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Care Objective

- Ensure safe and effective airway management throughout entire episode of care
- To be read as an adjunct to CPG A0302 Endotracheal intubation. This CPG includes two additional pathways available to MICA flight paramedics.

General notes

- While traditionally patients with altered conscious state are intubated for airway protection during aeromedical transport, it is not a mandated clinical requirement. Transport time, ability to divert, reason for transport and clinical fragility must be taken into account even in the setting of aeromedical retrieval.
- The term 'peri-arrest' is reserved for the patient whose vital signs predict a strong likelihood of rapid deterioration into cardiac arrest.
- Due to the rapid metabolism/off-set of propofol in critically unwell patients, an immediate post intubation bolus of propofol and subsequent infusion will be required to maintain anaesthesia / sedation.
- MFPs are authorised to undertake a second RSI in the setting of a failed intubation where it's deemed to be clinically appropriate and safe to do so. A second RSI should be undertaken as per CPG A0302/AAV 01.

RSI – Crash airway

- The aim is to secure the airway rapidly while avoiding haemodynamic compromise and extended scene/procedure times in unconscious patients who require immediate airway management to prevent pending cardiac arrest.
- It is expected that concurrent IV access should be attempted if not already obtained.
- RSI with a paralytic only and with expedited preparation is permitted where there is an immediate need to secure the airway and:
  - Administration of sedative / analgesic is likely to cause delay and / or haemodynamic collapse
  - Peri arrest, airway reflexes present
Guideline Principles

- This guideline supplements CPG A0303 Difficult Airway Guideline, which applies to all MICA Paramedics.
- In addition to the following notes, Plan C is the key variation from CPG A0303.

Crew Resource Management

- In complex cases where MFPs are committed to other tasks (such as finger thoracostomy) the most experienced MICA Paramedic should be selected for intubation.

Additional intubation attempts

- MFPs should in general abide by the limitation of two intubation attempts. However a third attempt may be appropriate in the setting of:
  - Oxygen saturations can be maintained
  - There is an identified corrective intubation strategy (E.g. technique issues, airway visibility, insufficient ramping, equipment failure, etc.)

Plan C

- The intubating LMA replaces the iGel within Plan C.
- In the setting of intubating LMA insertion, correction of desaturation by ventilation should be undertaken prior to ETT insertion through the device.
- With regard to iLMA:
  - LMA success is measured by oxygenation
  - iLMA-ETT success is measured by electronic ETCO₂
Flowchart

**Status**
- Patient requiring intubation

**Plan A**
First Pass Intubation

**Action**
- **OPTIMISED** first pass intubation attempt

**Assess**
- Confirmation of tracheal placement by ETCO₂?

**Yes**
- **Action**
  - Mx as per airway maintenance CPG

**No**
- **Action**
  - **ALTERNATIVE** second pass intubation

**Assess**
- Confirmation of tracheal placement by ETCO₂?

**Yes**
- **Action**
  - Mx as per airway maintenance CPG

**No**
- **COMMUNICATE!**
  - "Unable to intubate, moving to rescue airway strategy"

**Plan C**
Airway Rescue Strategy

**Action**
- Insert intubating LMA
- Correct desaturation
- One attempt ETT via intubating LMA

**Assess**
- Able to oxygenate?
- ETCO₂ confirmation if ETT passed?

**Yes**
- **Action**
  - Mx as per airway maintenance CPG

**No**
- **Action**
  - Cricothyroidotomy
  - Mx as per airway maintenance CPG

**Plan D**
Can’t Intubate, Can’t Oxygenate
Care Objective

- Optimise sedation +/- paralysis
- Optimise ventilation parameters using lung protective strategies
- Undertake the ‘Critical IHT Checklist’ to ensure comprehensive patient care post intubation
- To be read as an adjunct to CPG A0305 Airway Maintenance
Sedation and Paralysis

- If Propofol is given to induce unconsciousness then consider post intubation sedation using:
  - Propofol infusion at rate 100 mg – 300 mg/hr (10 – 30 mL/hr). Add Morphine infusion for patients intubated with Propofol with underlying pain

- If patient has had continuous seizure activity:
  - Midazolam Infusion @ 0.2 – 0.4 mg/kg/hr IV as an independent infusion
  - Supplement with Midazolam 0.05 – 0.1 mg/kg IV bolus as required (nil maximum)
  - Consider adding Propofol infusion 50 – 200 mg/hr in the seizure patient who appears resistant to opioid / midazolam sedation.
  - It is preferable to over-sedate these patients to maintain patient control than administer paralysis and potentially mask seizure activity.
  - Patients intubated for status epilepticus should not receive routine post intubation paralysis. However if sedation using Midazolam and Propofol is insufficient to safely maintain intubation and ventilation, then Rocuronium should be administered
  - Patient receiving high dose sedation may require cardiovascular support

Trauma

- Blood pressure should be managed as per CPG AAV 08 Inadequate Perfusion associated with Hypovolaemia

Non-traumatic brain injury

- In suspected NTBI due to suspected intracranial bleeding or sub-arachnoid haemorrhage (pre-RSI GCS < 8), maintain SBP > 120 mmHg and < 140mmHg.

- If hypotension is present in the suspected NTBI (SBP < 120 mmHg):
  - Maintain minimum sedation rates of Fentanyl 20 mcg/hr and Midazolam at 2 mg/hr IV
  - Administer Normal Saline 0.9% 20 mL/kg IV, titrated to target BP
  - If SBP remains < 120 mmHg despite fluid challenge then consider Noradrenaline infusion. Titrated to a SBP 120 mmHg using a dose between 5 – 25 mcg/min IV (5 mL/hr – 25 mL/hr)

- If hypertension is present (SBP > 140 mmHg) despite Fentanyl 100 mcg/hr and Midazolam at 10 mg/hr
  - Administer Propofol 0.5 mg/kg IV bolus. Repeat as required
  - Consider Propofol infusion at 50 mg/hr (5 mL/hr). Titrates to effect
## Mechanical Ventilation

