## Drug Therapy Protocols: Adrenaline (epinephrine)

**Policy code**  
DTP_ADR_0119

**Date**  
January, 2019

**Purpose**  
To ensure a consistent procedural approach to adrenaline (epinephrine) administration.

**Scope**  
Applies to Queensland Ambulance Service (QAS) clinical staff.

**Health care setting**  
Pre-hospital assessment and treatment.

**Population**  
Applies to all ages unless stated otherwise.

**Source of funding**  
Internal – 100%

**Author**  
Clinical Quality & Patient Safety Unit, QAS

**Review date**  
January, 2022

**Information security**  

**URL**  

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**Adrenaline (epinephrine)**

**Drug class**
Sympathomimetic

**Pharmacology**
Adrenaline (epinephrine) is a naturally occurring catecholamine which primarily acts on Alpha (α) and Beta (β) adrenergic receptors. The actions of these receptors cause an increase in heart rate (β1), increase in the force of myocardial contraction (β1), increase in the irritability of the ventricles (β1), bronchodilation (β2) and peripheral vasoconstriction (α1).[1–3]

**Metabolism**
The majority of circulating adrenaline (epinephrine) is metabolised by sympathetic nerve endings. It is subject to the process of mitochondrial enzymatic breakdown by monoamine oxidase at the synaptic level.

**Indications**
- **Anaphylaxis** OR severe allergic reaction
- **Severe life-threatening bronchospasm** OR **silent chest** (patients must only be able to speak in single words AND/OR have haemodynamic compromise AND/OR an ALOC)
- **Bradycardia with poor perfusion** unresponsive to atropine AND/OR transcutaneous pacing
- **Cardiac arrest**
- **Croup** (with stridor at rest)
- **Shock unresponsive to adequate fluid resuscitation** (excluding haemorrhagic, obstructive and anaphylactic)

**Contraindications**
- Nil

**Precautions**
- Hypertension
- Hypovolaemic shock
- Concurrent MAOI therapy

**Side effects**
- Anxiety
- Hypertension
- Palpitations/tachyarrhythmias
- Pupil dilation
- Tremor

**Presentation**
- Ampoule, 1 mg/1 mL (1:1,000) adrenaline (epinephrine)
- Ampoule, 1 mg/10 mL (1:10,000) adrenaline (epinephrine)
- Prefilled syringe EpiPen® Auto-injector, 300 mcg adrenaline (epinephrine)
Onset | Duration | Half-life
---|---|---
30 seconds (IV) 60 seconds (IM) | 5–10 minutes | 2 minutes

**Special notes**
- Ambulance officers must only administer medications for the listed indications and dosing range. Any consideration for treatment outside the listed scope of practice requires mandatory approval via the QAS Clinical Consult and Advice Line.
- 1:1,000 (1 mg/mL) adrenaline (epinephrine) presentation should be used for all nebuliser administration.
- 1:10,000 (100 microg/1 mL) or a 1:100,000 (10 microg/1 mL) adrenaline (epinephrine) preparation should be used for all low dose IM/IV injections. Ensure all syringes are appropriately labelled.
- If possible, all time critical adrenaline (epinephrine) IM injections should be administered in the vastus lateralis (improved absorption).
- Suitably qualified officers should, where possible, administer adrenaline infusions through an appropriately placed central venous line.
- Suitably qualified officers should, where possible, utilise invasive pressure monitoring for patients being administered adrenaline (epinephrine) infusions.
- Adrenaline (epinephrine) infusions must be administered through a dedicated line.
- Patients on adrenaline (epinephrine) infusions without continuous IBP monitoring must have their NIBP measured regularly (every 5 mins at a minimum).
- All cannulae with adrenaline (epinephrine) infusions should be as proximal as possible, be freely flowing, and be watched closely for extravasation.
- NIBP cuffs are only to be placed on limbs without infusion as not to obstruct the flow.
- All cannulae and IV lines must be flushed thoroughly with sodium chloride 0.9% following each medication administration.
## Adult dosages

