<td>550</td>
<td>585</td>
<td>625</td>
<td>650</td>
</tr>
</tbody>
</table>

**RR** 8 /min

continued next page
**VENTILATION**

**Pmax** 35 cmH₂O

![Image of Pmax 35 cmH₂O](image)

**FiO₂** minimum for saturations 88 to 95%

![Image of FiO₂ 60%](image)

**PEEP** 0 cmH₂O

**I:E** ≥ 1:4

**Autoflow On** with slope

Insert **nasogastric** or orogastric tube

continued next page
Maintain **sedation:**

Mix **morphine 50 mg** and **midazolam 50 mg** and make up to **50 mL** with **normal saline**. Each 1 mL contains morphine 1 mg and midazolam 1 mg. Give **loading dose** of **2 to 10 mL**, and **start infusion at 2.5 to 5 mL/hour**.

**OR**

**IV propofol 10 mg/mL** (neat solution) at **3 to 5 mL/hour** and **IV fentanyl 50 micrograms/mL** (neat solution) **loading dose** of **2 to 4 mL** (= 100 to 200 micrograms) then **0.4 to 4 mL/hour** (= 20 to 200 micrograms/hour)

---

Check portable **CXR**

---

Insert urinary **IDC**

---

**Raise** head of bed to 45° (or higher if obese)

---

Consider **permissive hypercapnia** keeping **pH > 7.1**

---

Examine expiratory flow curves

If breath stacking then decrease RR to minimum of 4/min

---

If hypotensive and difficult to ventilate then **disconnect** tube and allow patient to expire stacked breaths

---

**continued next page**
If complications on the ventilator then call for help and check:

- **Obstruction**: check for high peak inspiratory pressure, suction secretions
- **Dislodgement**: check end-tidal CO₂ waveform, repeat laryngoscopy
- **Equipment failure**: disconnect from ventilator, bag patient, check all connections in circuit, check gas supply
- **Pneumothorax**: check breath sounds, lung sliding on ultrasound, repeat CXR
- **Stacking breaths**: bag slowly, push on chest to assist

Never ignore a ventilator alarm

If Pmax alarms:

- the Oxylog 3000 displays !!! Paw high
- check for patient agitation and tube obstruction
- if not agitation or obstruction then press and hold Insp Hold

If Pplat > 30 then decrease VT in 1 mL/kg steps to a minimum of 4 mL/kg
VENTRICULAR FIBRILLATION

CPR: 30 COMPRESSIONS : 2 BREATHS
100 TO 120 PER MINUTE
5 CM DEEP
ROTATE COMPRESSIONS
MINIMISE INTERRUPTIONS

CALL FOR HELP
INFORM TEAM
CRASH CART

START CPR

Attach defibrillator or monitor

Pads or paddles in left midaxillary line over sixth intercostal space (under breast) and right parasternal area over second intercostal space. In patients with a PPM or ICD put pads at least 8 cm from the PPM or ICD.

If the rhythm is shockable (VF or pulseless VT) then shock
For all shocks use 200 J then immediately continue chest compressions

Consider airway adjuncts (oro- or naso-pharyngeal airway, and if skilled LMA or ETT)
High-flow oxygen
Intravenous or intraosseous access
Waveform capnography (end-tidal CO₂ monitoring)

CPR 2 minutes
Look at the clock

continued on page 61
**FIND AND TREAT CAUSE**

**OBTAiN BEdSiDE BLOODS AND CONSiDER CARDiAC ULTRASOUND**

Consider **myocardial infarct** and **pulmonary embolus** (may require PCI or thrombolysis)

If **hypoxia** give high-flow **oxygen**, **check connections**, check for bilateral breath sounds, suction endotracheal tube and reconfirm placement, consider **CXR**

If **hyperkalaemia**:
- give **IV calcium chloride 10% 10 mL bolus** or **IV calcium gluconate 10% 30 mL bolus**
- give **IV short-acting insulin 10 units** with **IV dextrose 50% 50 mL**
- give **nebulised salbutamol 10 to 20 mg**

If **hypokalaemia** give **IV potassium chloride 1 mmol/mL 5 mL bolus and IV magnesium sulphate 50% 2.5 mL bolus**

If profound **acidosis** consider **IV sodium bicarbonate 8.4% 1 mL/kg bolus** on expert advice

If **hypovolaemia** give **IV normal saline 20 mL/kg and check haemoglobin**

If **hypocalcaemia** give **IV calcium gluconate 10% 20 mL or IV calcium chloride 10% 10 mL**

If **hyperthermia** consider sepsis, neuroleptic malignant syndrome, serotonin toxicity, malignant hyperthermia, heat stroke

If **hypothermia** use forced air blanket, **warm IV fluids**, raise room temperature

Consider **toxins** including medications, infusions, ingestions, and medication error

Consider **tension pneumothorax**. Check for signs and perform emergency needle decompression or finger thoracostomy. Call for CXR but do not delay treatment.

Consider **cardiac tamponade** especially if penetrating trauma or recent cardiac surgery
Simultaneously Find and Treat Cause (facing page)

Plan actions before interrupting compressions

Shockable? then shock using 200 J

IV adrenaline 1 mg followed by normal saline 20 mL flush
CPR 2 minutes

Shockable? then shock
After third shock give IV amiodarone 300 mg in dextrose 5% 20 mL
CPR 2 minutes

Shockable? then shock

IV adrenaline 1 mg
CPR 2 minutes

Shockable? then shock
After fifth shock consider IV amiodarone 150 mg in dextrose 5% 20 mL
CPR 2 minutes

Shockable? then shock

continued next page
<table>
<thead>
<tr>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV adrenaline 1 mg</strong></td>
</tr>
<tr>
<td><strong>CPR 2 minutes</strong></td>
</tr>
<tr>
<td><strong>Shockable? then shock</strong></td>
</tr>
<tr>
<td>**If refractory pulseless VT or VF then consider **</td>
</tr>
<tr>
<td><strong>CPR 2 minutes</strong></td>
</tr>
<tr>
<td><strong>Shockable? then shock</strong></td>
</tr>
<tr>
<td><strong>IV adrenaline 1 mg</strong></td>
</tr>
<tr>
<td><strong>CPR 2 minutes</strong></td>
</tr>
<tr>
<td><strong>Shockable? then shock</strong></td>
</tr>
<tr>
<td><strong>CPR 2 minutes</strong></td>
</tr>
</tbody>
</table>

**CPR now exceeds 20 minutes**

**IF RETURN OF SPONTANEOUS CIRCULATION GO TO PAGE 25 (ROSC)**
If PULSE but COMPROMISED (hypotension, chest pain or altered conscious state):

- Give IV sedation as required. Be prepared to support airway.
- Ensure the defibrillator is synchronised
- Perform synchronised DC cardioversion 100 to 200 J (if obese start at 200 J)
- If shock fails to deliver:
  - try a different lead
  - check cables and power supply
  - consider unsynchronised DC shock if disorganised rhythm
- If no response repeat shock at 200 J (may need to press synchronise each time)

If HAEMODYNAMICALLY STABLE then consider:

- IV amiodarone 300 mg in dextrose 5% over 20 to 30 minutes then IV amiodarone 900 mg over 24 hours

  OR

- IV sotalol 1.5 mg/kg in dextrose 5% over 15 to 30 minutes then IV sotalol 80 to 160 mg over 12 hours

  OR

- IV lignocaine 1 to 1.5 mg/kg (usually 75 to 100 mg) over 1 to 2 minutes then IV lignocaine 4 mg/minute for 1 hour then 1 to 3 mg/minute

Look for causes (eg. electrolytes, myocardial infarct or ischaemia, medications)

Seek expert advice as soon as possible
PULSELESS VENTRICULAR TACHYCARDIA

CPR: 30 COMPRESSIONS : 2 BREATHS
100 TO 120 PER MINUTE
5 CM DEEP
ROTATE COMPRESSORS
MINIMISE INTERRUPTIONS

CALL FOR HELP
INFORM TEAM
CRASH CART

START CPR

Attach defibrillator or monitor

Pads or paddles in left midaxillary line over sixth intercostal space (under breast) and right parasternal area over second intercostal space. In patients with a PPM or ICD put pads at least 8 cm from the PPM or ICD.

If the rhythm is shockable (VF or pulseless VT) then shock

For all shocks use 200 J then immediately continue chest compressions

Consider airway adjuncts (oro- or naso-pharyngeal airway, and if skilled LMA or ETT)

High-flow oxygen

Intravenous or intraosseous access

Waveform capnography (end-tidal CO₂ monitoring)

CPR 2 minutes

Look at the clock

continued on page 67
If hypocalcaemia:
- give IV calcium chloride 10% 10 mL bolus or IV calcium gluconate 10% 30 mL bolus
- give IV short-acting insulin 10 units with IV dextrose 50% 50 mL
- give nebulised salbutamol 10 to 20 mg

If hypokalaemia:
- give IV potassium chloride 1 mmol/mL 5 mL bolus and IV magnesium sulphate 50% 2.5 mL bolus

If hypovolaemia:
- give IV normal saline 20 mL/kg and check haemoglobin

If hypocalcaemia:
- give IV calcium gluconate 10% 20 mL or IV calcium chloride 10% 10 mL

If hyperthermia:
- consider sepsis, neuroleptic malignant syndrome, serotonin toxicity, malignant hyperthermia, heat stroke

If hypothermia:
- use forced air blanket, warm IV fluids, raise room temperature

Consider toxins including medications, infusions, ingestions, and medication error

Consider tension pneumothorax. Check for signs and perform emergency needle decompression or finger thoracostomy. Call for CXR but do not delay treatment.