<table>
<thead>
<tr>
<th>Mode</th>
<th>SIMV Volume-Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>FiO₂</td>
<td>1.0</td>
</tr>
<tr>
<td>May be titrated once stable, stationary and ventilator/ETT is secure.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Obstructive lung</th>
<th>Normal lung</th>
<th>Restrictive lung</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute bronchospasm, COPD, asthma</td>
<td>ARDS, obesity, pneumonia, aspiration, pulmonary fibrosis</td>
<td></td>
</tr>
</tbody>
</table>

### Tidal Volume

<table>
<thead>
<tr>
<th>Mode</th>
<th>Obstructive lung</th>
<th>Normal lung</th>
<th>Restrictive lung</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIMV</td>
<td>6 – 8 mL/kg</td>
<td>6 mL/kg</td>
<td>&gt; 18</td>
</tr>
</tbody>
</table>

- **Rate**: 6 – 8
  - Titrated to correct for AutoPEEP, blood pressure, blood gases and PIPs.
  - 12 – 15
  - Titrated rate and V₁ to target EtCO₂ 30 – 35 mmHg or blood gases
- **PEEP**: Zero
  - 5 cmH₂O
  - 5 – 15 cmH₂O
  - Titrated to SpO₂ 94%
- **I : E**: 1 : 6 – 8
  - 1 : 2 – 3
  - 1 : 1 – 1.5
  -Titrate to indicated I:E

### Other

- **PIPs**: May exceed 40-60 cmH₂O, particularly in acute Asthma
- **Serial Ultrasound**: Consider ruling out TPT development
- **EtCO₂**: Accept hypercapnia but aim for pH > 7.1
- **Consider ABG analysis**: EtCO₂ can be an unreliable guide for PCO₂, even in 'stable' patients
- **Most critical patients are acidic**: Does the patient require respiratory compensation and higher MVs?
- **Avoid disconnection / suctioning** as optimal lung recruitment depends on continuous airway pressure (PEEP).
- **EtCO₂**: Mild hypercapnia acceptable in restrictive lung patients without brain injury.
- **Severe multi-trauma**: Where combined head / chest injury, blood pressure preservation outweighs normalisation of blood gases. Titrated Mean Airways Pressure accordingly.

### Spontaneously Ventilating

- **Monitor** for ventilator synchrony and MV.
- **Pressure support (5 – 10 cmH₂O)** titrated to expected V₁ and compliance
- **Ensure** triggering and sensitivity accurately captures breaths.
- **Sedation** must be adequate to avoid asynchrony.
Transthoracic Pacing

Flowchart

**Status**
- Evidence of persistent bradycardia

**Initial Assessment**
- Atropine has been administered
- Isoprenaline or Adrenaline infusion running
- Transvenous pacing is not available

**Action: Commencement of Transthoracic Pacing**
- Attach pads to left anterior chest wall and right posterior chest wall
- Switch Zoll Series X monitor/defibrillator to “Pacing”
- Provide appropriate sedation
  - Administer **Midazolam 1-2mg IV** and **Fentanyl 50mcg IV** and repeat as required
- Set pacing output to **30mA** and a heart rate of **70/minute**
- Increase by **10mA** until capture of QRS on ECG
- Set at **10mA** above capture voltage
Pacing Wire Care

- In general the OUTPUT setting on the pacemaker should be set at 2 times the THRESHOLD level plus 1mA (i.e. 2 x THRESHOLD(mA) + 1mA)
- Pacing THRESHOLD would usually be determined on consultation with the sending hospital
- In general the SENSITIVITY setting should be set towards the maximum sensitivity (i.e. 0.5mV is the most sensitive)
- If Transthoracic Pacing instituted prior to or during flight consider implications on mission safety and appropriate communication with relevant aircrew/pilot.
Flowchart

**Status**
- Evidence of persistent bradycardia

**Initial Management & Assessment**
- Referring hospital handover
- Need for aeromedical transport with temporary transvenous pacing (TVP) wire for symptomatic bradycardia
- Confirm clinical evidence of appropriate transvenous pacemaker settings and pacemaker pacing or not pacing

**Pacemaker not Pacing**
- **Action**
  - **IF** pacemaker NOT currently pacing (i.e. demand rate < intrinsic rate)
    - Check that pacer 100% sensing intrinsic cardiac activity
  - **IF** pacemaker NOT currently sensing
    - Set sensitivity until 100% sensed intrinsic activity noted
    - Increase demand rate to > intrinsic rate to check:
      - Pacemaker capture
      - Appropriate output settings
    - Confirm evidence of 100% capture on ECG and presence of peripheral pulses
    - Return demand rate to appropriate settings
    - Do not increase rate above 100 bpm

**Pacemaker Pacing**
- **Action**
  - **IF** pacemaker currently pacing (i.e. demand rate > intrinsic rate)
    - Confirm evidence of 100% capture on ECG and presence of peripheral pulses
  - **IF** 100% capture not present
    - Increase OUTPUT until capture and pulses achieved
    - Set OUTPUT to appropriate levels with safety margin

**Pacing wire care**
- **Action**
  - Confirm, secure and note position and insertion length of temporary transvenous pacing wire
  - Confirm and secure all connections

**Pacemaker Failure to Capture or Pace**
- **Action**
  - Transvenous Pacing failure to capture and/or pacemaker fail to pace AND/OR
  - Less than adequate perfusion i.e. clinical evidence of bradycardia
  - Check all leads, connections and pacemaker function
  - Place patient in left lateral position and/or encourage patient to cough
  - Reassess physiological status
  - **IF** less than adequate perfusion:
    - Increase OUTPUT until capture and return to adequate perfusion
    - Consider need for institution of Transthoracic pacing (TPP) or pharmacological support
  - **IF** Transvenous Pacing ineffective or not possible **AND** less than adequate perfusion
    - Manage as per CPG A0402 Bradycardia and/or AAV-03 Transthoracic Pacing

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This is an uncontrolled document, it is the reader’s responsibility to ensure currency.
Multimodal pain relief is recognised as the most effective pathway for efficacious analgesia and limits excessive opiate administration. Unless contraindicated Paracetamol IV should be administered to all trauma patients complaining of pain. Parecoxib, in addition, should be strongly considered for patients with moderate to severe pain unless contraindicated.

