



# EMERGENCY PROTOCOLS

## ADULT

Airway .....	1	ROSC .....	53
Checklist .....	4	Status Epilepticus .....	54
Crash Airway .....	8	SVT .....	56
Difficult Airway .....	9	Tachycardia .....	57
Failed Airway .....	10	Torsades .....	61
Surgical Airway .....	11	Toxicology .....	62
Anaphylaxis .....	12	Beta Blocker .....	66
Asthma .....	14	Calcium Channel .....	68
Asystole .....	23	Tricyclic .....	70
Birth .....	28	Paracetamol .....	72
Bradycardia .....	34	Ventilation .....	80
DKA .....	36	VF .....	89
Hyperkalaemia .....	44	VT .....	95
Hypoglycaemia .....	47	VT - Pulseless .....	97
PEA .....	49		

**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.

Emergency Protocols is a non-profit organisation based in New South Wales, Australia. It is independent of commercial influence, including medical device and pharmaceutical industry sponsorship.

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 June 2019, and should not be used after June 2021.

Author: Dean Robertson MBChB MBA DCH FACRRM  
GP VMO, Emergency Department, Maclean District Hospital, NSW

Editor: Charlotte Hall BMed MSc GradCertClinEd FACEM  
Emergency Physician and Medical Educator, North Coast NSW

Managing Editor: John Mackenzie MBChB DipMSM FACEM  
Emergency Physician and Hyperbaric Medicine Consultant, Prince of Wales Hospital, NSW  
Medical Project Officer, Emergency Care Institute, Agency for Clinical Innovation, NSW

Toxicology Editor: Lindsay Murray MBBS FACEM  
Clinical Toxicologist and Emergency Physician, Lismore Base Hospital, NSW



**Endorsed by the Emergency Care Institute of the Agency for Clinical Innovation and by the Australian College of Rural & Remote Medicine.**

Printed copies of this manual can be purchased from [www.emergencyprotocols.org.au](http://www.emergencyprotocols.org.au)

We welcome any comments via e-mail: [info@emergencyprotocols.org.au](mailto:info@emergencyprotocols.org.au)

### Sources

Australia and New Zealand Emergency Department Airway Registry ([www.airwayregistry.org.au](http://www.airwayregistry.org.au))

Australian Resuscitation Council ([www.resus.org.au](http://www.resus.org.au))

Australian Society of Clinical Immunology ([www.allergy.org.au](http://www.allergy.org.au))

Difficult Airway Society ([www.das.uk.com](http://www.das.uk.com))

Emergency Care Institute ([www.aci.health.nsw.gov.au/networks/eci](http://www.aci.health.nsw.gov.au/networks/eci))

NSW Health ([www.health.nsw.gov.au](http://www.health.nsw.gov.au))

Stanford Anesthesia Emergency Manual ([www.emergencymanual.stanford.edu](http://www.emergencymanual.stanford.edu))

Toxicology Handbook, 3rd edn. Murray L, Little M, Pascu O, Hoggett KA. Churchill Livingstone, London, 2015.



**Do not use after June 2021**

 **CALL FOR HELP**



**INFORM TEAM**



**CRASH CART**

**IF UNRESPONSIVE AND NEAR DEATH GO TO PAGE 8 (AIRWAY - CRASH)**

**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

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

continued next page

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

Additional **high flow oxygen** via **nasal prongs** at 15 L/min

## 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**

**continued next page**

## INTUBATION DRUGS

Draw up **induction** drug: 

**IV ketamine 1.5 mg/kg** (preferred in sepsis, hypotension, asthma)


OR

**IV thiopentone 3 mg/kg** (adult) or **1 to 2 mg/kg** (elderly)

OR

**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)

OR

**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 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)

consider **pressors**

(IV metaraminol 0.5 to 1 mg)

### Pre-oxygenation:

**3 minutes**

> 15 L/min O<sub>2</sub> via **mask**

**and** 15 L/min via **nasal prongs**

### Non-invasive ventilation if:

obese

obstructive sleep apnoea

sats < 95% despite O<sub>2</sub>

### Monitoring equipment:

**end-tidal CO<sub>2</sub>**

**oxygen saturations**

**ECG** monitoring

**non-invasive BP:**

non-IV-fluid arm

2 minute intervals

# CHECKLIST



## 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 infusion:

**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 CO<sub>2</sub> **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 80)

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  $\geq$  90%

**Plan B:** secondary tracheal intubation: **different blade** or **video laryngoscopy**,  
bougie or stylet, three attempts in 2 minutes, sats  $\geq$  90%

**Plan C:** maintenance of oxygenation: **laryngeal mask airway**,  
three attempts in 2 minutes, sats  $\geq$  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 80)

## 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 80)

## 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 80)

**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 80)

**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 80)

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

**GO TO PAGE 10 (AIRWAY - FAILED)**

 **CALL FOR HELP**



**INFORM TEAM**



**CRASH CART**

## If forced to act:

give induction and paralysis **drugs** (see page 3)

### one best attempt

if **successful** then go to **Ventilation** (page 80)

if **failed** then go to **Airway - Failed** (page 10)

**IF UNSUCCESSFUL 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 consider **awake technique** with:

**direct laryngoscopy**

or **video laryngoscopy**

or **intubating LMA**

or **fibreoptic scope**

or **blind intubation**

or **transtracheal airway**



if **anaesthetist** and **equipment** available

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

If **successful intubation** see **Ventilation** (page 80)

**IF UNSUCCESSFUL THEN GO TO NEXT PAGE (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 80)

## 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)**

 CALL FOR HELP



INFORM TEAM



CRASH CART

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 80)

## 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** (1 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** (see Airway - Difficult page 9)

---

**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** 

Give **Anaphylaxis Action Plan** (available from [www.allergy.org.au](http://www.allergy.org.au))

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

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

This protocol is only for  
**LIFE-THREATENING ASTHMA** in adults



**DROWSY**  
**COLLAPSED**  
**EXHAUSTED**  
**CYANOTIC**  
**POOR RESPIRATORY EFFORT**  
**QUIET BREATH SOUNDS**  
**OXYGEN SATURATIONS < 90 %**

 **CALL FOR HELP**



**INFORM TEAM**



**CRASH CART**

If **peri-arrest** give **IM adrenaline 0.5 mg** (0.5 mL of adrenaline 1:1000)