Consider cardiac tamponade especially if penetrating trauma or recent cardiac surgery
Simultaneously **Find and Treat Cause** (facing page)

**Plan actions** before interrupting compressions

---

**Shockable? then shock using 200 J**

---

**IV adrenaline 1 mg** followed by normal saline 20 mL flush

**CPR 2 minutes**

---

**Shockable? then shock**

After third shock give **IV amiodarone 300 mg** in dextrose 5% 20 mL

---

**CPR 2 minutes**

---

**Shockable? then shock**

---

**IV adrenaline 1 mg**

**CPR 2 minutes**

---

**Shockable? then shock**

After fifth shock consider **IV amiodarone 150 mg** in dextrose 5% 20 mL

---

**CPR 2 minutes**

---

**Shockable? then shock**

---

**continued next page**
IV adrenaline 1 mg
CPR 2 minutes

Shockable? then shock

If refractory pulseless VT or VF then consider IV magnesium 50% 2.5 mL bolus

CPR 2 minutes

Shockable? then shock

IV adrenaline 1 mg
CPR 2 minutes

Shockable? then shock

CPR 2 minutes

CPR now exceeds 20 minutes

IF RETURN OF SPONTANEOUS CIRCULATION GO TO PAGE 25 (ROSC)
Open and clear the airway:

- **sniffing position** (unless cervical spine injury)

  - older child
  - small child
  - infant

  - external auditory canal anterior to shoulder
  - infants may need a towel under the shoulders
  - older children may need a towel under the head

- chin lift
- jaw thrust
- suction

Insert oropharyngeal airway or nasopharyngeal airway (nasopharyngeal route relatively contra-indicated with facial or basal skull fractures)

- **Oropharyngeal** size: incisor to angle of mandible
- **Nasopharyngeal** size: nostril to tragus of ear

continued next page
Bag-mask ventilate with 100% oxygen

<table>
<thead>
<tr>
<th>Age</th>
<th>Mask size</th>
</tr>
</thead>
<tbody>
<tr>
<td>newborn</td>
<td>00</td>
</tr>
<tr>
<td>neonate</td>
<td>0/1</td>
</tr>
<tr>
<td>infant</td>
<td>2</td>
</tr>
<tr>
<td>small child</td>
<td>3</td>
</tr>
<tr>
<td>large child</td>
<td>4</td>
</tr>
<tr>
<td>adult</td>
<td>5</td>
</tr>
</tbody>
</table>

Correct size fits over mouth and nose but does not press on eyes

Look for chest rise with each squeeze of the bag

If no chest rise then:

- check mask seal
- optimise sniffing position
- bag-mask ventilate with two pairs of hands

IF UNABLE TO VENTILATE THEN GO TO PAGE 80 (AIRWAY - FAILED)

continued next page
**Assess for difficult airway:** (any one of the following)

- small mouth
- small jaw
- large tongue
- short neck
- Down syndrome or cerebral palsy
- facial anomaly or other chronic disability
- signs of airway obstruction
- trauma or swelling to the face
- morbid obesity
- cervical collar
- unstable haemodynamics
- failed non-invasive ventilation
- upright position of comfort
- history of known difficult airway or anaesthesia complication

**PRE-OXYGENATE**

Pre-oxygenate using bag-mask ventilation with 100% oxygen for 3 minutes

Consider high flow nasal oxygen

Consider end-tidal CO₂ monitoring
**PAEDIATRIC AIRWAY**

**ESTIMATE WEIGHT AND ETT SIZE**

*Estimate weight* using chart below or Broselow tape

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Weight</th>
<th>Cuffed ETT size (mm)</th>
<th>ETT length at lips (cm)</th>
<th>LMA size</th>
</tr>
</thead>
<tbody>
<tr>
<td>birth</td>
<td>3 kg</td>
<td>3.5</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>3 months</td>
<td>6 kg</td>
<td>4.0</td>
<td>11</td>
<td>1.5</td>
</tr>
<tr>
<td>6 months</td>
<td>7.5 kg</td>
<td>4.0</td>
<td>12</td>
<td>1.5</td>
</tr>
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<td>1</td>
<td>10 kg</td>
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</tr>
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<td>3</td>
<td>14 kg</td>
<td>4.5</td>
<td>13.5</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>16 kg</td>
<td>5.0</td>
<td>14</td>
<td>2</td>
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<td>5.0</td>
<td>14.5</td>
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<td>2.5</td>
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<td>16.5</td>
<td>3</td>
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<tr>
<td>11 - 12</td>
<td>40 kg</td>
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<td>18</td>
<td>3</td>
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<tr>
<td>≥ 13</td>
<td>50 kg</td>
<td>7.0</td>
<td>18</td>
<td>3</td>
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</table>

Use equipment from *weight-based drawer* if available

**Choose ETT sizes** using chart above

**IF PREDICTED DIFFICULT AIRWAY GO TO PAGE 79 (AIRWAY - DIFFICULT)**

If not predicted difficult airway then *continue on next page*

continued next page
**INTUBATION DRUGS**

**Draw up induction drug:**
- **IV ketamine 2 mg/kg** (preferred in sepsis, hypotension, asthma)
- **OR**
- **IV propofol 3 mg/kg**
- **OR**
- **IV thiopentone 2 to 5 mg/kg** (preferred in status epilepticus, raised ICP)

**Draw up paralysis drug:**
- **IV suxamethonium 2 mg/kg**, but **do not use suxamethonium if**:
  - hyperkalaemia
  - 48 to 72 hours after burn, crush or denervating injury
  - malignant hyperthermia
  - chronic myopathy
  - denervating neuromuscular disease
- **OR**
- **IV rocuronium 1.2 mg/kg**
  - if suxamethonium contra-indicated, but paralysis lasts 10 to 40 minutes

**PRE-INTUBATION CHECKLIST (NEXT TWO PAGES)**

**continued next page**
PRE-INTUBATION

TEAM

Team leader identified
Everyone introduced, by name and role, and each briefed in turn by team leader
If cervical spine injury is suspected then person doing in-line cervical spine immobilisation briefed?
Do you have enough help?
Predicted to be difficult?

Verbalise the airway strategy:
A. Initial tracheal intubation
B. Secondary tracheal intubation
C. Maintenance of oxygenation (LMA)
D. Surgical airway (cricothyroidotomy)

Anticipated problems?
Questions or concerns?

PATIENT

Position:
sniffing
ramp if obese

Haemodynamics:
consider fluid bolus
(IV normal saline 20 mL/kg)
consider pressors
(IV metaraminol 5 to 10 mcg/kg)

Pre-oxygenation:
3 minutes
> 15 L/min O₂ via mask
and 15 L/min via nasal cannulae

Non-invasive ventilation if:
obese
obstructive sleep apnoea
sats < 95% despite O₂

Monitoring equipment:
end-tidal CO₂
oxygen saturations
ECG monitoring
non-invasive BP:
non-IV-fluid arm
2 minute intervals
**DRUGS**

**First IV cannula** or intraosseous line: fluid running

**Second IV cannula** or intraosseous line

**Induction** drug:
- **ketamine** 2 mg/kg
- or **propofol** 3 mg/kg
- or **thiopentone** 2 to 5 mg/kg

**Paralysis** drug:
- **suxamethonium** 2 mg/kg
- or **rocuronium** 1.2 mg/kg

**Vasopressor** drug: **metaraminol** 5 to 10 mcg/kg

**Post-intubation** drug:
- **propofol**
- or **morphine & midazolam**
- or other

**Draw up** drugs

**Draw up** normal saline flushes

**Label** drugs and flushes

Check drug **contra-indications**

Check **allergies**

---

**EQUIPMENT**

**Suction** working

**Oxygen:**
- bag-valve mask
- end-tidal CO₂ **connected**

Oropharyngeal airway

Nasopharyngeal airway

**Laryngoscopes x 2:**
- check **light**
- check **blade size**

**Endotracheal tubes x 2:**
- choose sizes
- **test cuffs** with **syringe**
- lubricate

**Bougie** or **stylet:**
- lubricate

Ventilator **settings** and **circuit**

**Tube tie** or **tape**

**Magill’s forceps**

**Laryngeal mask airway:**
- check size

**Needle cricothyroidotomy** equipment:
- large cannula
- three-way tap
- oxygen tubing
VERBALISE THE AIRWAY STRATEGY

Verbalise the airway strategy:

Plan A: tracheal intubation: **direct laryngoscopy** or **video laryngoscopy**, bougie, two attempts in 30 seconds, sats ≥ 90%