Paracetamol and Parecoxib are slow acting, long lasting agents that provide bridging analgesia between the prehospital and Emergency Department settings.

The use of Ketamine is not specifically contraindicated in the patient requiring winching. However MFPs must be acutely aware that that a dissociated patient can be an inherent safety risk during the winching operation. Ideally patients should be allowed time to return to full consciousness prior to extrication and MFPs should include this potential delay in winch operations planning. Alternatively, other analgesic agents such as Methoxyflurane may be considered for procedural pain relief in the winch setting.

ALS Flight Paramedics must consult with either the clinician or a MFP via the FCC prior to exceeding Morphine 20 mg IV or Fentanyl 200 mcg IV

**Infusions**

**Morphine Infusion**
- Morphine 30 mg added to make 30 mL with Dextrose 5% or Normal Saline.
- 1 mL/hr = 1 mg/hr

**Fentanyl Infusion**
- Fentanyl 300 mcg added to make 30 mL with Dextrose 5% or Normal Saline
- 1 mL/hr = 10 mcg/hr

**Ketamine Infusion**
- Ketamine 50 mg added to make 50 mL with Dextrose 5% or Normal Saline
- 1 mL/hr = 1 mg/hr

Ketamine 50 mg may be obtained by adding 50 mg (5 mL) of the pre-diluted 10 mg/mL Ketamine solution to 45 mL Dextrose 5% or Normal Saline to make a 1 mg/mL dilution

General Notes

- Multimodal pain relief is recognised as the most effective pathway for efficacious analgesia and limits excessive opiate administration. Unless contraindicated Paracetamol IV should be administered to all trauma patients complaining of pain. Parecoxib, in addition, should be strongly considered for patients with moderate to severe pain unless contraindicated.
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- ALS Flight Paramedics must consult with either the clinician or a MFP via the FCC prior to exceeding Morphine 20 mg IV or Fentanyl 200 mcg IV
Flowchart

**Status**
- Complaint of pain

**Initial Management**
- Pain score > 2
- Refer to CPG A0501 Pain Relief for initial treatment

**Ongoing analgesia**
- Inadequate analgesia obtained

**Action**
- Morphine up to 10 mg IV
  - OR
  - Fentanyl 25 – 100 mcg IV at 5 minute intervals as required
  - Ketamine 10 – 20 mg IV at 5 – 10 minute intervals as required

Consider infusions
- Morphine 2 – 10 mg/hr
  - OR
  - Fentanyl 20 – 100 mcg/hr
  - AND/OR
  - Ketamine 0.1 – 0.3 mg/kg/hr if transport time is prolonged
- For patients with severe traumatic pain who do not respond adequately to the above, then consider RSI

**Procedural analgesia**
- General anaesthesia (without paralysis and intubation) may be required for trapped patients requiring limb amputation

**Action**
- Ketamine 1.5 mg/kg IV bolus
  - If Ketamine emergence may impair safe winch retrieval consider
    - Methoxyflurane 3 mL

**Bridging analgesia**
- Paracetamol 1 g IV over 15 minutes
- Parecoxib Sodium 40 mg IV

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Inadequate Perfusion Associated with Sepsis

Special Notes

- Noradrenaline infusion preparation
  - Noradrenaline 3mg added to 47ml of Dextrose 5% or Normal Saline
  - 1ml/hr = 1 mcg/min

- Steroid therapy is not routinely administered in severe sepsis

- Appropriate antibiotics should be administered. Consult with receiving hospital for administration of Ceftriaxone 1gm IV

- For inter-hospital transfers, consult with ARV for recommended antibiotic therapy

Flowchart

- **Status**
  - Suspected or diagnosed severe sepsis

- **Assess**
  - Manage and treat as CPG A0705 Inadequate Perfusion Non-Cardiogenic/Non-Hypovolaemic

- **Airway and Breathing**
  - If in respiratory distress, SpO₂ < 92% on supplemental O₂ or in altered conscious state
  - Intubate prior to transport as per CPG AAV 01 Rapid Sequence Intubation

- **Perfusion**
  - If systolic blood pressure < 90mmHg after Normal Saline 40mL/kg
  - Consider invasive blood pressure monitoring as per CPG AAV REF01 Arterial Line Insertion
  - Noradrenaline infusion
    - Noradrenaline infusion must be administered through a separate dedicated IV line. If a CV line is not inserted, short term administration via a separate peripheral line may be undertaken with care to avoid extravasation.
    - Commence @ 5mcg/min (5mL/hr) and titrate to SBP > 90 to a maximum 25mcg/min (25mL/hr)
  - Consult with receiving hospital if treatment not effective

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Special Notes

Additional Modifying Factors

- Penetrating trunk trauma – accept a palpable carotid pulse and transport immediately. The treatment of major haemorrhage following penetrating truncal trauma is surgical.

- In cases where there is uncontrolled bleeding and the flight time is short, there must be no additional scene time spent undertaking RSI, even in the comatose patient

- If the patient is aged 15 – 17 years, parental consent is required for administration of PRCC

- iCa should be measured as early as practicable in patients with haemorrhagic hypovolaemia. Calcium Gluconate 10% may be administered empirically following 4 units of PRCC or where hypocalcaemia is identified (regardless of the number of units of PRCC administered). If hypocalcaemia is present following the initial dose for either indication, a repeat dose may be administered.
Inadequate Perfusion Associated with Hypovolemia

CPG AAV 08

Flowchart

**Status**
- Evidence of hypovolaemia

**Assess**
- Manage as per CPG A0801 Hypovolaemia
- Apply arterial tourniquet if appropriate (i.e. uncontrolled limb bleeding despite adequate external pressure)
- Apply haemostatic dressing if appropriate (i.e. uncontrolled head/trunk wound bleeding despite adequate pressure)

**If SBP < 70 mmHg**

**Action**
- Administer Packed Red Cell Concentrate
- Assess after each transfusion and repeat as required
- If the patient has severe traumatic brain injury (GCS < 9), commence Adrenaline infusion and titrate to SBP ≥ 120 mmHg

**Hypocalcaemia**
- Following administration of 4 units PRCC

**OR**
- iCa < 1.12 at any stage

**Action**
- Calcium Gluconate 4.4 mmol (2 g) IV administered over 2 – 5 minutes

If iCa < 1.12 mmol / L following initial dose:
- Calcium Gluconate 2.2 – 4.4 mmol (1 – 2 g) IV administered over 2 – 5 minutes

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General Care

- Always consider pneumothorax and/or haemothorax in the setting of unexplained hypotension, especially in the setting of traumatic chest injury and positive pressure ventilation.
- Early targeted pain relief in the conscious chest injury patient remains an important strategy for maximizing spontaneous minute volume and patient comfort.
- In the setting of major chest trauma in the IHT, consult with ARV.