**Nebuliser mask** with **salbutamol 10 mg** (two nebulas given together)

**Oxygen 10 L/min** aiming for saturations  $\geq 92\%$

**Continuous salbutamol 10 mg** (two nebulas given together)

## NON-INVASIVE VENTILATION

If **not improving** but **cooperative** then **trial non-invasive ventilation**:

BIPAP settings:  $\text{FiO}_2$  1.0 (100% oxygen)

IPAP 10  $\text{cmH}_2\text{O}$

EPAP 0 to 5  $\text{cmH}_2\text{O}$

**titrate** support according to blood gases and expert advice

use salbutamol 12 puffs via a metered dose inhaler through the circuit

continued next page



## IF NOT IMPROVING THEN GO TO PAGE 16

**Continuous salbutamol 10 mg** (two nebulas given together) ▼

Add **ipratropium bromide:** ▼

if using nebuliser mask then add **ipratropium bromide 500 microgram nebule** every **20 minutes** (can be added to the nebuliser with the salbutamol)

if using non-invasive ventilation then add **ipratropium bromide 8 puffs** via metered dose inhaler every **20 minutes** through the circuit

**IV access** and take blood for FBC, EUC, CaMgPh and venous blood gas ▼

**IV hydrocortisone 100 mg** ▼

**IV magnesium sulphate 10 mmol** in 100 mL normal saline 0.9% over 20 minutes ▼

IV maintenance fluids ▼



**Seek expert advice**

Consider **IV salbutamol infusion**. Dilute 5 mL of salbutamol 1 mg/mL ampoules up to 50 mL with normal saline (5 mg/50 mL = 100 mcg/mL). Give IV salbutamol 250 mcg bolus (= 2.5 mL) over five minutes, then start infusion at 5 mcg/min (= 3 mL/h). Can increase to 10 mcg/min (= 6 mL/h). Watch for hypokalaemia and lactic acidosis. Monitor serum potassium, glucose and blood gas every 1 to 2 hours. ▼

## IF NOT IMPROVING THEN GO TO NEXT PAGE

## INTUBATION IN ASTHMA

Prepare for intubation if:

not improving

OR

failing non-invasive ventilation

OR

rising  $PCO_2$

Perform intubation only if staff are adequately trained, otherwise prepare equipment and drugs while awaiting arrival of expert help

Consider using **IV ketamine 2 mg/kg** as induction drug and bronchodilator

Consider using **IV rocuronium 1.2 mg/kg**

See **Airway** (page 1) and **Pre-Intubation Checklist** (page 4)

**Inflate cuff** to 20 to 30  $cmH_2O$

**Check tube placement** using **end-tidal  $CO_2$  monitor**:



If using colourimeter then “go for gold” within six breaths

**continued next page**

## Check tube placement:

**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)



Insert **nasogastric** or orogastric tube



**Avoid vigorous bagging** when intubated

Allow **prolonged time** for **expiration**



**Check portable CXR** for endotracheal tube position



Start **ketamine infusion** if no contra-indications. Dilute ketamine 200 mg ampoule with normal saline 0.9% to give a total volume of 50 mL (= 4 mg/mL). For a 70 kg patient start infusion at 5 mL/h (= 21 mg/h and 5 micrograms/kg/minute).



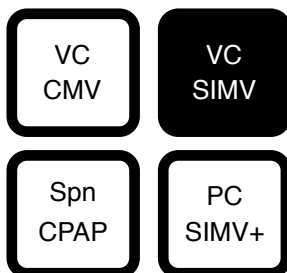
**SEE VENTILATOR SETTINGS ON NEXT PAGE**

continued next page

## VENTILATOR SETTINGS IN ASTHMA

**Seek expert help** as patients with very severe asthma can be difficult to ventilate  
Safe initial settings are shown here

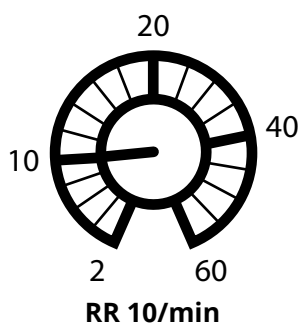
**Mode** VC-SIMV



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

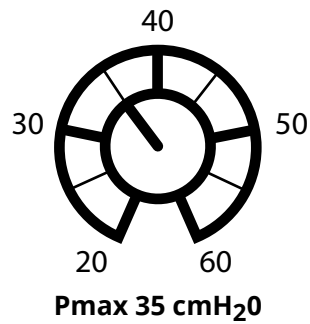
Height	5' 153 cm	5'2" 156 cm	5'4" 163 cm	5'6" 168 cm	5'8" 173 cm	5'10" 178 cm	6' 183 cm	6'2" 188 cm	6'4" 193 cm
<b>VT male</b>	305	320	360	385	415	440	470	490	520
<b>VT female</b>	275	295	330	360	385	415	440	470	490
<b>VT pregnant</b>	370	390	440	480	510	550	585	625	650

**RR** 10 /min

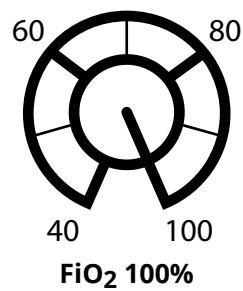


continued next page

**Pmax** 35 cmH<sub>2</sub>O



**FiO<sub>2</sub>** 100%



**PEEP** 5 cmH<sub>2</sub>O

**I:E** 1:4

Observe closely for signs of pneumothorax


Check blood gas and discuss with expert


Insert urinary **IDC**

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

**continued next page**

## TROUBLESHOOTING THE VENTILATOR

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

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

**Dislodgement:** check **end-tidal CO<sub>2</sub> waveform**, repeat laryngoscopy

**Obstruction:** check for high peak inspiratory pressure, **suction** secretions

**Pneumothorax:** check **breath sounds**, equal **chest rise**, pleural sliding on **ultrasound**, repeat CXR

**Equipment failure:** **disconnect** from ventilator, **bag** patient, check all connections in circuit, check gas supply, replace filter in circuit