### Anaphylaxis OR severe allergic reaction

<table>
<thead>
<tr>
<th>Route</th>
<th>Dosage</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IM</strong></td>
<td>EpiPen® Auto-injector (300 microg)</td>
<td>Single dose only.</td>
</tr>
<tr>
<td><strong>IM</strong></td>
<td>500 microg (300 microg if known pregnancy)</td>
<td>Repeated at 5 minute intervals. No maximum dose.</td>
</tr>
<tr>
<td><strong>IV</strong></td>
<td>Commence infusion at 6 microg/minute (1 drop/second) and increase by 6 microg/minute (1 drop/second) every 3–5 minutes – titrate accordingly to indication and patient’s physiological response to treatment. May be administered for refractory anaphylaxis (unresponsive to 3 x 500 microg (300 microg if known pregnancy) adrenaline (epinephrine) IM and adequate fluid resuscitation). <strong>Infusion preparation:</strong> Inject 1 mg of 1:1000 adrenaline (epinephrine) in 500 mL of sodium chloride 0.9% to achieve a final concentration of 2 microg/mL Ensure bag is appropriately labelled. Administer infusion via a SmartSite® add-on burette set (with ball valve drip chamber) through a dedicated IV cannula.</td>
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</tbody>
</table>

### Severe life-threatening bronchospasm OR silent chest

<table>
<thead>
<tr>
<th>Route</th>
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<tr>
<td><strong>IM</strong></td>
<td>500 microg (300 microg if known pregnancy)</td>
<td>Repeated at 5 minute intervals. No maximum dose.</td>
</tr>
</tbody>
</table>

## Adrenaline (epinephrine)

### Management of severe anaphylaxis

- **Adult dosages**
  - **IM**
    - EpiPen® Auto-injector (300 microg)
      - Single dose only.
    - 500 microg (300 microg if known pregnancy)
      - Repeated at 5 minute intervals.
      - No maximum dose.
  - **IV**
    - Commence infusion at 6 microg/minute (1 drop/second) and increase by 6 microg/minute (1 drop/second) every 3–5 minutes – titrate accordingly to indication and patient’s physiological response to treatment.
  - **IO**
    - Commence infusion at 6 microg/minute (1 drop/second) and increase by 6 microg/minute (1 drop/second) every 3–5 minutes – titrate accordingly to indication and patient’s physiological response to treatment.

### Severe life-threatening bronchospasm OR silent chest

- **Adult dosages**
  - **IM**
    - 500 microg (300 microg if known pregnancy)
      - Repeated at 5 minute intervals.
      - No maximum dose.
  - **IV**
    - Commence infusion at 6 microg/minute (1 drop/second) and increase by 6 microg/minute (1 drop/second) every 3–5 minutes – titrate accordingly to indication and patient’s physiological response to treatment.

### Infusion preparation

**Infusion preparation:** Inject 1 mg of 1:1000 adrenaline (epinephrine) in 500 mL of sodium chloride 0.9% to achieve a final concentration of 2 microg/mL Ensure bag is appropriately labelled. Administer infusion via a SmartSite® add-on burette set (with ball valve drip chamber) through a dedicated IV cannula.
## Adult dosages (cont.)

### Severe life-threatening bronchospasm OR silent chest

- **IO** Commence infusion at 6 microg/minute (1 drop/second) and increase by 6 microg/minute (1 drop/second) every 3–5 minutes – titrate accordingly to indication and patient’s physiological response to treatment. May be administered for severe life-threatening bronchospasm or silent chest (unresponsive to 3 x 500 microg if known pregnancy) adrenaline (epinephrine) IM.

  **Infusion preparation:** Inject 1 mg of 1:1000 adrenaline (epinephrine) in 500 mL of sodium chloride 0.9% to achieve a final concentration of 2 microg/mL. Ensure bag is appropriately labelled. Administer infusion via a SmartSite® add-on burette set (with ball valve drip chamber) through a dedicated IV cannula.

### Bradycardia with poor perfusion

- **IV** 20–50 microg
  
  Repeated at 1 minute intervals. **No maximum dose.**

- **IO** 20–50 microg
  
  Repeated at 1 minute intervals. **No maximum dose.**

### Cardiac arrest

- **ACP**
  
  **IV** 1 mg
  
  Repeated at 3–5 minute intervals. **No maximum dose.**

- **IO** 1 mg
  
  Repeated at 3–5 minute intervals. **No maximum dose.**

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## Shock unresponsive to adequate fluid resuscitation

(excluding haemorrhagic, obstructive and anaphylactic)

- **IV** Commence infusion at 6 microg/minute (1 drop/second) and increase by 6 microg/minute (1 drop/second) every 3–5 minutes – titrate accordingly to indication and patient’s physiological response to treatment.