Flowchart

**Status**
- Chest injury
  - Traumatic
  - Spontaneous
  - Iatrogenic

**Assess**
- High likelihood of pneumo/hemorrhax?
  - Hypotension in trauma, particularly multi-trauma
  - Unexplained hypotension during PPV
  - Empirical management in traumatic arrest
  - Hypoxia
  - Penetrating chest injury
  - Blast injury
  - Ultrasound findings

**Not Intubated**
- If elective decompression is required due to:
  - Clinical compromise
  - Anticipated complications of flight
- Refer to CPG A0802 Chest Injuries

**Assess**
- Clinical compromise remains despite initial Mx

**Intubated**
- If decompression is required due to:
  - Collective evidence of likely pneumothorax/haemothorax
  - Persistent unexplained hypotension during positive pressure ventilation
  - Perform Finger Thoracostomy
  - It may be reasonable to commence Mx with anterior decompression due to logistical context, however this should be followed up with FTC as soon as practicable

**Conscious**
- Continued deterioration despite management and:
  - Patient demonstrates awareness
  - Significant respiratory compromise
  - Anticipated complications of flight
  - Consider intubation prior to transport

**Unconscious**
- In the setting of:
  - Adequate MICA resourcing
  - Concurrent preparation for intubation
- With any of the following:
  - Persistent hypotension/hypoxia in trauma
  - Complex multi-trauma
  - Perl or actual arrest
  - Perform Finger Thoracostomy
  - In the setting of poor MICA resourcing and airway under threat, divert to intubation as a priority
Related Resources

Spinal Cord Injury

Flowchart

**Status**
- Potential or suspected spinal injury

**Assess**
- Manage initially as per CPG A0804 Spinal Injury

**Airway**
- Intubate as required as per CPG AAV 001 Rapid Sequence Intubation in the presence of quadriplegia and paradoxical ventilation

**If SBP remains < 90mmHg and prolonged**
- If isolated neurogenic shock is suspected
  - Administer Normal Saline 10mL/kg IV aiming to maintain systolic blood pressure > 90mmHg
  - Invasive blood pressure monitoring should be established as per CPG AAV 11 Arterial Line Insertion
  - If SBP remains < 90mmHg, commence Noradrenaline Infusion
    - 5mcg/min (5mL/hr) – 25mcg/min (25mL/hr) IV to titrate to SBP > 90mmHg to maintain spinal cord perfusion and limit secondary injury.

Preparation of Noradrenaline Infusion:
- **Noradrenaline 3mg** added to make 50mL with **Glucose 5% or Normal Saline**
- 1mL/hr = 1 mcg/min
This CPG is to be used in conjunction with and as an adjunct to AV CPG A0201 Cardiac Arrest

**Traumatic Cardiac Arrest**

The intent is to prioritise haemorrhage control and managing correctable causes prior to other therapies. Priorities include oxygenation and ventilation; exclusion of tension pneumothorax by insertion of bilateral pleural decompression and administration of Red Cell Concentrate x 4 IV/IO in order of clinical need. This should be followed by routine cardiac arrest management including cardiac rhythm check. Once correctable causes have been addressed, a cardiac rhythm check and other standard cardiac arrest therapies such as compressions and adrenaline should be administered.

In cases where the Hx, MOI or injuries are inconsistent with traumatic cardiac arrest, or patient is in VF/VT, consider medical cause. If any doubt exists as to the cause of arrest, treat as per Medical Cardiac Arrest.

Control of major haemorrhage is a priority and can be achieved with tourniquets, haemostatic dressings and/or direct pressure.

A pelvic splint should be applied after other interventions in undifferentiated blunt trauma. Where pelvic fracture is clearly contributing to cardiac arrest, a pelvic splint may be applied earlier.

A supraglottic airway is an appropriate option to manage the airway initially and to facilitate continuous compressions. When ETT is attempted, it should not interrupt compressions.

ETCO$_2$ can be used as a surrogate marker of cardiac output during cardiac arrest. Where capnography is available, measure ETCO$_2$. An ETCO$_2$ reading greater than 10mmHg is desirable.

Where clear signs of prolonged cardiac arrest are present, or continued resuscitation may be futile, consider AAV CPG G 01 and/or AV CPG A0203 Withholding or Ceasing Resuscitation.

IV access may be difficult in this cohort of patient and consideration should be given to rapidly establishing peripheral access via IO.

**Ratios of compression to ventilation:**

**No ETT/SGA**

- 30 compressions to 2 ventilations
- Aim for 100 – 120 compressions per minute
- Pause for ventilations

**ETT/SGA**

- 15 compressions to 1 ventilation
- Aim for 100 – 120 compressions per minute
- 6 - 8 ventilations per minute
- No pause for ventilations
- The required depth of compression is > 5cm and full recoil of the chest should be allowed.
• Evidence suggests compressions rates often differ from recommendations. Consider using metronome if available.

• CPR operators should rotate every 2 minutes to reduce fatigue and maintain performance. A gradual fall in ETCO$_2$ may suggest fatigue during CPR.
This CPG applies to critical asthmatic patients who remain acutely unwell despite salbutamol, ipratropium bromide and adrenaline therapy given as per CPG A0601 Asthma.

Consider administration of Magnesium Sulfate as soon as practicable following commencement of adrenaline infusion.

**ADULT**

- Dilute Magnesium Sulfate 10 mmol (2.5 g) to 25mL with Normal Saline (this equals 100 mg / 1 mL) for IV administration.
- Administer 10 mmol (2.5 g) via infusion pump over 20 minutes.