Plan B: secondary tracheal intubation: **different blade** or **video laryngoscopy**, two attempts in 30 seconds, sats ≥ 90%

Plan C: maintenance of oxygenation: **laryngeal mask airway**, three attempts, sats ≥ 80% and heart rate not falling

Plan D: surgical airway: cannula **cricothyroidotomy**

TRACHEAL INTUBATION

Give **induction** drug and flush

Give **paralysis** drug and flush

Direct laryngoscopy or **video laryngoscopy**

If poor view apply external laryngeal manipulation

**Bougie** or stylet

Maximum of **two attempts** in **30 seconds**

If sats < 90% then re-insert **oropharyngeal airway** and/or nasopharyngeal airway and **bag-mask ventilate** using two pairs of hands

IF CANNOT OXYGENATE THEN GO TO PAGE 80 (AIRWAY - FAILED)

continued next page
CONSIDER WHAT OTHER HELP IS AVAILABLE

Improve patient position:
- sniffing position
- chin lift
- jaw thrust

SECONDARY TRACHEAL INTUBATION

Prepare ETT with bougie or stylet
Video laryngoscopy or direct laryngoscopy with different blade
Avoid cricoid pressure
External laryngeal manipulation

Maximum of two attempts in 30 seconds
If sats < 90% then re-insert oropharyngeal airway and/or nasopharyngeal airway and bag-mask ventilate using two pairs of hands

If successful intubation then go to Airway - Secure (page 82)

IF UNSUCCESSFUL THEN GO TO PAGE 80 (AIRWAY - FAILED)
PAEDIATRIC AIRWAY - CRASH

PATIENT UNRESPONSIVE AND NEAR DEATH

CALL FOR HELP

INFORM TEAM

CRASH CART

Maintain oxygenation

Attempt intubation. If successful then go to Airway - Secure (page 82)

Bag-mask ventilate with 100% oxygen and check for chest rise

IF UNABLE TO VENTILATE THEN GO TO PAGE 80 (AIRWAY - FAILED)

IV suxamethonium 2 mg/kg

Attempt intubation. If successful then go to Airway - Secure (page 82)

Bag-mask ventilate with 100% oxygen

IF UNABLE TO VENTILATE THEN GO TO PAGE 80 (AIRWAY - FAILED)

Attempt intubation. If successful then go to Airway - Secure (page 82)

Bag-mask ventilate with 100% oxygen

GO TO PAGE 80 (AIRWAY - FAILED)
If forced to act:

- give sedation and paralysis **drugs** (page 73)
- **one best attempt** by most experienced operator
- if **successful** then go to **Airway - Secure** (page 82)
- if **failed** then go to **Airway - Failed** (next page)

**IF UNABLE TO VENTILATE THEN GO TO NEXT PAGE (AIRWAY - FAILED)**

If any one of:

- **bag-mask ventilation**
- or **laryngeal mask airway**
- or **intubation**

are predicted to be unsuccessful then use **awake technique** with:

- **direct laryngoscopy**
- or **video laryngoscopy**
- or **intubating LMA**
- or **fibreoptic scope**
- or **blind intubation**

If **anaesthetist** and **equipment** available

- or **transtracheal airway**

otherwise use **RSI with double setup** (second airway doctor ready for surgical airway)

If **successful intubation** then go to **Airway - Secure** (page 82)

**IF UNSUCCESSFUL THEN GO TO NEXT PAGE (AIRWAY - FAILED)**
PAEDIATRIC AIRWAY - FAILED

“CAN’T INTUBATE”

Cricoid pressure off
Insert laryngeal mask airway (LMA)

Maximum of three attempts with laryngeal mask airway
Consider changing device or size (see sizing chart on page 72)

If successful oxygenation then go to Airway - Secure (page 82)

IF SATS < 90% THEN “FAILED LARYNGEAL MASK AIRWAY”

Bag-mask ventilate using two pairs of hands
Optimise sniffing position
Maximum jaw thrust
Oropharyngeal and/or nasopharyngeal airway

If successful oxygenation then calm down and consider other options

If heart rate is falling then go to next page (Cricothyroidotomy)

IF SATS < 80% THEN “CAN’T INTUBATE, CAN’T OXYGENATE”

GO TO NEXT PAGE (CRICOTHYROIDOTOMY)
Extend neck (unless cervical spine injury)

Use non-dominant hand to stabilise the larynx

Attach a syringe to the largest available cannula (12, 14 or 16 gauge). Use dominant hand to palpate the cricothyroid membrane, then insert cannula through the cricothyroid membrane, aiming downwards at 45° towards the feet. Stay in the midline.

When air is aspirated advance the cannula over the needle into the trachea

Withdraw the needle, attach the oxygen tubing to a three-way tap, and attach the three-way tap to the cannula. If there is no three-way tap available then connect an IV giving set to the cannula, insert spike of giving set into oxygen tubing, remove barrel from a syringe, and attach open syringe to side port of giving set.

Turn the oxygen flow rate (in litres) to the patient’s age (in years)

Inspiration: occlude for 1 second the open end of the three-way tap (or the open end of the syringe attached to the side port of the IV giving set).

If the chest does not rise then increase the oxygen flow rate in 1 L/min increments.

Expiration (via upper airway): release for 4 seconds

Needle cricothyroidotomy only gains time for a definitive airway to be established.

If the patient is >12 years old then consider surgical cricothyroidotomy (page 11).
Inflate cuff and check cuff pressure

Check tube placement:
- end-tidal CO₂ (if using colourimeter then “go for gold” within six breaths)
- auscultation

Secure tube
Record position at lips

Insert nasogastric or orogastric tube (avoid nasogastric tube if head injury)

Maintain sedation (eg. mix morphine 50 mg and midazolam 50 mg and make up to 50 mL with normal saline. Titrate infusion rate.)

Check portable CXR

Insert urinary IDC

Raise head of bed to 45°

If complications on the ventilator, check:
- Dislodgement: check end-tidal CO₂ waveform, repeat laryngoscopy
- Obstruction: check for high peak inspiratory pressure, suction secretions
- Pneumothorax: check breath sounds, lung sliding on ultrasound, repeat CXR
- Equipment failure: disconnect from ventilator, bag patient
- Stacking breaths: bag slowly, push on chest to assist
Remove allergen

Lie patient flat unless upright position required to maintain airway

IM adrenaline 10 micrograms/kg up to 500 micrograms into mid-lateral thigh

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Weight</th>
<th>Adrenaline dose</th>
<th>Adrenaline volume 1:1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1</td>
<td>5 - 10 kg</td>
<td>50 - 100 mcg</td>
<td>0.05 - 0.1 mL</td>
</tr>
<tr>
<td>1 - 2</td>
<td>10 kg</td>
<td>100 mcg</td>
<td>0.1 mL</td>
</tr>
<tr>
<td>3 - 4</td>
<td>15 kg</td>
<td>150 mcg</td>
<td>0.15 mL</td>
</tr>
<tr>
<td>5 - 6</td>
<td>20 kg</td>
<td>200 mcg</td>
<td>0.2 mL</td>
</tr>
<tr>
<td>7 - 10</td>
<td>30 kg</td>
<td>300 mcg</td>
<td>0.3 mL</td>
</tr>
<tr>
<td>11 - 12</td>
<td>40 kg</td>
<td>400 mcg</td>
<td>0.4 mL</td>
</tr>
<tr>
<td>≥ 13</td>
<td>50 kg</td>
<td>500 mcg</td>
<td>0.5 mL</td>
</tr>
</tbody>
</table>

High-flow oxygen

Repeat adrenaline dose every 5 minutes as needed

Intravenous or intraosseous access

If hypotensive give IV normal saline 20 mL/kg bolus
If normotensive consider IV maintenance fluids

continued next page
If multiple doses of adrenaline required, inadequate response or deterioration, then start an **IV adrenaline infusion**: adrenaline 0.3 mg/kg body weight in 50 mL dextrose 5%, so that 1 mL/h ≈ 0.1 micrograms/kg/min. Start infusion at 0.5 mL/h (≈ 0.05 mcg/kg/min) and titrate to a maximum of 10 mL/h (≈ 1 mcg/kg/min).