  **Infusion preparation:** Inject 1 mg of 1:1000 adrenaline (epinephrine) in 500 mL of sodium chloride 0.9% to achieve a final concentration of 2 microg/mL. Ensure bag is appropriately labelled. Administer infusion via a SmartSite® add-on burette set (with ball valve drip chamber) through a dedicated IV cannula.

- **IO** Commence infusion at 6 microg/minute (1 drop/second) and increase by 6 microg/minute (1 drop/second) every 3–5 minutes – titrate accordingly to indication and patient’s physiological response to treatment.

  **Infusion preparation:** Inject 1 mg of 1:1000 adrenaline (epinephrine) in 500 mL of sodium chloride 0.9% to achieve a final concentration of 2 microg/mL. Ensure bag is appropriately labelled. Administer infusion via a SmartSite® add-on burette set (with ball valve drip chamber) through a dedicated IV cannula.

- **ACP**
  
  **IV** Commence infusion at 6 microg/minute (6 mL/hour) and increase by 6 microg/minute (6 mL/hour) every 3–5 minutes as determined by MAP.

  **Infusion preparation:** Mix 3 mg of 1:1000 adrenaline (3 mL) with 47 mL of sodium chloride 0.9% in a 50 mL syringe to achieve a final concentration of 60 microg/mL. Ensure all syringes are appropriately labelled. Administer via syringe driver.
### Paediatric dosages

#### Anaphylaxis or severe allergic reaction

| IM | ≥ 6 years – EpiPen® Auto-injector (300 microg) Single dose only.  
| IM | 1–5 years – EpiPen® Jr Auto-injector (150 microg) Single dose only.  

| ≥ 6 years – 300 microg  
Repeated at 5 minute intervals.  
No maximum dose.  
| 1 – < 6 years – 150 microg  
Repeated at 5 minute intervals.  
No maximum dose.  
| 6 months – 1 year – 100 microg  
Repeated at 5 minute intervals.  
No maximum dose.  
| < 6 months – 50 microg  
Repeated at 5 minute intervals.  
No maximum dose.  

| IV | QAS Clinical Consultation and Advice Line consultation and approval required in all situations.  
| IO | QAS Clinical Consultation and Advice Line consultation and approval required in all situations.  

#### Severe life-threatening bronchospasm or silent chest

(patients must only be able to speak in single words AND/OR have haemodynamic compromise AND/OR an ALOC)

| IM | ≥ 6 years – 300 microg  
Repeated at 5 minute intervals.  
No maximum dose.  
| 1 – < 6 years – 150 microg  
Repeated at 5 minute intervals.  
No maximum dose.  
| 6 months – 1 year – 100 microg  
Repeated at 5 minute intervals.  
No maximum dose.  
| < 6 months – 50 microg  
Repeated at 5 minute intervals.  
No maximum dose.  

### Paediatric dosages (cont.)

| IM | QAS Clinical Consultation and Advice Line consultation and approval required in all situations.  
| IV | QAS Clinical Consultation and Advice Line consultation and approval required in all situations.  

*May be administered for upper airway obstruction thought to be allergic in origin – IM adrenaline (epinephrine) must also be administered.*
Adrenaline (epinephrine)

### Paediatric dosages (cont.)

<table>
<thead>
<tr>
<th>Cardiac arrest</th>
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| **IV** | ≥ 10 kg (≥ 1 year) – 10 microg/kg  
Repeated at 3 – 5 minute intervals.  
No maximum dose. |
| **< 10 kg (< 1 year) – 100 microg**  
Repeated at 3 – 5 minute intervals.  
No maximum dose. |

| **IO** | ≥ 10 kg (≥ 1 year) – 10 microg/kg  
Repeated at 3 – 5 minute intervals.  
No maximum dose. |
| **< 10 kg (< 1 year) – 100 microg**  
Repeated at 3 – 5 minute intervals.  
No maximum dose. |

<table>
<thead>
<tr>
<th>Croup (with stridor at rest)</th>
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| **NEB** | 5 mg  
Single dose only. |

| **Shock unresponsive to adequate fluid resuscitation**  
(excluding haemorrhagic, obstructive and anaphylactic) |
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<td><strong>IV</strong></td>
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| **IO** | QAS Clinical Consultation and Advice Line consultation and approval required in all situations. |

| Bradycardia with poor perfusion  
unresponsive to atropine AND/OR transcutaneous pacing |
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| **IO** | QAS Clinical Consultation and Advice Line consultation and approval required in all situations. |