**Flowchart**

1. **Status**
   - Severe asthma
   - Maximum therapy as per CPG A0601 Asthma

2. **Assess**
   - Severe as per CPG A0601 Asthma

3. **Severe**
   - Magnesium Sulfate infusion 10 mmol (2.5 g) IV over 20 minutes
This guideline is to be read as an adjunct to CPG AAV A01 Rapid Sequence Intubation and CPG P0301 Endotracheal intubation (paediatric)

Flowchart

- Status
  - Patient prepared for intubation

- Contraindications
  - No functional electronic capnography
  - When airway rescue using CPG A0303 Difficult Airway is not possible
  - If GCS > 12 patients can only be intubated after consultation with RCH

- RSI – High GCS
  - Airway Burns
  - Fentanyl 2 mcg/kg IV
  - Propofol 1 mg/kg IV
  - Rocuronium 1 mg/kg IV
  - Action

- RSI – Crash airway
  - Unconscious and peri-arrest
  - Immediate need to secure airway
  - Airway reflexes present
  - Action

- RSI Standard
  - Sedation as per CPG A0302
  - Rocuronium 1 mg/kg IV (max. 100 mg)
  - Action
This guideline is to be read as an adjunct to CPG P0303 Airway Maintenance (paediatric)

Flowchart

**Sedation**

- **Action**
  - Mx as per CPG P0303 Airway Maintenance (paediatric)
  - Fentanyl / Midazolam infusion 0.2 - 0.4 mL/kg/hr IV OR
  - Morphine / Midazolam infusion 0.2 - 0.4 mL/kg/hr IV

If Propofol is given for induction consider:
- **Propofol Infusion** at rate 2 mg/kg/hr – 4 mg/kg/hr IV

**Paralysis**

- **Action**
  - Rocuronium 0.6 mg/kg IV every 15 minutes
  - Infusion Rocuronium 1 mg/kg/hr IV
This is an uncontrolled document, it is the reader's responsibility to ensure currency.

Multimodal pain relief is recognised as the most effective pathway for efficacious analgesia and limits excessive opiate administration. Unless contraindicated, Paracetamol IV should be administered to all trauma patients complaining of pain regardless of severity. Parecoxib, in addition, should be strongly considered for patients with moderate to severe pain unless contraindicated.

Paracetamol and Parecoxib are slow acting, long lasting agents that provide bridging analgesia between the prehospital and emergency department settings.

Dose errors in IV paracetamol administration for paediatrics is a documented issue. Do not administer paracetamol directly from the soft pack to paediatric patients. To avoid the risk of overdose, draw the required dose out of the soft pack and administer from a separate syringe.

The use of Ketamine is not specifically contraindicated in the patient requiring winching. However MFPs must be acutely aware that a dissociated patient can be an inherent safety risk during the winching operation. Ideally patients should be allowed time to return to full consciousness prior to extrication and MFPs should include this potential delay in winch operations planning. Alternatively, other analgesic agents such as Methoxyflurane may be considered for procedural pain relief in the winch setting.

ALS Flight Paramedics are not permitted to cannulate paediatric patients for the administration of analgesia. In the event of an established IV, ALS Flight Paramedics are to consult with an on duty MFP via the FCC for specific treatment outlined in this CPG.

### IV Paracetamol dose / volume table

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Weight (kg)</th>
<th>Dose (mg)</th>
<th>Total volume (mL)</th>
<th>Rate (mL/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 months</td>
<td>6</td>
<td>90</td>
<td>9</td>
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</tr>
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<td>3</td>
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<tr>
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<tr>
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<td>18</td>
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</tr>
<tr>
<td>11</td>
<td>36</td>
<td>540</td>
<td>54</td>
<td>216</td>
</tr>
</tbody>
</table>

### Infusions
Morphine Infusion
- Morphine 30 mg added to make 30 mL with Dextrose 5% or Normal Saline
- 1 mL/hr = 1 mg/hr

Fentanyl Infusion
- Fentanyl 300 mcg added to make 30 mL with Dextrose 5% or Normal Saline
- 1 mL/hr = 10 mcg/hr

Ketamine Infusion
- Ketamine 50 mg added to make 50 mL with Dextrose 5% or Normal Saline
- 1 mL/hr = 1 mg/hr

Ketamine 50 mg may be obtained by adding 50 mg (5 mL) of the pre-diluted 10 mg/mL Ketamine solution to 45 mL Dextrose 5% or Normal Saline to make a 1 mg/mL dilution

Flowchart
Inadequate Perfusion Associated with Hypovolemia

**Flowchart**

**Status**
- Evidence of hypovolaemia

**Initial management**
- Manage as per CPG P0801 Hypovolaemia (Paediatric)
- Apply arterial tourniquet if appropriate (i.e. uncontrolled limb bleeding despite adequate external pressure)

**If systolic BP remains < 100mmHg**

**Action**
- After **20mL/kg Normal Saline**, seek consent for a blood transfusion from a parent and if approved
- Administer **Packed Red Cell Concentrate 10mL/kg**
- Assess after each transfusion and repeat, as required
- If consent from a parent is not possible, administer further **Normal Saline 20mL/kg**
- If the patient has severe traumatic brain injury (GCS < 9) and remains hypotensive despite commencement of blood transfusion, consult the RCH Emergency Physician to commence **adrenaline/noradrenaline infusion** and titrate to systolic BP that is normal for age

**Additional Modifying Factors**
- Penetrating trunk injury – Accept a palpable carotid pulse and transport immediately. The treatment of major haemorrhage following penetrating truncal trauma is surgical
- In cases where the flight time is short, there must be no additional scene time undertaking RSI, even in a comatose patient

This is an uncontrolled document, it is the reader's responsibility to ensure currency.
General Care

- This CPG is to be used in conjunction with and as an adjunct to AV CPG P0201 Cardiac Arrest (Paediatric)

Traumatic Cardiac Arrest

- The intent is to prioritise haemorrhage control and managing correctable causes prior to other therapies. Priorities include oxygenation and ventilation; exclusion of tension pneumothorax by insertion of bilateral intercostal catheters; and administration of Red Cell Concentrate 10ml/kg IV/IO in order of clinical need. This should be followed by routine cardiac arrest management including cardiac rhythm check. Once correctable causes have been addressed, a cardiac rhythm check and other standard cardiac arrest therapies such as compressions and adrenaline should be administered.