If adrenaline infusion **ineffective or unavailable**, consider:

**for persistent hypotension/shock:**
- give IV normal saline (maximum 50 mL/kg in the first 30 minutes)
- in patients with cardiogenic shock (especially if taking beta-blockers)
- consider an **IV glucagon bolus** of 20 to 30 micrograms/kg (maximum 1 mg) over five minutes. Rapid administration can cause vomiting. Dose can be repeated or followed by an infusion.
- consider **IV metaraminol** 10 micrograms/kg

**for upper airway obstruction:**
- **nebulised adrenaline** (0.5 mL/kg of 1:1,000 to a maximum of 5 mL)
- consider **intubation** (anticipate difficult airway and call for expert help)

**for persistent wheeze:**
- bronchodilators: **salbutamol**:
  - < 5 years: 6 puffs of 100 micrograms via spacer or nebulised 2.5 mg
  - ≥ 5 years: 12 puffs of 100 micrograms via spacer or nebulised 5 mg
- **PO prednisone** 1 mg/kg (maximum 50 mg) or **IV hydrocortisone** 5 mg/kg (maximum 200 mg)

**Observe for at least 4 hours after last dose of adrenaline**
PAEDIATRIC ASYSTOLE

CPR: 15 COMPRESSIONS : 2 BREATHS
100 TO 120 PER MINUTE
COMPRESSION DEPTH 1/3 OF CHEST
HAND ON LOWER HALF OF STERNUM
MINIMISE INTERRUPTIONS

CALL FOR HELP
INFORM TEAM
CRASH CART

START CPR

Attach defibrillator or monitor
Consider airway adjuncts (oro- or naso-pharyngeal airway, and if skilled LMA or ETT)
High-flow oxygen
Intravenous or intraosseous access

IV adrenaline 10 micrograms/kg followed by normal saline flush

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Weight</th>
<th>Adrenaline dose</th>
<th>Adrenaline volume 1:10,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1</td>
<td>5 - 10 kg</td>
<td>50 - 100 mcg</td>
<td>0.5 - 1 mL</td>
</tr>
<tr>
<td>1 - 2</td>
<td>10 kg</td>
<td>100 mcg</td>
<td>1 mL</td>
</tr>
<tr>
<td>3 - 4</td>
<td>15 kg</td>
<td>150 mcg</td>
<td>1.5 mL</td>
</tr>
<tr>
<td>5 - 6</td>
<td>20 kg</td>
<td>200 mcg</td>
<td>2 mL</td>
</tr>
<tr>
<td>7 - 10</td>
<td>30 kg</td>
<td>300 mcg</td>
<td>3 mL</td>
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<tr>
<td>11 - 12</td>
<td>40 kg</td>
<td>400 mcg</td>
<td>4 mL</td>
</tr>
<tr>
<td>≥ 13</td>
<td>50 kg</td>
<td>500 mcg</td>
<td>5 mL</td>
</tr>
</tbody>
</table>

If only 1:1,000 adrenaline available then dilute to 10 mL with normal saline and dose as above

continued on page 87
FIND AND TREAT CAUSE

**OBTAIN BEDSIDE BLOODS AND CONSIDER CARDIAC ULTRASOUND**

If hypoxia give high-flow oxygen, check connections, check for bilateral breath sounds, suction endotracheal tube and reconfirm placement, consider CXR.

If hypovolaemia give IV normal saline 20 mL/kg and check haemoglobin.

If hyperkalaemia:
- give IV calcium gluconate 10% 0.7 mL/kg or IV calcium chloride 10% 0.2 mL/kg
- give IV insulin 0.1 units/kg with IV dextrose 10% 5 mL/kg
- give IV sodium bicarbonate 8.4% 1 mL/kg (maximum 50 mL)

If hypokalaemia give IV potassium chloride 1 mmol/mL 0.03 to 0.07 mL/kg (maximum 5 mL) slow injection and IV magnesium sulphate 50% 0.05 to 0.10 mL/kg bolus (maximum 2.5 mL)

If profound acidosis consider IV sodium bicarbonate 8.4% 1 mL/kg (maximum 50 mL)

If hypothermia use forced air blanket, warm IV fluids, raise room temperature.

If hyperthermia consider sepsis, heat stroke, malignant hyperthermia, serotonin toxicity, and neuroleptic malignant syndrome (seek expert advice)

If hypocalcaemia give IV calcium gluconate 10% 0.7 mL/kg (maximum 20 mL) or IV calcium chloride 10% 0.2 mL/kg

Consider toxins including medications, infusions, ingestions, and medication error.

Consider tension pneumothorax. Check for signs and perform emergency needle decompression or finger thoracostomy. Call for CXR but do not delay treatment.

Consider thrombosis including pulmonary embolus, myocardial infarct and stroke.

Consider cardiac tamponade.
Simultaneously Find and Treat Cause (facing page)

Waveform capnography

Plan actions before interrupting compressions

CPR 2 minutes

Look at the clock

If the rhythm is shockable (VF or pulseless VT) then shock using 4 J/kg

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Weight</th>
<th>Shock</th>
</tr>
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<tbody>
<tr>
<td>&lt; 1</td>
<td>5 - 10kg</td>
<td>20 - 40 J</td>
</tr>
<tr>
<td>1 - 2</td>
<td>10 kg</td>
<td>40 J</td>
</tr>
<tr>
<td>3 - 4</td>
<td>15 kg</td>
<td>60 J</td>
</tr>
<tr>
<td>5 - 6</td>
<td>20 kg</td>
<td>80 J</td>
</tr>
<tr>
<td>7 - 10</td>
<td>30 kg</td>
<td>120 J</td>
</tr>
<tr>
<td>11 - 12</td>
<td>40 kg</td>
<td>160 J</td>
</tr>
<tr>
<td>≥ 13</td>
<td>50 kg</td>
<td>200 J</td>
</tr>
</tbody>
</table>

CPR 2 minutes

Shockable? then shock

IV adrenaline 10 micrograms/kg

CPR 2 minutes

continued next page
### PAEDIATRIC ASYSTOLE

<table>
<thead>
<tr>
<th>Shockable? then shock</th>
</tr>
</thead>
<tbody>
<tr>
<td>After third shock give <strong>IV amiodarone 5 mg/kg</strong> in dextrose 5% 20 mL</td>
</tr>
</tbody>
</table>

| CPR 2 minutes |

| Shockable? then shock |

<table>
<thead>
<tr>
<th>IV adrenaline 10 micrograms/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPR 2 minutes</td>
</tr>
</tbody>
</table>

| Shockable? then shock |

| CPR 2 minutes |

| Shockable? then shock |

<table>
<thead>
<tr>
<th>IV adrenaline 10 micrograms/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPR 2 minutes</td>
</tr>
</tbody>
</table>

| Shockable? then shock |

| CPR 2 minutes |

| Shockable? then shock |

**continued next page**
**PAEDIATRIC ASYSTOLE**

- **IV adrenaline 10 micrograms/kg**
  - CPR 2 minutes

- **Shockable? then shock**
  - CPR 2 minutes

- **CPR now exceeds 20 minutes. Seek expert advice and consider stopping.**

---

**Post-resuscitation care:**

- Re-evaluate **ABCDE** and re-assess **all tubes and lines**
- Cervical **collar** if required
- Twelve lead **ECG**
- **CXR, IDC, nasogastric tube**
- **Temperature probe** in nasopharynx, oesophagus or bladder
- Assess for **injuries** from resuscitation
- Treat **precipitating causes** (consider antibiotics, seizure management)
- Aim for **normal sats** and **normal PaCO₂** unless specific conditions
- Aim for **normoglycaemia**
- Targeted temperature management aiming **32 to 37 °C**
- Psychological support for family and staff

---

**Seek expert advice regarding ongoing care and transfer**
< 100/MINUTE IF AGE < 2 YEARS  
< 60/MINUTE IF AGE 2 TO 12 YEARS  
< 50/MINUTE IF AGE > 12 YEARS

**IF NO PULSE THEN GO TO PAGE 93 (PEA)**

**CALL FOR HELP**  
**INFORM TEAM**  
**CRASH CART**

Maintain **airway**  
Assist **breathing** as necessary  
High-flow **oxygen**  
Attach oximetry, blood pressure monitor and cardiac monitor  
**Intravenous** or **intraosseous** access  
12-lead ECG if available (don’t delay therapy)

**If compromised:**  
**bag-mask** ventilation  
if age < 12 and heart rate < 60/minute then **chest compressions**  
if age ≥ 12 and heart rate < 50/minute then **chest compressions**  
treat **shock** (IV normal saline 20 mL/kg, repeated as necessary)

**If compromised and high vagal tone** (eg. from nasopharyngeal or oesophageal stimulation, tracheal intubation, tracheal suctioning, increased ICP) then give  
**IV or IO atropine 20 mcg/kg** (minimum dose 100 mcg, maximum dose 600 mcg, may be repeated after five minutes to a maximum total of 1 mg in child or 2 mg in adolescent).  
**See next page for atropine dose chart**

continued next page
If compromised and high vagal tone, continued:

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Weight</th>
<th>Atropine dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1</td>
<td>5 - 10kg</td>
<td>100 - 200 mcg</td>
</tr>
<tr>
<td>1 - 2</td>
<td>10 kg</td>
<td>200 mcg</td>
</tr>
<tr>
<td>3 - 4</td>
<td>15 kg</td>
<td>300 mcg</td>
</tr>
<tr>
<td>5 - 6</td>
<td>20 kg</td>
<td>400 mcg</td>
</tr>
<tr>
<td>7 - 10</td>
<td>30 kg</td>
<td>600 mcg</td>
</tr>
<tr>
<td>11 - 12</td>
<td>40 kg</td>
<td>600 mcg</td>
</tr>
<tr>
<td>≥ 13</td>
<td>50 kg</td>
<td>600 mcg</td>
</tr>
</tbody>
</table>

If still compromised give IV or IO adrenaline 10 micrograms/kg

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Weight</th>
<th>Adrenaline dose</th>
<th>Adrenaline volume 1:10,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1</td>
<td>5 - 10kg</td>
<td>50 - 100 mcg</td>
<td>0.5 - 1 mL</td>
</tr>
<tr>
<td>1 - 2</td>
<td>10 kg</td>
<td>100 mcg</td>
<td>1 mL</td>
</tr>
<tr>
<td>3 - 4</td>
<td>15 kg</td>
<td>150 mcg</td>
<td>1.5 mL</td>
</tr>
<tr>
<td>5 - 6</td>
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<td>4 mL</td>
</tr>
<tr>
<td>≥ 13</td>
<td>50 kg</td>
<td>500 mcg</td>
<td>5 mL</td>
</tr>
</tbody>
</table>

If still compromised consider:

**IV adrenaline infusion:** adrenaline 0.3 mg/kg in 50 mL dextrose 5%, so that 1 mL/h ≈ 0.1 micrograms/kg/min. Start infusion at 0.5 to 10 mL/h (≈ 0.05 to 1 micrograms/kg/min). Titrate rate according to response.