**Stacking breaths:** **bag** slowly, push on chest to assist expiration

 **Never ignore a ventilator alarm**

continued next page

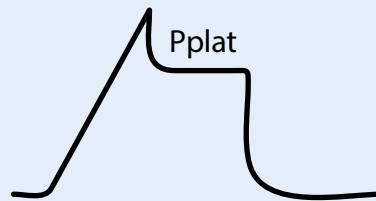
## TROUBLESHOOTING THE VENTILATOR

### 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



**Seek expert advice**







and  
NO PULSE

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

 **CALL FOR HELP**



**INFORM TEAM**

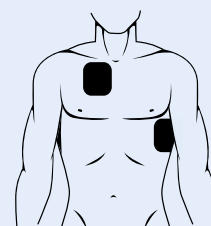


**CRASH CART**

**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 CO<sub>2</sub> monitoring)

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

**continued on page 25**

# 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**

**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 53 (ROSC)**





DO NOT PULL THE BABY  
DO NOT PULL THE UMBILICAL CORD  
DO NOT PANIC

 CALL FOR HELP

 INFORM TEAM

 SINGLE ROOM

**CALL FOR HELP**

## Call for help:

consider **obstetrician, paediatrician, midwife** or **experienced GP**

are any of the **nurses** trained as **midwives**?

at **least one** health professional for **mother**

at **least one** health professional for **baby**

**PREPARE**

## Prepare:

**emergency delivery kit**

**warm towels**

**sterile scissors**

**cord ties**

gown

sterile gloves

eye protection

[continued next page](#)

## HISTORY

### History:

antenatal notes

current gestation

gravidity, parity

**previous deliveries** (vaginal, caesarean, complications)

**any problems** during **this pregnancy**

**medical conditions** including bleeding disorders

## EXAMINATION

**Observations** including **blood pressure**

### Palpate fundus:

work out **presenting part**

if skilled use **ultrasound**

Assess **foetal heart rate** using handheld Doppler (normal range in labour is 110 to 160 beats/min)

Take **bloods:**

**haemoglobin**

**group & hold**

[continued next page](#)

## LABOUR

**First stage:** regular uterine contractions with dilation of the cervix

**Second stage:** descent of the presenting part and delivery

**Third stage:** delivery of the placenta

**Signs of imminent delivery:**

**bloody show** (expulsion of mucus plug from cervix)

**breakage of amniotic sac** (determine the appearance of the expelled fluid)

**urge to push** or sensation of impending defaecation

**If:**

the **baby is not crowning** (ie. the baby's head is not bulging at the perineum)

AND

**no urge to push**

AND

**no complications**

**then consider moving the mother** to a delivery suite

continued next page



## DELIVERY

Allow mother to get into **comfortable position** (ideally on her back with knees up) ▼

**Wash hands** and put on **gloves** ▼

When the **head is visible** tell mother to **stop pushing** to prevent tearing of the perineum ▼

If **cord is wrapped around the neck** then gently slip it over the head ▼

If **sac is covering the head** then tear it open with your fingers to let the baby breathe ▼

About one minute after the head is out the mother should have another contraction and urge to push, which should expel the rest of the baby ▼

During delivery **support the baby**, but let them be born by themselves ▼

**Do not pull** the baby ▼

Be **careful** with the **slippery baby** ▼

[continued next page](#)

## BABY IS BORN



If the baby is not in good health then start Neonatal Resuscitation

If the **baby is healthy**, pink, active and crying then put the baby on the **mother's chest**

**Dry the baby** and keep the **baby warm**

**APGAR** score at **1, 5 and 10 minutes** (see chart below)

APGAR	2	1	0
<b>Appearance</b>	Pink all over	Body is pink	Blue or pale
<b>Pulse</b>	> 100 /min	< 100 /min	No pulse
<b>Grimace</b>	Cries on stimulation	Grimace when suctioned	No response
<b>Activity</b>	Active	Weak movement	No movement
<b>Respiration</b>	Strong cry	Gasping	No cry

**APGAR score is the sum of the five components**

Give mother **oxytocin** (after excluding undiagnosed twin pregnancy):

**IV oxytocin 5 units** in 20 mL normal saline 0.9% as slow push over five minutes

OR

**IM oxytocin 5 units** if no IV access

**Clamp the umbilical cord** with **two clamps/ties** and **cut in between** (about 4 cm from the baby)

continued next page

## DELIVERY OF THE PLACENTA

**Do not hurry** the delivery of the placenta



A few minutes after birth there may be a gush of blood and lengthening of the cord



Place **one hand** on the **lower abdomen** to **protect the uterus**



**Guide the placenta out** by **holding the cord** so it does not sag, but **do not pull it**



Gently **massage the funds of the uterus** to encourage contraction and delivery of the placenta, and to reduce blood loss



Repeatedly massage the uterus for the next hour to assist with uterine contraction



COMPROMISED AND HEART RATE < 60

IF NO PULSE THEN GO TO PAGE 49 (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** (see next page) ▼

**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**

<b>Symptoms:</b>	<b>THIRST</b>	<b>Signs:</b>	<b>DEHYDRATION</b>
	<b>VOMITING</b>		<b>DEEP SIGHING RESPIRATIONS</b>
	<b>ABDOMINAL PAIN</b>		<b>SMELL OF KETONES ON BREATH</b>
	<b>WEAKNESS</b>		<b>LETHARGY</b>
	<b>CONFUSION</b>		<b>DROWSINESS</b>
	<b>POLYURIA</b>		
	<b>WEIGHT LOSS</b>		

**Diagnosis:** **KETONES:** ketones in urine or blood ( $> 0.6$  mmol/L)  
**ACIDOSIS:** pH  $< 7.3$

This protocol is for unwell patients. Patients with pH  $> 7.3$  who are not dehydrated or vomiting may tolerate oral fluids and SC insulin.