- In cases where the Hx, MOI or injuries are inconsistent with traumatic cardiac arrest, or patient is in VF/VT, consider medical cause. If any doubt exists as to the cause of arrest, treat as per Medical Cardiac Arrest.

- Control of major haemorrhage is a priority and can be achieved with tourniquets, haemostatic dressings and/or direct pressure.

- A pelvic splint should be applied after other interventions in undifferentiated blunt trauma. Where pelvic fracture is clearly contributing to cardiac arrest, a pelvic splint may be applied earlier.

- A supraglottic airway is an appropriate option to manage the airway initially and to facilitate continuous compressions. When ETT is attempted, it should not interrupt compressions.

- ETCO$_2$ can be used as a surrogate marker of cardiac output during cardiac arrest. Where capnography is available, measure ETCO$_2$. An ETCO$_2$ reading greater than 10mmHg is desirable.

- Where clear signs of prolonged cardiac arrest are present, or continued resuscitation may be futile, consider AAV CPG G01 and/or AV CPG A0203 Withholding or Ceasing Resuscitation.

Administration of Red Cell Concentrate (RCC)

- It is a legal requirement to obtain parental consent prior to administration of Red Cell Concentrate for any patient aged under 18 years (except if married). Therefore RCC must only be administered to a child < 18 years if a parent/legal guardian can be contacted and the parent/legal guardian does not object to the administration of a “blood transfusion”

Ratios of compression to ventilation

No ETT/SGA

- 15 compressions to 2 ventilations
- Aim for 100 - 120 compressions per minute
- <14 ventilations per minute
- Pause for ventilations

ETT/SGA

- 15 compressions to 2 ventilations

This is an uncontrolled document, it is the reader’s responsibility to ensure currency.
• Aim for 100 - 120 compressions per minute
• <14 ventilations per minute
• No pause for ventilations

Flowchart

**Traumatic cardiac arrest**
• Hx, MOI or injuries do not suggest medical causes of cardiac arrest

**Initial management**
• Control external blood loss
• Apply arterial tourniquet if appropriate (i.e. uncontrolled limb bleeding despite adequate external pressure)
• Apply haemostatic dressing if appropriate (i.e. uncontrolled head/trunk wound bleeding despite adequate pressure)
• Apply pelvic splint if the fracture of the pelvis is suspected

**Subsequent management**

**Action**
• Open airway (insert airway or SGA) and administer oxygen using gentle ventilation
• Check cardiac rhythm (if asystole consider cessation of resuscitation)
• Insert large bore IV cannula and administer **Red Cell Concentrate 10mL/kg IV** and repeat as needed if consent of a parent is possible
• Perform bilateral finger thoracostomy
• Commence chest compressions

**Perform the following**

**Action**
• Endotracheal intubation and measure ETCO₂
• Cardiac ultrasound to diagnose pericardial tamponade and/or pseudo- PEA (Pulseless Electrical Activity)
This CPG applies to critical asthmatic patients who remain acutely unwell despite salbutamol, ipratropium bromide and adrenaline therapy given as per CPG P0602 Asthma.

Consider administration of Magnesium Sulfate as soon as practicable following commencement of adrenaline infusion.

### General Notes

- Dilute **Magnesium Sulfate 10 mmol (2.5 g)** to 25 mL with **Normal Saline** (this equals 100 mg / 1 mL) for IV administration.

- Administer **50 mg / kg** via infusion pump over **20 minutes**

### Infusions

#### PAEDIATRIC

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Weight (kg)</th>
<th>Dose (mg)</th>
<th>Dose (g)</th>
<th>Total volume (mL)</th>
<th>Rate (mL/hr)</th>
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<td>36</td>
<td>1800</td>
<td>1.8</td>
<td>18</td>
<td>54</td>
</tr>
</tbody>
</table>
**Flowchart**

**Status**
- Critical asthma
- Maximum therapy as per CPG P0602 Asthma

**Assess**
- Critical as per CPG P0602 Asthma

**Severe**

**Action**
- Magnesium Sulfate infusion 50 mg/kg IV over 20 minutes
10 mg in 2.5 mL (ampoule)
10 mg in 5 mL (ampoule)

Primary Emergency Indication
1. Muscle relaxant for maintaining endotracheal intubation

Adult doses:
• 0.5 mg/kg

Contraindications
1. Allergy to atracurium or cisatracurium
2. Asthma
3. Significant cardiovascular disease

Precautions
1. Myasthenia gravis (prolongs paralysis)
2. Neuromuscular diseases e.g. dystrophia myotonica, history of polio (unpredictable effect)
3. Severe obesity (unpredictable effect)
4. Burns (may require increase dose and shortened duration of action)
5. Acidosis, dehydration, debilitation, electrolyte imbalance (enhance effects)
6. Hypothermia (increases intensity and/or duration of action)

Side Effects
• Anaphylaxis

Infusions
• 10 – 20 mg/hr (adult) following bolus
During air transport, the use of muscle relaxants is considered the safest approach to maintaining endotracheal intubation. In most cases the initial bolus will maintain relaxation for the duration of the flight. However, particular care should be taken to ensure adequate muscle relaxant during the unloading procedure. At the first sign of any return of movement a repeat bolus must be administered.
## Presentation
- 2.47g (10 mmol magnesium) in 5mL glass ampoule

## Mode of action
- Bronchodilation via relaxation of bronchial smooth muscle

## Primary emergency indications
- Severe acute asthma unresponsive to other treatment

## Contraindications
- Heart Block (may be exacerbated by magnesium)
- Renal Failure (increased risk of hypermagnesaemia)

## Precautions
- Patients with myasthenia gravis – magnesium interferes with neuromuscular transmission, may exacerbate condition

## Severe drug interactions (if applicable)
- Neuromuscular blockers including rocuronium – effects can be increased and prolonged by magnesium sulfate. Monitor and reduce dose if required