**pacing**
and seek expert advice

If not compromised then seek expert advice
CPR: 15 COMPRESSIONS : 2 BREATHS
100 TO 120 PER MINUTE
COMPRESSION DEPTH 1/3 OF CHEST
HAND ON LOWER HALF OF STERNUM
MINIMISE INTERRUPTIONS

CALL FOR HELP  INFORM TEAM  CRASH CART

START CPR

Attach defibrillator or monitor
Consider airway adjuncts (oro- or naso-pharyngeal airway, and if skilled LMA or ETT)
High-flow oxygen
Intravenous or intraosseous access

IV adrenaline 10 micrograms/kg followed by normal saline flush

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Weight</th>
<th>Adrenaline dose</th>
<th>Adrenaline volume 1:10,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1</td>
<td>5 - 10 kg</td>
<td>50 - 100 mcg</td>
<td>0.5 - 1 mL</td>
</tr>
<tr>
<td>1 - 2</td>
<td>10 kg</td>
<td>100 mcg</td>
<td>1 mL</td>
</tr>
<tr>
<td>3 - 4</td>
<td>15 kg</td>
<td>150 mcg</td>
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<tr>
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<td>2 mL</td>
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<td>300 mcg</td>
<td>3 mL</td>
</tr>
<tr>
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<td>40 kg</td>
<td>400 mcg</td>
<td>4 mL</td>
</tr>
<tr>
<td>≥ 13</td>
<td>50 kg</td>
<td>500 mcg</td>
<td>5 mL</td>
</tr>
</tbody>
</table>

If only 1:1,000 adrenaline available then dilute to 10 mL with normal saline and dose as above

continued on page 95
FIND AND TREAT CAUSE

**OBTAIN BEDSIDE BLOODS AND CONSIDER CARDIAC ULTRASOUND**

If **hypoxia** give high-flow **oxygen**, **check connections**, check for bilateral breath sounds, suction endotracheal tube and reconfirm placement, consider **CXR**

If **hypovolaemia** give **IV normal saline 20 mL/kg** and check haemoglobin

If **hyperkalaemia**:
- give **IV calcium gluconate 10% 0.7 mL/kg** or **IV calcium chloride 10% 0.2 mL/kg**
- give **IV insulin 0.1 units/kg with IV dextrose 10% 5 mL/kg**
- give **IV sodium bicarbonate 8.4% 1 mL/kg** (maximum 50 mL)

If **hypokalaemia** give **IV potassium chloride 1 mmol/mL 0.03 to 0.07 mL/kg** (maximum 5 mL) slow injection and **IV magnesium sulphate 50% 0.05 to 0.10 mL/kg** bolus (maximum 2.5 mL)

If profound **acidosis** consider **IV sodium bicarbonate 8.4% 1 mL/kg** (maximum 50 mL)

If **hypothermia** use forced air blanket, **warm IV fluids**, raise room temperature

If **hyperthermia** consider sepsis, heat stroke, malignant hyperthermia, serotonin toxicity, and neuroleptic malignant syndrome (seek expert advice)

If **hypocalcaemia** give **IV calcium gluconate 10% 0.7 mL/kg** (maximum 20 mL) or **IV calcium chloride 10% 0.2 mL/kg**

Consider **toxins** including medications, infusions, ingestions, and medication error

Consider **tension pneumothorax**. Check for signs and perform emergency needle decompression or finger thoracostomy. Call for CXR but do not delay treatment.

Consider **thrombosis** including pulmonary embolus, myocardial infarct and stroke

Consider **cardiac tamponade**
Simultaneously **Find and Treat Cause** (facing page)

Waveform capnography

**Plan actions** before interrupting compressions

**CPR 2 minutes**

Look at the **clock**

If the rhythm is **shockable** (**VF** or **pulseless VT**) then **shock** using **4 J/kg**

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Weight</th>
<th>Shock</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1</td>
<td>5 - 10kg</td>
<td>20 - 40 J</td>
</tr>
<tr>
<td>1 - 2</td>
<td>10 kg</td>
<td>40 J</td>
</tr>
<tr>
<td>3 - 4</td>
<td>15 kg</td>
<td>60 J</td>
</tr>
<tr>
<td>5 - 6</td>
<td>20 kg</td>
<td>80 J</td>
</tr>
<tr>
<td>7 - 10</td>
<td>30 kg</td>
<td>120 J</td>
</tr>
<tr>
<td>11 - 12</td>
<td>40 kg</td>
<td>160 J</td>
</tr>
<tr>
<td>≥ 13</td>
<td>50 kg</td>
<td>200 J</td>
</tr>
</tbody>
</table>

**CPR 2 minutes**

**Shockable?** then **shock**

**IV adrenaline 10 micrograms/kg**

**CPR 2 minutes**

**continued next page**
### Shockable? then shock
After third shock give IV amiodarone 5 mg/kg in dextrose 5% 20 mL

<table>
<thead>
<tr>
<th>CPR 2 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shockable? then shock</td>
</tr>
<tr>
<td>IV adrenaline 10 micrograms/kg</td>
</tr>
<tr>
<td>Shockable? then shock</td>
</tr>
<tr>
<td>CPR 2 minutes</td>
</tr>
<tr>
<td>Shockable? then shock</td>
</tr>
<tr>
<td>IV adrenaline 10 micrograms/kg</td>
</tr>
<tr>
<td>Shockable? then shock</td>
</tr>
<tr>
<td>CPR 2 minutes</td>
</tr>
<tr>
<td>Shockable? then shock</td>
</tr>
</tbody>
</table>

continued next page
IV adrenaline 10 micrograms/kg
CPR 2 minutes

Shockable? then shock
CPR 2 minutes

CPR now exceeds 20 minutes. Seek expert advice and consider stopping.

Post-resuscitation care:
Re-evaluate ABCDE and re-assess all tubes and lines
Cervical collar if required
Twelve lead ECG
CXR, IDC, nasogastric tube
Temperature probe in nasopharynx, oesophagus or bladder
Assess for injuries from resuscitation
Treat precipitating causes (consider antibiotics, seizure management)
Aim for normal sats and normal PaCO₂ unless specific conditions
Aim for normoglycaemia
Targeted temperature management aiming 32 to 37 °C
Psychological support for family and staff

Seek expert advice regarding ongoing care and transfer
PAEDIATRIC STATUS EPILEPTICUS

CALL FOR HELP  INFORM TEAM  CRASH CART

Protect airway in recovery position (consider nasopharyngeal airway)
High-flow oxygen and suction

Attempt IV access
If IV access then take blood for FBC, EUC, CaMgPh, anticonvulsant levels, and culture

Check blood glucose (from IV or fingerprick). If blood glucose < 3.0 mmol/L then give IV dextrose 10% 2 mL/kg, followed by infusion of IV dextrose 10% at 5 mL/kg/hour, and check blood glucose again in 5 minutes.

Unless given pre-hospital, give:

**IV or IM midazolam 0.15 mg/kg** (see chart below, maximum 10 mg)

**buccal or intranasal midazolam 0.3 mg/kg** (see chart below, maximum 10 mg)

**IV diazepam 0.25 mg/kg** (maximum 10 mg, do not give IM diazepam)

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Weight</th>
<th>Midazolam IV/IM</th>
<th>Midazolam Buccal/Intranasal</th>
</tr>
</thead>
<tbody>
<tr>
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<td>5 - 10kg</td>
<td>0.75 - 1.5 mg</td>
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</tr>
<tr>
<td>1 - 2</td>
<td>10 kg</td>
<td>1.5 mg</td>
<td>3 mg</td>
</tr>
<tr>
<td>3 - 4</td>
<td>15 kg</td>
<td>2.25 mg</td>
<td>4.5 mg</td>
</tr>
<tr>
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<td>20 kg</td>
<td>3 mg</td>
<td>6 mg</td>
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<td>7 - 10</td>
<td>30 kg</td>
<td>4.5 mg</td>
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<td>40 kg</td>
<td>5 mg</td>
<td>10 mg</td>
</tr>
<tr>
<td>≥ 13</td>
<td>50 kg</td>
<td>7.5 mg</td>
<td>10 mg</td>
</tr>
</tbody>
</table>

continued next page
If still fitting after 5 minutes give:

- IV or IM midazolam 0.15 mg/kg (see chart on previous page, maximum 10 mg)

OR

- buccal or intranasal midazolam 0.3 mg/kg (see chart, maximum 10 mg)

OR

- IV diazepam 0.25 mg/kg (maximum 10 mg)

If still fitting after 5 minutes give:

- IV or IO phenytoin 20 mg/kg in normal saline 100 mL over 20 minutes (or IV/IO phenytoin 10 mg/kg if already on phenytoin) with ECG monitoring. Do not exceed 50 mg/min or 1 mg/kg/min, whichever is slower.