 **CALL FOR HELP**



**INFORM TEAM**



**RESUS BAY**

## RESUSCITATION

**Airway:** protect airway as required ([page 1](#)). Naso-gastric tube if coma or vomiting

**Breathing:** oxygen if hypoxic

**Circulation:** give IV fluid **1000 to 2000 mL** in **first hour** (PlasmaLyte, Hartmann's or normal saline 0.9%)

[continued next page](#)

## ASSESSMENT

**Disability** assessed by **Glasgow Coma Scale (GCS)**

<b>Eye Opening</b>	Spontaneous	<b>4</b>
	To voice	<b>3</b>
	To pain	<b>2</b>
	None	<b>1</b>
<b>Verbal Response</b>	Oriented	<b>5</b>
	Confused	<b>4</b>
	Inappropriate words	<b>3</b>
	Incomprehensible sounds	<b>2</b>
	None	<b>1</b>
<b>Motor Response</b>	Obeys commands	<b>6</b>
	Localises pain	<b>5</b>
	Withdraws from pain	<b>4</b>
	Abnormal flexion	<b>3</b>
	Abnormal extension	<b>2</b>
	None	<b>1</b>

**Glasgow Coma Scale (GCS) is the sum of the best responses**

**Weigh** patient or estimate weight

continued next page

## INVESTIGATIONS

### IV access:

FBC EUC CaMgPh lipase BGL serum osmolality

blood ketones (fingerprick)

### venous gas

investigations for precipitating cause (consider septic workup)

### Urine:

ketones

culture (if clinical evidence of infection)

consider  $\beta$ -HCG

### ECG

## SEVERITY

pH < 7.3 to 7.2	<b>Mild</b>
pH < 7.2 to 7.1	<b>Moderate</b>
pH < 7.1	<b>Severe</b>

continued next page



## EXCLUDE HYPEROSMOLAR HYPERGLYCAEMIC STATE (HHS)

### Is this Hyperosmolar Hyperglycaemic State (HHS)?

**osmolality** > 320 mosmol/kg (calculated osmolality = sodium x 2 + urea + BGL)

AND

**BGL** > 30 mmol/L

AND

**pH** > 7.3 and  $\text{HCO}_3^-$  > 15 mmol/L

AND

low or **no ketones** on fingerprick test (< 0.6 mmol/L)

**then different management** is required. Seek **expert advice**.

## REHYDRATION

**IV fluid 1000 to 2000 mL** in **first hour** (PlasmaLyte, Hartmann's or normal saline 0.9%)

**IV fluid 500 mL/h** over next **2 to 4 hours** (PlasmaLyte or Hartmann's)

**Adjust IV fluid rate** to achieve:

normal perfusion

normal blood pressure

urine output > 0.5 mL/kg/h

continued next page

## INSULIN INFUSION

**If  $K \geq 3.3$  then:**

add short-acting insulin (Actrapid or Humulin R) 100 units to 99 mL of normal saline 0.9% to make 100 mL of 1 unit/mL

flush tubing

start IV infusion at 5 mL/h (= 5 units/h)


**If  $K < 3.3$  then **delay insulin infusion** until **potassium replaced****


If patient has a Continuous Subcutaneous Insulin Infusion (CSII) pump then turn the CSII pump off


continued next page

## POTASSIUM REPLACEMENT


If  $K > 5.0$  then **do not replace potassium** 

If **urine output**  $< 30$  mL/h then **do not replace potassium** 


If  $K$  **3.5 to 5.0** then give **IV normal saline 0.9% 100 mL** with **KCl 10 mmol** over one hour (can be via sideline) 

If  $K < 3.5$  then give **IV normal saline 0.9% 100 mL** with **KCl 10 mmol** over one hour (can be via sideline), then **repeat** IV normal saline 0.9% 100 mL with KCl 10 mmol over next hour 

## MAGNESIUM REPLACEMENT

If  $Mg < 0.6$  mmol/L then given IV normal saline 0.9% 100 mL with magnesium sulphate 10 mmol (5 mL of 50% solution) over 4 hours 

## PHOSPHATE REPLACEMENT

If  $PO_4 < 0.32$  mmol/L then give IV normal saline 0.9% 500 mL with potassium dihydrogen phosphate 10 mmol over 6 hours 

continued next page

## MONITOR

### Hourly:

respiratory rate, saturations, heart rate, blood pressure, temperature

**neuro observations** using GCS

**BGL**

**fluid balance**

### 2 to 4 hourly:

**EUC**

venous gas

ketones

Consider **urinary IDC** and **naso-gastric tube**

At 2 and 4 hours, if **BGL is not decreasing** or **venous pH is not increasing** then **increase the insulin infusion rate**

**Continue insulin infusion until ketosis cleared**, so patient will require additional dextrose once BGL < 15 mmol/L or if BGL falls by > 5 mmol/L/hour

When **BGL < 15 mmol/L** add **IV dextrose 10%** at **100 mL/h**, and continue the rehydration fluid (PlasmaLyte or Hartmann's)

Aim for **BGL 10 to 15 mmol/L** while on insulin infusion

Consider DVT prophylaxis



$K \geq 6.5$  mmol/L

 CALL FOR HELP



INFORM TEAM

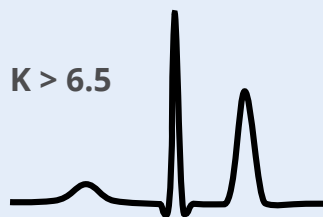


CRASH CART

Stop IV potassium and PO potassium and NGT feeding

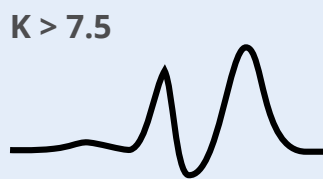
Stop any medication causing hyperkalaemia (eg. ACE-inhibitors, spironolactone, beta-blockers, digoxin)

Continuous cardiac monitoring and ECG:



tall "tented" T waves

prolonged PR interval, flat P waves



wide QRS (increased risk of arrhythmia)

progresses to **disappearance of P wave**

**fusion of QRS and T wave** into a sine wave

ventricular fibrillation may be the first ECG manifestation

IV access:

confirm hyperkalaemia with **second sample** (but assume correct reading if renal failure)


check **EUC** and **BGL**

**venous blood gas**

consider CK, cortisol, aldosterone, and digoxin level

continued next page

## TREATMENT

If **ECG changes** of hyperkalaemia then give **IV calcium gluconate 10% 30 mL** 


**Nebulised salbutamol 10 mg** 


**IV dextrose 50% 50 mL** 

**IV insulin** bolus:


if advanced CKD in non-diabetic patient then give **IV short-acting insulin** (Actrapid or Humulin R) **0.1 units/kg** as bolus (maximum 10 units)

in all other patients give **IV short-acting insulin** (Actrapid or Humulin R) **10 units** as bolus

If **pH < 7.2** then consider **IV sodium bicarbonate 8.4% 1 mL/kg** (maximum 100 mL, do not give simultaneously with calcium) 

Give **PO** or **PR polystyrene sulfonate** (Resonium) **30 g** (avoid in ileus, abdominal surgery, perforation, hypernatraemia) 