## Adverse effects
- Adverse effects may indicate hypermagnesaemia, however this is unlikely with a single dose:
  - Nausea, vomiting, flushing, blurred vision
  - Hypotension
  - CNS depression
  - Muscle weakness and loss of reflexes
  - More severe magnesium toxicity may result in respiratory depression, coma, arrhythmias and cardiac arrest

## Administration advice
- Route of administration: IV infusion, IO infusion
- Onset of action: Immediate
- Time to peak effect: 30 minutes
- Duration of action: 30 minutes

## Pregnancy & breastfeeding category
- Safe to Use in both Pregnancy and Breastfeeding.

## Special notes

## Infusion information
- Dilute Magnesium Sulfate 2.5g to 25 mLs with Normal Saline. Administered via infusion pump over 20 minutes.
## Nifedipine

**Presentation**
- 10 mg or 20 mg tablet

**Pharmacology**
- A calcium channel blocker
  - Actions:
    - Relaxes uterine smooth muscle

**Metabolism**
- Metabolised by the liver

**Primary emergency Indications**
- Premature labour

**Contraindications**
- Hypotension (systolic BP < 100 mmHg)

**Precautions**
- Since Nifedipine causes hypotension, care must be taken to avoid hypovolaemia

**Route of administration**
- Oral

**Usual Dose**
- 20 mg tablet

**Side effects**
- Hypotension
- Tachycardia

**Special notes**
- Onset time: 10 minutes
- Peak: 12 minutes
- Duration: 240 minutes
- **Administer only on advice of a physician for premature labour**
<table>
<thead>
<tr>
<th>Presentation</th>
<th>4mg in 4ml ampoule</th>
</tr>
</thead>
</table>
| Pharmacology | A synthetic adrenergic stimulant with primarily alpha effects  
Actions:  
• Causes peripheral vasoconstriction (α receptors) |
| Metabolism   | By monoamine oxidase and other enzymes in blood, liver and around nerve endings and excreted by the kidneys |
| Primary emergency indications |  
• Severe sepsis with inadequate perfusion and mean arterial BP < 70 mmHg  
• Neurogenic shock  
• Hypotensive intracranial hemorrhage |
| Contraindications |  
• Hypovolaemic shock  
• Patients with mesenteric or peripheral vascular ischaemia, unless administration is deemed life threatening |
| Precautions | Since Noradrenaline may cause tissue necrosis, care must be taken to avoid leakage of the drug into tissues |
| Route of administration | Intravenous infusion using syringe pump only |
| Usual Dose | Noradrenaline 3 mg diluted to 50 ml with 47 ml Normal Saline or Dextrose 5%  
1ml resultant solution = 0.06 mg Noradrenaline  
1ml/hr = 1.0 mcg/min |
| Side effects |  
• Peripheral ischaemia  
• Ventricular arrhythmias  
• Hypertension |
| Special notes | Noradrenaline must be administered via a dedicated IV line. If a CV line is not inserted, short term administration via a separate peripheral line may be undertaken with care to avoid extravasation  
Intravenous effects (bolus):  
Onset: 1 minute  
Peak: 2 minutes  
Duration: 5 minutes |
<table>
<thead>
<tr>
<th>Presentation</th>
<th>300ml pack (Blood group O Rhesus negative)</th>
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<tbody>
<tr>
<td>Pharmacology</td>
<td>Human blood product</td>
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<tr>
<td></td>
<td>Actions</td>
</tr>
<tr>
<td></td>
<td>• Increases oxygen transport</td>
</tr>
<tr>
<td>Metabolism</td>
<td></td>
</tr>
<tr>
<td>Primary emergency indications</td>
<td>• Hypovolaemic shock and 20ml/kg crystalloid resuscitation already administered</td>
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<tr>
<td></td>
<td>• Hypovolaemic shock and measured anaemia (Hct &lt; 30)</td>
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<tr>
<td></td>
<td>• Measured anaemia (Hct &lt; 27) in patients with cardiac or neurological injury/disease</td>
</tr>
<tr>
<td></td>
<td>• Severe measured anaemia (Hct &lt; 21)</td>
</tr>
<tr>
<td>Contraindications</td>
<td>• Known religious objection to blood products</td>
</tr>
<tr>
<td></td>
<td>• Children &lt; 18 years old without parental consent who are not married</td>
</tr>
<tr>
<td>Route of administration</td>
<td>Intravenous</td>
</tr>
<tr>
<td>Usual Dose</td>
<td>1-5 units (300-1500 ml)</td>
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<tr>
<td>Side effects</td>
<td>• Anaphylaxis</td>
</tr>
<tr>
<td></td>
<td>• Infection</td>
</tr>
<tr>
<td></td>
<td>• Hypothermia</td>
</tr>
<tr>
<td>Special notes</td>
<td>If available, a fluid warming device should be used to administer this product</td>
</tr>
</tbody>
</table>
Mode of action
Non-steroidal anti-inflammatory drug (NSAID)

Cyclooxygenase-2 (COX-2) is an enzyme involved in the production of prostaglandins following tissue damage, resulting in an inflammatory response. Parecoxib is a COX-2 specific inhibitor.

Indications
- Moderate - severe traumatic or post-operative pain (except post CABG), as an adjunct to opioid analgesia

Contraindications
- Known hypersensitivity to any NSAID, aspirin or sulfonamides
- Post-operative analgesia following coronary artery bypass graft (CABG) or major vascular surgery

Precautions
- Severe renal impairment, or at risk of acute renal failure (e.g. hypovolaemia)

Adverse effects
- Acute renal failure (rare)
- Hypersensitivity reactions (rare)

Significant interactions
- Nil

Pregnancy
- Withhold – limited safety information

Breastfeeding
- Considered safe to use

Administration advice
- **Presentation:** 40 mg powder for injection in glass vial. Reconstitute powder with 2 mL of sodium chloride 0.9%. The reconstituted solution should be clear and colourless. Do not use water for injection
- **Route:** IV
- **Onset of action:** 15 minutes
- **Peak:** 2 hours
- **Duration of action:** 6 – 24 hours