OR

- IV or IO levetiracetam 20 mg/kg in normal saline 100 mL over 20 minutes

OR

- IV or IO phenobarbitone 20 mg/kg (or IV/IO phenobarbitone 10 mg/kg if already on phenobarbitone)

Continuously monitor respirations, oxygen saturations, heart rate, blood pressure and ECG while fitting or unconscious.

A child whose conscious state is not improving as expected after apparent termination of the seizure may be in subclinical status and require further treatment.

If seizures continue then seek expert advice

If seizures continue:

consider rapid sequence induction with IV thiopentone 2 to 5 mg/kg

arrange retrieval or PICU transfer
Maintain **airway**

Assist **breathing** as necessary

High-flow **oxygen**

If **unstable** (hypotension or altered conscious state) and **without IV/IO access:**

**synchronous DC shock 1 J/kg** (see chart below)

if unsuccessful then **synchronous DC shock 2 J/kg**

if unsuccessful then **synchronous DC shock 2 J/kg** and consider **IV amiodarone 5 mg/kg** over 20 minutes

seek **expert advice** and send **12-lead ECG**

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Weight</th>
<th>Shock 1 J/kg</th>
<th>Shock 2 J/kg</th>
<th>Amiodarone</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1</td>
<td>5 - 10kg</td>
<td>5 - 10 J</td>
<td>10 - 20 J</td>
<td>25 - 50 mg</td>
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<td>10 kg</td>
<td>10 J</td>
<td>20 J</td>
<td>50 mg</td>
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<td>3 - 4</td>
<td>15 kg</td>
<td>15 J</td>
<td>30 J</td>
<td>75 mg</td>
</tr>
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<td>5 - 6</td>
<td>20 kg</td>
<td>20 J</td>
<td>40 J</td>
<td>100 mg</td>
</tr>
<tr>
<td>7 - 10</td>
<td>30 kg</td>
<td>30 J</td>
<td>60 J</td>
<td>150 mg</td>
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<td>11 - 12</td>
<td>40 kg</td>
<td>40 J</td>
<td>80 J</td>
<td>200 mg</td>
</tr>
<tr>
<td>≥ 13</td>
<td>50 kg</td>
<td>50 J</td>
<td>100 J</td>
<td>250 mg</td>
</tr>
</tbody>
</table>

If **stable** attempt **vagal manoeuvre:**

infants: **cold stimulus** to the face (eg. washcloth soaked in ice water)

children: **Valsalva** manoeuvre (eg. ask child to blow plunger out of syringe)

do not use orbital pressure

**seek expert advice** and send **12-lead ECG**

continued next page
PAEDIATRIC SUPRAVENTRICULAR TACHYCARDIA

If intravenous or intraosseous access:

**IV adenosine 100 micrograms/kg** (see chart below)

if unsuccessful after 2 minutes then **IV adenosine 200 micrograms/kg**

if unsuccessful after 2 minutes then **IV adenosine 300 micrograms/kg**

seek **expert advice** and send 12-lead ECG

consider:

- **IV adenosine 400 to 500 micrograms/kg**
  (maximum in neonate 300 micrograms/kg, maximum in older child 12 mg)

  OR

- synchronous DC shock (may need procedural sedation)

  OR

- **IV amiodarone 5 mg/kg over 20 to 60 minutes**

  OR

- other anti-arrhythmic medication

---

### Adenosine Dosage Chart

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Weight</th>
<th>Adenosine 100 mcg/kg</th>
<th>Adenosine 200 mcg/kg</th>
<th>Adenosine 300 mcg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1</td>
<td>5 - 10kg</td>
<td>0.5 - 1 mg</td>
<td>1 - 2 mg</td>
<td>1.5 - 3 mg</td>
</tr>
<tr>
<td>1 - 2</td>
<td>10 kg</td>
<td>1 mg</td>
<td>2 mg</td>
<td>3 mg</td>
</tr>
<tr>
<td>3 - 4</td>
<td>15 kg</td>
<td>1.5 mg</td>
<td>3 mg</td>
<td>4.5 mg</td>
</tr>
<tr>
<td>5 - 6</td>
<td>20 kg</td>
<td>2 mg</td>
<td>4 mg</td>
<td>6 mg</td>
</tr>
<tr>
<td>7 - 10</td>
<td>30 kg</td>
<td>3 mg</td>
<td>6 mg</td>
<td>9 mg</td>
</tr>
<tr>
<td>11 - 12</td>
<td>40 kg</td>
<td>4 mg</td>
<td>8 mg</td>
<td>12 mg</td>
</tr>
<tr>
<td>≥ 13</td>
<td>50 kg</td>
<td>5 mg</td>
<td>10 mg</td>
<td>12 mg</td>
</tr>
</tbody>
</table>

Check **electrolytes**

Refer to paediatric cardiologist
Call for help
Inform team
Crash cart

Maintain airway
Assist breathing as necessary
High-flow oxygen
Attach oximetry, blood pressure monitor and cardiac monitor
Intravenous or intraosseous access
12-lead ECG if available (don’t delay therapy)

Evaluate QRS duration where 1 mm (small square) on ECG is 0.04 seconds

If QRS > 0.09 s then this could be ventricular tachycardia:

- ventricular rate usually > 120/minute and regular
- P waves often not seen
- T waves often opposite in polarity from QRS complex
- consider underlying cause: electrolyte abnormality (hyperkalaemia, hypocalcaemia, hypomagnesaemia), congenital heart disease and surgery, myositis, cardiomyopathy, long QT syndrome, drug toxicity
- or may be SVT with aberrant intraventricular conduction

If QRS > 0.09 s then assume VT until proven otherwise and go to page 110 (VT)

Continued next page
If QRS ≤ 0.09 s then is this supraventricular tachycardia?

- vague, nonspecific history
- history of abrupt rate changes
- infants: rate usually ≥ 220/minute
- children: rate usually ≥ 180/minute
- no variation in heart rate
- absent or abnormal P waves

If supraventricular tachycardia then go to page 100

If QRS ≤ 0.09 s then is this sinus tachycardia?

- history consistent with known cause
- infants: rate usually < 220/minute
- children: rate usually < 180/minute
- normal P waves
- constant PR interval, variable R-R interval

If sinus tachycardia then search for and treat cause:

- consider sepsis:
  - check lactate
  - follow sepsis pathway
- consider surgical emergency (eg. ischaemic bowel):
  - check lactate
  - consider CXR, AXR and ultrasound
  - seek early advice from surgeons even if there are no abdominal signs

Seek expert advice
CPR: 15 COMPRESSIONS : 2 BREATHS
100 TO 120 PER MINUTE
COMPRESSION DEPTH 1/3 OF CHEST
HAND ON LOWER HALF OF STERNUM
MINIMISE INTERRUPTIONS

CALL FOR HELP  INFORM TEAM  CRASH CART

START CPR

Attach defibrillator or monitor

If the rhythm is shockable (VF or pulseless VT) then shock using 4 J/kg

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Weight</th>
<th>Shock</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1</td>
<td>5 - 10kg</td>
<td>20 - 40 J</td>
</tr>
<tr>
<td>1 - 2</td>
<td>10 kg</td>
<td>40 J</td>
</tr>
<tr>
<td>3 - 4</td>
<td>15 kg</td>
<td>60 J</td>
</tr>
<tr>
<td>5 - 6</td>
<td>20 kg</td>
<td>80 J</td>
</tr>
<tr>
<td>7 - 10</td>
<td>30 kg</td>
<td>120 J</td>
</tr>
<tr>
<td>11 - 12</td>
<td>40 kg</td>
<td>160 J</td>
</tr>
<tr>
<td>≥ 13</td>
<td>50 kg</td>
<td>200 J</td>
</tr>
</tbody>
</table>

Consider airway adjuncts (oro- or naso-pharyngeal airway, and if skilled LMA or ETT) High-flow oxygen Intravenous or intraosseous access

continued on page 107
**FIND AND TREAT CAUSE**

**OBTAIN BEDSIDE BLOODS AND CONSIDER CARDIAC ULTRASOUND**

If **hypoxia** give high-flow **oxygen**, **check connections**, check for bilateral breath sounds, suction endotracheal tube and reconfirm placement, consider **CXR**