Check **BGL** after **15 and 30 minutes** and then **hourly** for four hours 

Consider acute adrenal insufficiency due to abrupt cessation of steroids (treat with IV hydrocortisone and volume replacement) 




**Seek expert advice**





## BGL < 4 mmol/L

If patient is on insulin infusion then **stop insulin infusion**


If patient is **conscious** and able to **swallow safely**: 


**oral glucose 15 g** or soft drink/juice 150 mL

then **two biscuits**



**If IV access (and cannot swallow) give IV dextrose 50% 30 mL**

**If no IV access** (and cannot swallow) give **IM glucagon 1.0 unit** (full vial) 

Identify and treat the **cause** of hypoglycaemia, considering: 


**intercurrent illness** (eg. IDDM with vomiting)

drug error

toxic ingestion


endocrine and metabolic disorders

deliberate self-harm

Check **ECG** 

**Recheck** BGL in 15 minutes 

**Repeat** IV dextrose 50% 30 mL as required 

Delay regular insulin until hypoglycaemia has resolved, and consider lower dose 



# PULSELESS ELECTRICAL ACTIVITY page 1 of 3



ANY RHYTHM  
and  
NO PULSE

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

 CALL FOR HELP

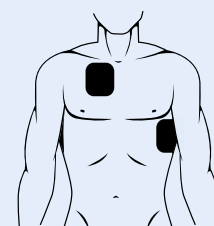
 INFORM TEAM

 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 CO<sub>2</sub> monitoring)

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

**continued on page 51**

# 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

# PULSELESS ELECTRICAL ACTIVITY page 2 of 3

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**

# PULSELESS ELECTRICAL ACTIVITY page 3 of 3

**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 53 (ROSC)**

# RETURN OF SPONTANEOUS CIRCULATION

page 1 of 1

**SEE ALSO PAGE 80 (VENTILATION)**

Re-evaluate **ABCDE** and re-assess **all tubes and lines**

Cervical **collar** if required

12-lead **ECG, CXR, IDC**, and **nasogastric tube**

**Temperature probe** in nasopharynx, oesophagus or bladder

Assess for **injuries** from resuscitation

**Treat precipitating causes**

Aim for **sats 94 to 98%** (or if at risk of hypercapnic respiratory failure aim 88 to 92%)

Maintain **normal PaCO<sub>2</sub>**

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)

Prevent and manage **fever** but do not cool below 36 °C

Consider **emergency cardiac catheterisation** (especially if STEMI or new LBBB)

 **CALL FOR HELP**



**INFORM TEAM**



**CRASH CART**

**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**

OR


**IV diazepam 10 to 20 mg**

OR

**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

page 1 of 1

**IF NO PULSE THEN GO TO PAGE 49 (PEA)**

**IF HYPOTENSION, SEVERE CHEST PAIN OR DECREASED LEVEL OF CONSCIOUSNESS THEN GO TO PAGE 57 (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 97 (PULSELESS VT)**

 **CALL FOR HELP**



**INFORM TEAM**



**CRASH CART**


### **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**



Each small square on ECG = 0.04 seconds

If patient **STABLE**:

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

**QRS ≥ 0.12 s** then go to page 60 (**Stable Wide Complex Tachycardia**)

0.12 seconds is three small squares on ECG


# STABLE NARROW COMPLEX TACHYCARDIA


page 1 of 1

QRS < 0.12 s

**REGULAR:** Sinus tachycardia  
Paroxysmal supraventricular tachycardia  
Atrial flutter with 2:1 block (150/minute)  
Atrial flutter with 1:1 block (300/minute)  
Atrial tachycardia  
Atrioventricular nodal re-entry tachycardia  
Atrioventricular re-entry tachycardia  
Junctional tachycardia

**IRREGULAR:** Atrial fibrillation  
Atrial flutter with variable block  
Multifocal atrial tachycardia  
Atrial tachycardia with variable block  
Drug toxicity (eg. digoxin)

If the **diagnosis is clear** then treat according to the diagnosis 

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

page 1 of 1

**PRESUME VT UNTIL PROVEN OTHERWISE**

**IF PATIENT BECOMES UNSTABLE THEN GO TO PAGE 57 (TACHYCARDIA)**



**Seek expert advice as soon as possible**

## REGULAR:

Most **likely** to be **VT** (monomorphic)

Other possibilities include **atrial flutter** or **aberrant conduction in SVT**

If **VT** then go to page 95 (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

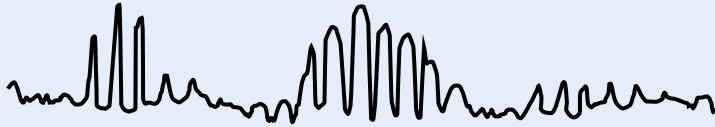
aberrant conduction with atrial flutter and variable block

aberrant conduction with multifocal atrial tachycardia

If the diagnosis is not clear then seek **expert advice**

## TORSADES:

Go to next page (**Torsades de Pointes**)



SHIFTING QRS AXIS  
OCCURS WITH QTc > 450 ms

**IF UNSTABLE THEN GO TO PAGE 57 (TACHYCARDIA)**

**(☎) CALL FOR HELP**



**INFORM TEAM**



**CRASH CART**

**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**


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

## TREAT THE PERSON, NOT THE POISON

See also: **Beta blockers** page 66      **Calcium channel blockers** page 68  
**Tricyclics** page 70      **Paracetamol** page 72


## 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**


OR

**IV diazepam 5 to 10 mg**


Do not use phenytoin. If seizures from **tricyclic overdose** then go to page 70


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 70 

If **beta blocker overdose** (eg. atenolol, metoprolol, sotalol) then see page 66 

If **calcium channel blocker overdose** (eg. verapamil, diltiazem) then see page 68 

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** (eg. fluids, sedation or seizure control using IV benzodiazepines) 