Notes
- Nil

Infusion
- N/A

References
## Presentation
200mg in 20ml ampoule

## Pharmacology
A sedative/anaesthetic agent

## Metabolism
By the liver

### Primary emergency Indications
- Induction of anaesthesia with GCS ≥ 13
  - Airway burns
  - Non trauma
- Sedation during mechanical ventilation
- Intracranial haemorrhage with hypertension

### Contraindications
- Allergy to Propofol or component parts (egg, soybean or glycerol)
- Sedation or anaesthesia in children < 3 years
- Hypotension BP < 100mmHg

### Precautions
Since Propofol may cause hypotension, care must be taken to avoid hypovolaemia

### Route of administration
Intravenous

### Side effects
- Hypotension
- Respiratory depression
- Bradycardia

### Special notes
Since Propofol has no analgesic properties, a Morphine or Fentanyl infusion may be required in addition to Propofol infusion for post operative and trauma patients
Intravenous effects (bolus):
  - Onset: 1 minutes
  - Peak: 2 minutes
  - Duration: 5 minutes
Vecuronium

- 4 mg powder
- 10 mg powder

**Primary Emergency Indication**

1. Muscle relaxant for maintaining endotracheal intubation

**Adult doses:**
- 0.1 mg/kg

**Contraindications**

1. Allergy to atracurium or cisatracurium
2. Asthma
3. Significant cardiovascular disease

**Precautions**

1. Renal impairment (prolongs paralysis)
2. Hepatic (prolongs paralysis)
3. Myasthenia gravis (prolongs paralysis)
4. Neuromuscular diseases e.g. dystrophia myotonica, history of polio (unpredictable effect)
5. Severe obesity (unpredictable effect)
6. Burns (may require increase dose and shortened duration of action)
7. Acidosis, dehydration, debilitation, electrolyte imbalance (enhance effects)
8. Hypothermia (increases intensity and/or duration of action)

**Side Effects**

- Anaphylaxis

**Infusions**

- 5 – 15 mg/hr following bolus
Notes

- Trade name: Norcuron
- Metabolism: Renal / Liver
- Route: IV
- Onset: 2 minutes
- Duration: 30 minutes
- During air transport, the use of muscle relaxants is considered the safest approach to maintaining endotracheal intubation. In most cases the initial bolus will maintain relaxation for the duration of the flight. However, particular care should be taken to ensure adequate muscle relaxant during the unloading procedure. At the first sign of any return of movement a repeat bolus must be administered.
Withholding and/or Ceasing Resuscitation

Special Notes

- A Refusal of Treatment Certificate may be completed by:
  - A person aged 18 years or older
  - An agent where a person aged 18 years or older has completed an Enduring Power of Attorney (Medical Treatment); or by
  - A guardian appointed by the Civil and Administrative Tribunal (VCAT)

- A Refusal of Treatment Certificate may be sighted by the attending ambulance crew, or they may accept in good faith the advice of those present at the scene. If there is any doubt about the application of a certificate the default position of resuscitation should be adopted

- A Refusal of Treatment Certificate may only be completed in relation to a current condition. When ceasing or withholding resuscitative efforts in these circumstances the attending Ambulance or MICA Paramedic needs to be satisfied that the patient's cardiac arrest is most likely due to this current condition

- Ambulance crews must clearly record full details of the information given to them and the basis for their decision regarding resuscitation on the Patient Care Record (PCR). This is particularly important in circumstances where a copy of the Refusal of Treatment Certificate has not been sighted as it will serve if necessary as evidence of their good faith

- Under the Medical Treatment Act 1988 a person acting under the direction of a registered Medical Practitioner who, in good faith and in reliance on a Refusal of Treatment Certificate, refuses to perform or continue medical treatment is not guilty of professional misconduct or guilty of an offence or liable in any civil proceedings because of the failure to perform or continue that treatment.

Circumstances Where Resuscitation Efforts May Be Withheld

- Likely risk to Paramedic health and safety
- Clear evidence of prolonged cardiac arrest (e.g. rigor mortis, decomposition, post mortem lividity)
- Injuries incompatible with life (e.g. decapitation)
- Inadequate resources to deal with all patients (e.g. multi casualty incidents)
- Death declared by a Medical Officer who is, or has been, at the scene
- An adult (18 years or older), where a Refusal of Treatment Certificate has been completed for a current condition which most likely caused the cardiac arrest
- A child (< 18 years old), where a Court Order is provided to the attending Ambulance crews indicating that Cardiopulmonary Resuscitation (CPR) is not to be commenced
- An adult patient (18 years or older) whose initial cardiac rhythm is asystole (over a minimum 30 second period), provided the time interval between the onset of cardiac arrest i.e. collapse, and arrival of the crew at the patient has exceeded 10 minutes and there are no compelling reasons to continue, such as suspected hypothermia, suspected drug overdose, a child (< 18 years) or family/bystander requests continued efforts

Circumstances Where Resuscitation Efforts May Be Ceased

- An adult patient (18 years or older) who, after 30 minutes of Advanced Life Support resuscitation (including advanced airway management), defibrillation and/or Adrenaline) has no return of spontaneous circulation, is not in VF or VT, has no other signs of life present such as gasps or pupil
reaction and hypothermia or drug overdose are not suspected

- During Air Ambulance transport when cardiac arrest occurs in the setting of severe injury and a quickly reversible cause for the cardiac arrest has been excluded (i.e. pneumothorax, cardiac arrhythmia) and it is not practical to continue chest compressions to hospital
Flowchart

**Status**
- Patient with potential haemodynamic instability

**Assess**
- The blood pressure of a patient with potential haemodynamic instability is most reliably monitored during air transport with an electronic transducer connected to an intra-arterial cannula
- Provided there is a palpable radial pulse and time permits, an arterial line may be inserted by a MICA Flight Paramedic in any of the following conditions:
  - Secondary transfer of haemodynamically unstable patients
  - Primary attendance at haemodynamically unstable patients where the transport time is likely protracted or where NIBP is unreliable

**Action**
- Up to two attempts at insertion are allowed at one radial artery site only
- A 20G or 22G IV cannula or a proprietary kit with guide-wire may be used
- An injection of **1-2mL of Lignocaine 1% S/C** may be required at the cannulation site in an awake patient