If **hypovolaemia** give **IV normal saline** 20 mL/kg and check haemoglobin

If **hyperkalaemia**:
- give **IV calcium gluconate 10%** 0.7 mL/kg or **IV calcium chloride 10%** 0.2 mL/kg
- give **IV insulin** 0.1 units/kg with **IV dextrose 10%** 5 mL/kg
- give **IV sodium bicarbonate 8.4%** 1 mL/kg (maximum 50 mL)

If **hypokalaemia** give **IV potassium chloride 1 mmol/mL** 0.03 to 0.07 mL/kg (maximum 5 mL) slow injection and **IV magnesium sulphate 50%** 0.05 to 0.10 mL/kg bolus (maximum 2.5 mL)

If profound **acidosis** consider **IV sodium bicarbonate 8.4%** 1 mL/kg (maximum 50 mL)

If **hypothermia** use forced air blanket, **warm IV fluids**, raise room temperature

If **hyperthermia** consider sepsis, heat stroke, malignant hyperthermia, serotonin toxicity, and neuroleptic malignant syndrome (seek expert advice)

If **hypocalcaemia** give **IV calcium gluconate 10%** 0.7 mL/kg (maximum 20 mL) or **IV calcium chloride 10%** 0.2 mL/kg

Consider **toxins** including medications, infusions, ingestions, and medication error

Consider **tension pneumothorax**. Check for signs and perform emergency needle decompression or finger thoracostomy. Call for CXR but do not delay treatment.

Consider **thrombosis** including pulmonary embolus, myocardial infarct and stroke

Consider **cardiac tamponade**
Simultaneously Find and Treat Cause (facing page)

Plan actions before interrupting compressions

CPR 2 minutes

Look at the clock

Waveform capnography (end-tidal CO₂ monitoring)

Shockable? then shock

IV adrenaline 10 micrograms/kg followed by normal saline flush

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Weight</th>
<th>Adrenaline dose</th>
<th>Adrenaline volume 1:10,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1</td>
<td>5 - 10 kg</td>
<td>50 - 100 mcg</td>
<td>0.5 - 1 mL</td>
</tr>
<tr>
<td>1 - 2</td>
<td>10 kg</td>
<td>100 mcg</td>
<td>1 mL</td>
</tr>
<tr>
<td>3 - 4</td>
<td>15 kg</td>
<td>150 mcg</td>
<td>1.5 mL</td>
</tr>
<tr>
<td>5 - 6</td>
<td>20 kg</td>
<td>200 mcg</td>
<td>2 mL</td>
</tr>
<tr>
<td>7 - 10</td>
<td>30 kg</td>
<td>300 mcg</td>
<td>3 mL</td>
</tr>
<tr>
<td>11 - 12</td>
<td>40 kg</td>
<td>400 mcg</td>
<td>4 mL</td>
</tr>
<tr>
<td>≥ 13</td>
<td>50 kg</td>
<td>500 mcg</td>
<td>5 mL</td>
</tr>
</tbody>
</table>

If only 1:1,000 adrenaline available then dilute to 10 mL with normal saline and dose as above

CPR 2 minutes

Shockable? then shock

After third shock give IV amiodarone 5 mg/kg in dextrose 5% 20 mL

continued next page
<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CPR 2 minutes</td>
</tr>
<tr>
<td>2</td>
<td>Shockable? then shock</td>
</tr>
<tr>
<td>3</td>
<td>IV adrenaline 10 micrograms/kg</td>
</tr>
<tr>
<td>4</td>
<td>CPR 2 minutes</td>
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<tr>
<td>5</td>
<td>Shockable? then shock</td>
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<td>6</td>
<td>CPR 2 minutes</td>
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<tr>
<td>8</td>
<td>IV adrenaline 10 micrograms/kg</td>
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<td>9</td>
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<td>Shockable? then shock</td>
</tr>
<tr>
<td>11</td>
<td>IV adrenaline 10 micrograms/kg</td>
</tr>
<tr>
<td>12</td>
<td>CPR 2 minutes</td>
</tr>
</tbody>
</table>

*continued next page*
**Shockable? then shock**

**CPR 2 minutes**

**CPR now exceeds 20 minutes. Seek expert advice and consider stopping.**

**Post-resuscitation care:**
- Re-evaluate **ABCDE** and re-assess **all tubes and lines**
- Cervical **collar** if required
- Twelve lead **ECG**
- **CXR, IDC, nasogastric tube**
- **Temperature probe** in nasopharynx, oesophagus or bladder
- Assess for **injuries** from resuscitation
- Treat **precipitating causes** (consider antibiotics, seizure management)
- Aim for **normal sats** and **normal PaCO<sub>2</sub>** unless specific conditions
- Aim for **normoglycaemia**
- Targeted temperature management aiming **32 to 37 °C**
- Psychological support for family and staff

**Seek expert advice regarding ongoing care and transfer**
Assess and support airway and breathing
High-flow oxygen
Attach oximetry, blood pressure monitor and cardiac monitor
Intravenous or intraosseous access
12-lead ECG if available (don’t delay therapy)

If pulse but compromised (hypotension, obtunded) then urgent cardioversion:
Give short-acting IV sedation as required. Be prepared to support airway.
Ensure the defibrillator is synchronised
Perform synchronised DC cardioversion 1 J/kg
(if fails to discharge then use asynchronous shock)
If no response then perform synchronised DC cardioversion 2 J/kg
If no response then give IV amiodarone 5 mg/kg in dextrose 5%
If no response then perform synchronised DC cardioversion 2 J/kg
Seek expert advice

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Weight</th>
<th>Shock 1 J/kg</th>
<th>Shock 2 J/kg</th>
<th>Amiodarone</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1</td>
<td>5 - 10kg</td>
<td>5 - 10 J</td>
<td>10 - 20 J</td>
<td>25 - 50 mg</td>
</tr>
<tr>
<td>1 - 2</td>
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<td>20 J</td>
<td>50 mg</td>
</tr>
<tr>
<td>3 - 4</td>
<td>15 kg</td>
<td>15 J</td>
<td>30 J</td>
<td>75 mg</td>
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<tr>
<td>5 - 6</td>
<td>20 kg</td>
<td>20 J</td>
<td>40 J</td>
<td>100 mg</td>
</tr>
<tr>
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<tr>
<td>≥ 13</td>
<td>50 kg</td>
<td>50 J</td>
<td>100 J</td>
<td>250 mg</td>
</tr>
</tbody>
</table>

continued next page
**If haemodynamically stable then:**

**IV amiodarone 5 mg/kg** in dextrose 5% over 1 to 4 hours

Consider **synchronous DC shock**

Seek **expert advice** and **send 12-lead ECG**

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Weight</th>
<th>Shock 1 J/kg</th>
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<td>100 J</td>
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CPR: 15 COMPRESSIONS : 2 BREATHS
100 TO 120 PER MINUTE
COMPRESSION DEPTH 1/3 OF CHEST
HAND ON LOWER HALF OF STERNUM
MINIMISE INTERRUPTIONS

CALL FOR HELP
INFORM TEAM
CRASH CART

START CPR

Attach defibrillator or monitor

If the rhythm is shockable (VF or pulseless VT) then shock using 4 J/kg

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Consider airway adjuncts (oro- or naso-pharyngeal airway, and if skilled LMA or ETT)
High-flow oxygen
Intravenous or intraosseous access

continued on page 115
**FIND AND TREAT CAUSE**

**OBTAiN BEiDSiDE BLOODS AND CONSiDER CARDiAC ULTRASOUiND**

If hypoxia give high-flow oxygen, check connections, check for bilateral breath sounds, suction endotracheal tube and reconfirm placement, consider CXR

If hypovolaemia give IV normal saline 20 mL/kg and check haemoglobin

If hyperkalaemia:
- give IV calcium gluconate 10% 0.7 mL/kg or IV calcium chloride 10% 0.2 mL/kg
- give IV insulin 0.1 units/kg with IV dextrose 10% 5 mL/kg
- give IV sodium bicarbonate 8.4% 1 mL/kg (maximum 50 mL)

If hypokalaemia give IV potassium chloride 1 mmol/mL 0.03 to 0.07 mL/kg (maximum 5 mL) slow injection and IV magnesium sulphate 50% 0.05 to 0.10 mL/kg bolus (maximum 2.5 mL)

If profound acidosis consider IV sodium bicarbonate 8.4% 1 mL/kg (maximum 50 mL)

If hypothermia use forced air blanket, warm IV fluids, raise room temperature

If hyperthermia consider sepsis, heat stroke, malignant hyperthermia, serotonin toxicity, and neuroleptic malignant syndrome (seek expert advice)

If hypocalcaemia give IV calcium gluconate 10% 0.7 mL/kg (maximum 20 mL) or IV calcium chloride 10% 0.2 mL/kg (maximum 10 mL)

Consider toxins including medications, infusions, ingestions, and medication error

Consider tension pneumothorax. Check for signs and perform emergency needle decompression or finger thoracostomy. Call for CXR but do not delay treatment.