**Monitoring** (respirations, O<sub>2</sub> sats, heart rate, BP, temperature, end tidal CO<sub>2</sub>) 

**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**

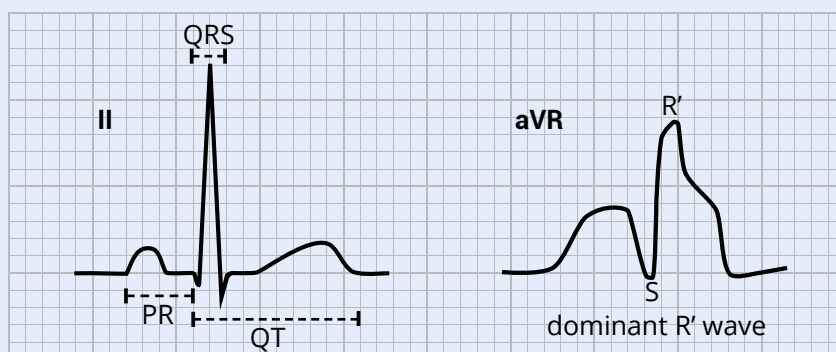
**rhythm**

**PR interval**

**QRS duration in lead II**

**QT interval**

**dominant R' wave** in aVR



each small square on ECG is 0.04 seconds

If dominant **R' wave** in aVR then see **Tricyclic Overdose** (page 70) ▼

If **paracetamol overdose** then see page 72 ▼



**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** ▼

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

**IF PROPRANOLOL OVERDOSE THEN GO TO PAGE 70 (TRICYCLICS)**

**IF SOTALOL OVERDOSE HAS CAUSED TORSADES THEN GO TO PAGE 61**

**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 35)

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 BGL > 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 62)**



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

# CALCIUM CHANNEL BLOCKER OVERDOSE

page 1 of 2

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

**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**

 **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 **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**

# CALCIUM CHANNEL BLOCKER OVERDOSE

page 2 of 2

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

**IV dextrose 50%** 50 mL bolus (unless BGL > 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

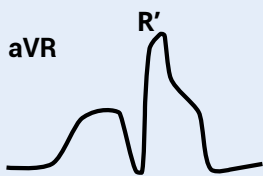
**COMPLETE ALL STEPS IN TOXICOLOGY (PAGE 62)**



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

**(☎)** 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 62)**



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

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

**Call Poisons Information Centre or local toxicologist if:**

> **50 g** or > **1 g/kg** ingestion


paracetamol level is **double** the **nomogram line** (page 73)

**intravenous** paracetamol error or overdose

**hepatotoxicity** (eg. ALT > 1000)

any **concerns**

## TIME OF INGESTION

**Single ingestion:** 


If < 8 hours ago then go to page 74

If > 8 hours ago then go to page 75

**Multiple ingestions** within 8 hour period: 

If < 8 hours since first dose then go to page 74

If > 8 hours since first dose then go to page 75

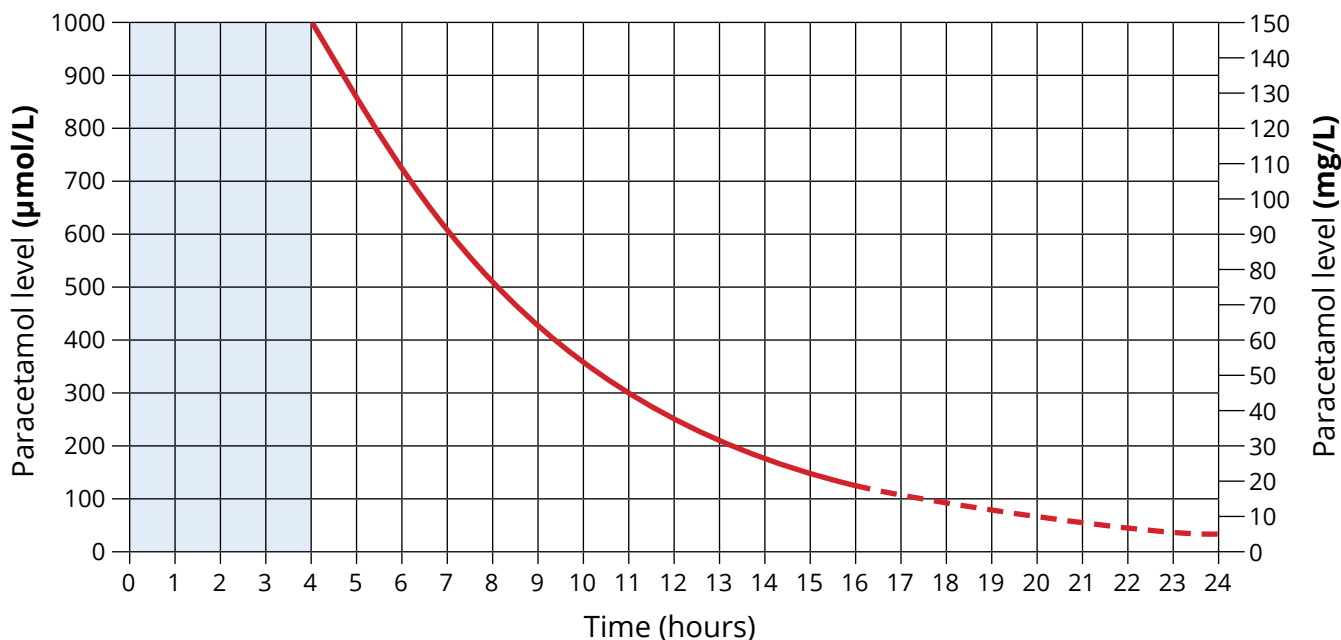
**Multiple ingestions** over longer than 8 hour period: 

Go to page 76

**Unknown time** of ingestion: 

Assume > 8 hours since first dose and go to page 75

### Paracetamol Treatment Nomogram



### NAC Infusion

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

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

## 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 78

If **modified release** (eg. Panadol Osteo) ingestion then go to page 77

If < **2 hours** since ingestion then give **PO activated charcoal 50 g**

Measure **paracetamol level** 4 to 8 hours after ingestion

If paracetamol level is **double nomogram line** (page 73) then go to page 78

If paracetamol level is above **nomogram line** then **start NAC infusion** (page 73)

If paracetamol level unavailable within 8 hours then **start NAC infusion** (page 73)

If NAC infusion is started within 8 hours and the three bag NAC infusion protocol is completed, then no further blood tests are required

## 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 78

If **modified release** (eg. Panadol Osteo) ingestion then go to page 77

**Start NAC infusion** (page 73)

Measure **paracetamol level** and **ALT**

If paracetamol level is **double nomogram line** (page 73) then go to page 78

If paracetamol level is under nomogram line (page 73) 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 73)

## 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 73).

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 73)

Measure **paracetamol level** at 4 to 8 hours and **repeat** 4 hours later  
If **either level** is above nomogram line (page 73) 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 73) then go to page 78

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 73)

## 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)

Weight	First Bag dextrose 5% 200 mL over 60 minutes (acetylcysteine)	Second Bag dextrose 5% 500 mL over 4 hours (acetylcysteine)	Third Bag (DOUBLE DOSE FOR MASSIVE INGESTION ONLY) dextrose 5% 1000 mL over 16 hours (acetylcysteine)
41 - 50 kg	7.5 g = 37.5 mL	2.5 g = 12.5 mL	10 g = 50 mL
51 - 60 kg	9 g = 45 mL	3 g = 15 mL	12 g = 60 mL
61 - 70 kg	10.5 g = 52.5 mL	3.5 g = 17.5 mL	14 g = 70 mL
71 - 80 kg	12 g = 60 mL	4 g = 20 mL	16 g = 80 mL
81 - 90 kg	13.5 g = 67.5 mL	4.5 g = 22.5 mL	18 g = 90 mL
91 - 100 kg	15 g = 75 mL	5 g = 25 mL	20 g = 100 mL
≥ 101 kg	16.5 g = 82.5 mL	5.5 g = 27.5 mL	22 g = 110 mL



**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 cmH<sub>2</sub>O

**Check tube placement:**

**end-tidal CO<sub>2</sub>** (if using colourimeter then “go for gold” within six breaths)



**look** for symmetric chest expansion

**auscultation** (check both axillae and over stomach)

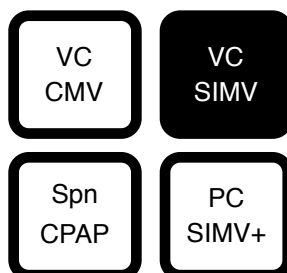
**Secure tube**

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

**IF ASTHMA OR COPD THEN GO TO PAGE 84 (OBSTRUCTIVE STRATEGY)**

## INITIAL VENTILATOR SETTINGS FOR LUNG-PROTECTIVE STRATEGY

**Mode** VC-SIMV

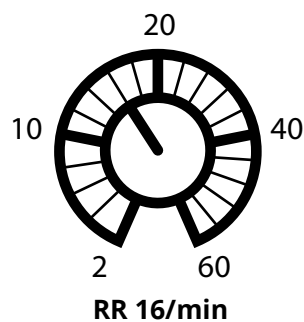


continued next page

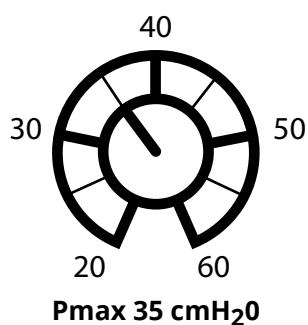
**VT 6 mL/kg of ideal body weight**

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

**RR 16 /min**



**Pmax 35 cmH<sub>2</sub>O**




**FiO<sub>2</sub> start at FiO<sub>2</sub> 100% and PEEP 5, then titrate to saturations 88 to 95%**

<b>FiO<sub>2</sub> (%)</b>	40	40	50	50	60	70	70	70	80	90
<b>PEEP (cmH<sub>2</sub>O)</b>	5	8	8	10	10	10	12	14	14	14

continued next page

I:E 1:1.5



Autoflow On with slope 



If hypertensive **acute pulmonary oedema** then start PEEP at 10 cmH<sub>2</sub>O and titrate up while titrating IV GTN, aiming for systolic  $\leq$  140 mmHg



If **cardiogenic shock** then avoid high PEEP

If **head injury** then use PEEP 5 cmH<sub>2</sub>O and aim for ETCO<sub>2</sub> in low end of normal range

In patients with "sick lungs" ETCO<sub>2</sub> may differ from P<sub>V</sub>CO<sub>2</sub> or P<sub>A</sub>CO<sub>2</sub>

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](#)

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



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



**Dislodgement:** check **end-tidal CO<sub>2</sub> waveform**, repeat laryngoscopy

**Obstruction:** check for high peak inspiratory pressure, **suction** secretions

**Pneumothorax:** check **breath sounds**, pleural sliding on **ultrasound**, repeat CXR

**Equipment failure:** **disconnect** from ventilator, **bag** patient, check all connections in circuit, check gas supply

**Stacking breaths:** **bag** slowly, push on chest to assist

## Never ignore a ventilator alarm

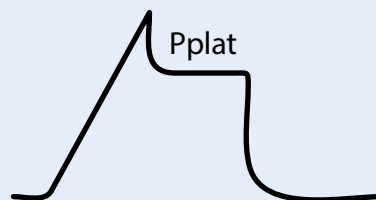
If **Pmax alarms:**



the Oxylog 3000 displays **!!! Paw high**

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

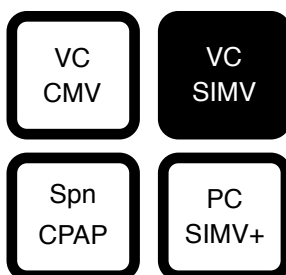
if not agitation or obstruction then press and hold **Insp Hold**



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

## INITIAL VENTILATOR SETTINGS FOR OBSTRUCTIVE STRATEGY

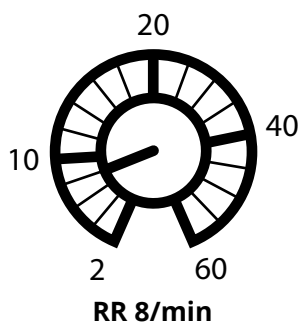
Mode VC-SIMV



VT 6 mL/kg of ideal body weight

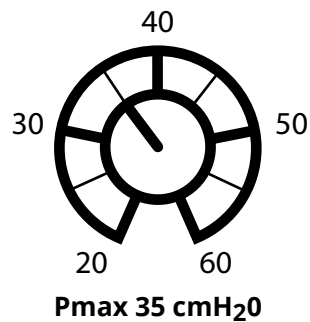
Height	5' 153 cm	5'2" 156 cm	5'4" 163 cm	5'6" 168 cm	5'8" 173 cm	5'10" 178 cm	6' 183 cm	6'2" 188 cm	6'4" 193 cm
<b>VT male</b>	305	320	360	385	415	440	470	490	520
<b>VT female</b>	275	295	330	360	385	415	440	470	490
<b>VT pregnant</b>	370	390	440	480	510	550	585	625	650