Consider thrombosis including pulmonary embolus, myocardial infarct and stroke

Consider cardiac tamponade
Simultaneously Find and Treat Cause (facing page)

Plan actions before interrupting compressions

CPR 2 minutes

Look at the clock

Waveform capnography (end-tidal CO\textsubscript{2} monitoring)

Shockable? then shock

**IV adrenaline 10 micrograms/kg** followed by normal saline flush

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Weight</th>
<th>Adrenaline dose</th>
<th>Adrenaline volume 1:10,000</th>
</tr>
</thead>
<tbody>
<tr>
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<td>50 - 100 mcg</td>
<td>0.5 - 1 mL</td>
</tr>
<tr>
<td>1 - 2</td>
<td>10 kg</td>
<td>100 mcg</td>
<td>1 mL</td>
</tr>
<tr>
<td>3 - 4</td>
<td>15 kg</td>
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<td>1.5 mL</td>
</tr>
<tr>
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<td>200 mcg</td>
<td>2 mL</td>
</tr>
<tr>
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</tr>
<tr>
<td>≥ 13</td>
<td>50 kg</td>
<td>500 mcg</td>
<td>5 mL</td>
</tr>
</tbody>
</table>

If only 1:1,000 adrenaline available then dilute to 10 mL with normal saline and dose as above

CPR 2 minutes

Shockable? then shock

After third shock give **IV amiodarone 5 mg/kg** in dextrose 5\% 20 mL

continued next page
<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CPR 2 minutes</td>
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<td>2</td>
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</tr>
<tr>
<td>3</td>
<td>IV adrenaline 10 micrograms/kg</td>
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<td>4</td>
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</tr>
<tr>
<td>5</td>
<td>Shockable? then shock</td>
</tr>
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<td>6</td>
<td>CPR 2 minutes</td>
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<td>7</td>
<td>Shockable? then shock</td>
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<td>IV adrenaline 10 micrograms/kg</td>
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<td>9</td>
<td>CPR 2 minutes</td>
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<tr>
<td>10</td>
<td>Shockable? then shock</td>
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<td>13</td>
<td>IV adrenaline 10 micrograms/kg</td>
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<tr>
<td>14</td>
<td>CPR 2 minutes</td>
</tr>
</tbody>
</table>

continued next page
**Shockable?** then **shock**

**CPR 2 minutes**

**CPR now exceeds 20 minutes. Seek expert advice and consider stopping.**

**Post-resuscitation care:**
Re-evaluate **ABCDE** and re-assess **all tubes and lines**
Cervical **collar** if required
Twelve lead **ECG**
**CXR, IDC, nasogastric tube**
**Temperature probe** in nasopharynx, oesophagus or bladder
Assess for **injuries** from resuscitation
Treat **precipitating causes** (consider antibiotics, seizure management)
Aim for **normal sats** and **normal PaCO₂** unless specific conditions
Aim for **normoglycaemia**
Targeted temperature management aiming **32 to 37 °C**
Psychological support for family and staff

**Seek expert advice regarding ongoing care and transfer**
If newborn is **term gestation, breathing or crying, and good tone**, then:

- maintain normal temperature, wrap and give to mother
- ongoing evaluation of respiratory effort

If **not** term gestation, breathing or crying, or good tone, then:

- **maintain normal temperature** (resuscitation table with heater if available)
- ensure **open airway**
- stimulate

If **heart rate > 100** and **laboured breathing or persistent cyanosis**, then:

- ensure **open airway**
- monitor **oxygen saturations** on right hand
- consider **CPAP** (Neopuff™)

If **heart rate < 100**, **gasing** or **apnoea**, then for 30 seconds:

- **positive pressure ventilation**
- monitor **oxygen saturations** on right hand

If **heart rate < 100** then for 30 seconds:

- ensure **open airway**
- reduce **leaks**
- consider **increasing pressure and using oxygen**
- consider **laryngeal mask airway (LMA)** or if skilled **intubation**

continued next page
If heart rate < 60 then:

- add chest compressions (three compressions then a breath, at a rate of one compression every half a second)
- 100% oxygen
- LMA or intubation

intravenous or intraosseous access
(consider umbilical vein catheter)

If heart rate < 60 then:

- continue chest compressions
- IV adrenaline 10 to 30 micrograms/kg (0.1 to 0.3 mL/kg of 1:10,000 adrenaline)
- consider volume expansion (IV normal saline 10 mL/kg)

<table>
<thead>
<tr>
<th>Gestation (weeks)</th>
<th>IV adrenaline (1:10,000)</th>
<th>IV normal saline</th>
</tr>
</thead>
<tbody>
<tr>
<td>23 - 26</td>
<td>0.1 mL</td>
<td>7.5 mL</td>
</tr>
<tr>
<td>27 - 37</td>
<td>0.25 mL</td>
<td>20 mL</td>
</tr>
<tr>
<td>38 - 43</td>
<td>0.5 mL</td>
<td>35 mL</td>
</tr>
</tbody>
</table>

If heart rate < 60 after a few minutes then:

- repeat IV adrenaline 10 to 30 micrograms/kg (0.1 to 0.3 mL/kg of 1:10,000 adrenaline)
- consider volume expansion (IV normal saline 10 mL/kg)
- seek expert advice

Target pre-ductal (right hand) oxygen saturations after birth:

- 1 minute 60 - 70 %
- 2 minutes 65 - 85 %
- 3 minutes 70 - 90 %
- 4 minutes 75 - 90 %
- 5 minutes 80 - 90 %
- 10 minutes 85 - 90 %
Emergency Protocols are a flight manual for the crashing patient.

In medicine competence is often measured by the ability to remember. Doctors have been taught to manage emergencies independently, by calmly reciting steps that may be stumbled over in a crisis managed by a team.

Cognitive aids, such as checklists and emergency manuals, have been frowned upon as “cookbook” medicine that somehow simplifies treatment – as if that is a bad thing in an emergency. Of course cognitive aids are no substitute for clinical acumen, good training, hard-won experience, and rehearsal with simulators. But perhaps the real opposition is to changing the image of the doctor in an emergency, away from the swashbuckling hero and towards a more human, more fallible, more integrated team member.

Pilots, military commanders and nuclear power plant operators use cognitive aids because:

• in a crisis memory fails, cognition is overloaded, “tunnel vision” develops, performance degrades, and distractions interrupt planned actions\(^1\)\(^2\)

• relevant literature can be difficult to find, poorly structured, and excessively detailed

• aviators have long demonstrated the safety benefits of a culture of teamwork engrained with cognitive aids and crew resource management techniques\(^3\)\(^4\)

• expertise requires repeated practice, and no-one is an expert in every emergency.

Using cognitive aids the doctor, like the pilot, still “flies the plane” and makes the big decisions. But cognitive aids improve performance, safety and satisfaction, which is why they have been widely adopted across industries managing time-critical emergencies. Good evidence supports cognitive aids in simulated medical emergencies.\(^5\)\(^6\)\(^7\) A trial from Harvard using intra-operative crisis checklists demonstrated a 73% reduction in critical errors, with 97% of participants wanting the checklists used if they were undergoing an operation.\(^8\) The adoption of cognitive aids in medicine is a cultural change whose time has come.

Emergency Protocols are integrated and improved guidelines from peak medical organisations. These protocols are linear and stepwise, rather than branching and looping, because sequential algorithms are simpler and safer in medical emergencies.\(^9\) Printed protocols are more accessible, user-friendly, familiar, robust and reliable than screen-based applications.

Emergency Protocols are standardised with common-sense definitions. A “difficult airway” is something that you predict. A “failed airway” is something that happens to you. The diagrams in the Ventilation protocol feature the ubiquitous Oxylog transport ventilator, the little orange workhorse of Australian retrieval medicine.

Emergency Protocols work best when doctors and nurses are familiar with the protocols and have trained with them in simulated emergencies.\(^10\) Assigning a reader is recommended\(^11\) as the reader can prompt the team and help avoid the task fixation common in medical emergencies.

Emergency Protocols are endorsed by the Emergency Care Institute of NSW Health.

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Emergency Protocols are developed and tested by a team of doctors, nurses, graphic designers, a senior commercial pilot and ex-military test pilot, and human factors practitioners. These protocols are constantly updated as expert opinion evolves. New guidelines are parsed, refined, integrated and iteratively tested. Drug doses are presented as the amount and concentration of the commonly available formulation, minimising calculation and confusion in emergency drug administration. Protocol steps are practical, such as checking oxygen connections for the hypoxic patient. There is no extraneous information to wade through. In an emergency you don’t need to know the level of evidence . . . just what to do next.

A large prospective randomised block-controlled simulator-based trial is underway at the University Centre for Rural Health in Lismore, NSW. The Trial of Emergency Medicine Protocols in Simulation Training (TEMPIST) examines doctors and nurses managing simulated medical emergencies with and without Emergency Protocols. Outcome measures are critical life-saving steps specific to each scenario, recorded on video and by high-fidelity manikin. Data collection has been completed. Results will be published in a peer-reviewed journal and available at www.emergencyprotocols.org.au.

In memory of Dr Leo Marneros FACEM, a legendary Clinical Educator who inspired so many of us, in so many ways.

References