RR 8 /min

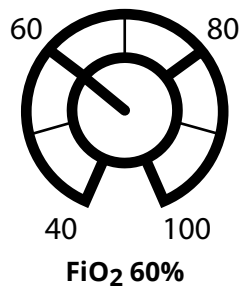


continued next page

**Pmax** 35 cmH<sub>2</sub>O



**FiO<sub>2</sub>** minimum for saturations 88 to 95%



**PEEP** 0 cmH<sub>2</sub>O

**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](#)



## TROUBLESHOOTING THE VENTILATOR

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

**Dislodgement:** check **end-tidal CO<sub>2</sub> waveform**, repeat laryngoscopy


**Obstruction:** check for high peak inspiratory pressure, **suction** secretions

**Pneumothorax:** check **breath sounds**, pleural sliding on **ultrasound**, repeat CXR

**Equipment failure:** **disconnect** from ventilator, **bag** patient, check all connections in circuit, check gas supply

**Stacking breaths:** **bag** slowly, push on chest to assist

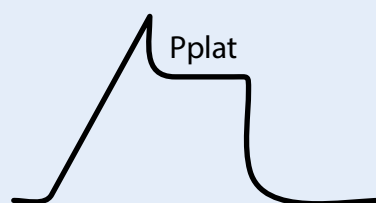
 **Never ignore a ventilator alarm**

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



**Seek expert advice**



# VENTRICULAR FIBRILLATION

page 1 of 3



and  
NO PULSE

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

 **CALL FOR HELP**



**INFORM TEAM**

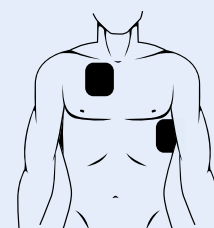


**CRASH CART**

**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 CO<sub>2</sub> monitoring)

**CPR 2 minutes**

Look at the **clock**

**continued on page 91**

# 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**

**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 53 (ROSC)**







**IF NO PULSE THEN GO TO PAGE 97 (PULSELESS VT)**

 **CALL FOR HELP**

 **INFORM TEAM**

 **CRASH CART**

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

page 1 of 3



and  
NO PULSE

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

 **CALL FOR HELP**

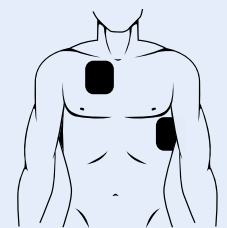
 **INFORM TEAM**

 **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 CO<sub>2</sub> monitoring)

**CPR 2 minutes**

Look at the **clock**

**continued on page 99**

# 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


# PULSELESS VENTRICULAR TACHYCARDIA

page 2 of 3

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**

# PULSELESS VENTRICULAR TACHYCARDIA

page 3 of 3

**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 53 (ROSC)**



## **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<sup>1,2</sup>
- 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<sup>3,4</sup>
- 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.<sup>5,6,7</sup> 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.<sup>8</sup> 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.<sup>9</sup> 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.<sup>10</sup> Assigning a reader is recommended<sup>11</sup> as the reader can prompt the team and help avoid the task fixation common in medical emergencies.

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.



The Trial of Emergency Medicine Protocols in Simulation Training (TEMPIST) is a large prospective randomised block-controlled simulator-based trial studying doctors and nurses managing simulated medical emergencies with and without Emergency Protocols. TEMPIST is underway at the University Centre for Rural Health in Lismore, NSW. Outcome measures are critical life-saving steps specific to each scenario, recorded on video and by high-fidelity manikin. Data collection has been completed. Preliminary analysis demonstrates a 54% decrease in critical errors when using Emergency Protocols, across a wide range of clinical scenarios and clinician seniority. Results will be published in a peer-reviewed journal and available at [www.emergencyprotocols.org.au](http://www.emergencyprotocols.org.au).

Emergency Protocols are used in Advanced Emergency Performance Training (ADEPT). The ADEPT course teaches high-level non-technical skills to doctors, nurses and allied health professionals. ADEPT features ex-military pilots and human factors professionals. Two innovative days optimise the participants skills in leadership, teamwork, communication, assertion, conflict management, self-awareness, situation awareness and decision-making. ADEPT is accredited for Continuing Professional Development points by the Australasian College of Emergency Medicine and the Australian College of Rural and Remote Medicine.

Emergency Protocols are endorsed by the Emergency Care Institute of the Agency for Clinical Innovation of NSW Health and by the Australian College of Rural and Remote Medicine.

## References

1. Kuhlmann S, Piel M, Wolf OT. Impaired memory retrieval after psychosocial stress in healthy young men. *J Neurosci*. 2005; 25(11): 2977-2982.
2. Roth EM, Mumaw RJ, Lewis PM. An empirical investigation of operator performance in cognitively demanding simulated emergencies. *US Nuclear Regulatory Commission*. 1994; NUREG/CR-6126.
3. Meilinger PS. When the Fortress went down. *Air Force Mag*. 2004; 87(9): 78-82.
4. Helmreich RL. On error management: lessons from aviation. *BMJ*. 2000; 320(7237): 81-785.
5. Marshall SD. The use of cognitive aids during emergencies in anesthesia: a review of the literature. *Anesth Analg*. 2013; 117(5): 1162-1171.
6. Harrison TK, Manser T, Howard SK, Gaba DM. Use of cognitive aids in a simulated anesthetic crisis. *Anesth Analg*. 2006; 103(3): 551-556.
7. Ziewacz JE, Arriaga AF, Bader AM, et al. Crisis checklists for the operating room: development and pilot testing. *J Am Coll Surg*. 2011; 213(2): 212-217.
8. Arriaga AF, Bader A, Wong JM, et al. Simulation-based trial of surgical-crisis checklists. *NEJM*. 2013; 368(3): 246-253.
9. Marshall SD, McIntosh C, Sanderson P, Kolawole H. The effect of two cognitive aid designs on team functioning during intra-operative emergencies: a multi-centre simulation study. *Anaesthesia*. 2016; 71(4): 389-404.
10. Goldhaber-Fiebert SN, Howard SK. Implementing emergency manuals: can cognitive aids help translate best practices for patient care during acute events? *Anesth Analg*. 2013; 117(5): 1149-1161.
11. Burden, AR, Carr ZJ, Staman GW, Littman JJ, Torjman MC. Does every code need a "reader"? *Simul Healthc*. 2012; 7(1): 1-9.



# EMERGENCY PROTOCOLS

EMERGENCY PHONE NUMBERS:

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....