# ADRENALINE

## BOLUS DOSE IV

**1:10,000 ADRENALINE**

- MiniJet (1 mg / 10 ml)

Add 1 ml to 9 ml Normal Saline = 100 mcg adrenaline in 10 ml

Use 5 - 10 mcg (0.5 - 1 ml) boluses titrate to effect

## ADRENALINE INFUSION

**1:1000 ADRENALINE**

- vial (1 mg / ml)

Add 3 mg (3 vials 1:1000) to 50 mls N Saline (60 mcg/ml)

Run at 2 - 20 ml / hr aim MAP > 70

### PAEDIATRIC ARREST

- IV: 0.01 mg/kg (10mcg/kg)
- 1/10,000 - 0.1 ml/kg IV ie. 10kg - 1ml
- ETT - 1/1000 - 0.1ml/kg

### ADULT ARREST

Non-shockable- 1mg immediately

Shockable - 1mg after 2nd shock then after every second loop

# ANAPHYLAXIS

**Use IM adrenaline in advance of IV dosing**

**ADRENALINE 1:1000 (1 mg/ml)**

- 0.01 mg/kg to a maximum of 0.3-0.5 mg IM
  - [i.e. 0.01 ml/kg of 1:1000 adrenaline]

Can repeat 5 minutes if not better or worse

<table>
<thead>
<tr>
<th>AGE</th>
<th>DOSE ADRENALINE</th>
<th>VOLUME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>500 micrograms IM</td>
<td>0.5 ml</td>
</tr>
<tr>
<td>&gt;12 yrs</td>
<td>500 micrograms IM</td>
<td>0.5 ml</td>
</tr>
<tr>
<td>6-12 yrs</td>
<td>300 micrograms IM</td>
<td>0.3 ml</td>
</tr>
<tr>
<td>&lt; 6 yrs</td>
<td>150 micrograms IM</td>
<td>0.15 ml</td>
</tr>
</tbody>
</table>

Don’t forget to give normal saline 10-20ml/kg boluses for persistent hypotension.

Salbutamol nebulisers may help with ongoing bronchospasm.

Patients on beta-blockers who do not respond to adrenaline may benefit from glucagon IV (20 to 30 mcg/ kg up to a maximum of 1 mg).

IV adrenaline may be given if there is no resolution despite multiple doses of IM adrenaline — experts vary in their recommendations of how to give this. APLS guidelines suggest 0.1-5.0 micrograms/kg/min.

**If resistant, I prefer this simple approach:**

1. grab 1 mg of adrenaline 1:10,000 from the resus trolley
2. inject into 1000 ml bag of normal saline
3. start infusion at 1 ml/min, which is 1 microgram/ min (this would be 0.1 micrograms/kg/min for a 10 kg child)
4. increase rate until resolution of severe anaphylaxis
5. DON’T FORGET TO TURN OFF

# ISOPRENALINE

**Syringe Driver**

**Isoprenaline 1 mg / 50 ml (20 mcg / ml)**

Use Isoprenaline hydrochloride 1 mg in 5 ml ampoules

Dilute 1 mg (5 ml) up to 50 ml with 5% Dextrose

Give 20 µg (1ml), repeated according to clinical response, followed by an infusion at 1-4 µg/min (3-12 ml/hr)

<table>
<thead>
<tr>
<th>DOSE RANGE</th>
<th>RATE OF INFUSION (Syringe Driver)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 mcg / min</td>
<td>3 ml / hr</td>
</tr>
<tr>
<td>2 mcg / min</td>
<td>6 ml / hr</td>
</tr>
<tr>
<td>4 mcg / min</td>
<td>12 ml / hr</td>
</tr>
</tbody>
</table>

1. Side effects include palpitations, headache, flushing of the skin, angina, nausea, vomiting, tremor, dizziness, weakness and sweating.

2. If heart rate exceeds 80 or patient develops chest pain or other arrhythmias decrease dose or temporarily discontinue infusion.

3. Administer with caution in the elderly, diabetic, hyperthyroid, patients with ischaemic heart disease or concurrently with other inotropes.

4. Administer via a central line or into a large peripheral venous line (extreme caution peripherally because of the risk of vasoconstriction, ischaemic pain and local necrosis).
### GTN INFUSION

#### Indications
1. Ischaemic chest pain or unstable angina not adequately relieved by oral, sublingual or transdermal nitrates,
2. Acute left ventricular failure,
3. Acute hypertension.

#### Syringe Driver
**GTN 50 mg / 50 ml (1000 mcg/ml)**
- Use GTN 50 mg in 10 ml ampoule
- Dilute 50 mg (10 ml) up to 50 ml with 5% Dextrose
- Commence at 25 - 50 mcg/min (1.5 - 3.0 ml/hr)
- Increase by 1 ml/hr every 5-10 mins according to clinical response

<table>
<thead>
<tr>
<th>DOSE RANGE</th>
<th>RATE OF INFUSION (Syringe Driver)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 mcg/min</td>
<td>3 ml/hr</td>
</tr>
<tr>
<td>100 mcg/min</td>
<td>6 ml/hr</td>
</tr>
<tr>
<td>150 mcg/min</td>
<td>9 ml/hr</td>
</tr>
<tr>
<td>200 mcg/min</td>
<td>12 ml/hr</td>
</tr>
</tbody>
</table>

#### Precautions and Side Effects
1. Up to 80% of active agent may be absorbed by PVC giving sets or IV fluid bags. Absorption increases with increased concentration and increased exposure time to the plastic. Plastic syringes and minimum volume tubing reduce absorption but the dose may still need to be gradually increased. Use clinical response rather than calculated dose to get a dose that is appropriate for the patient.
2. Headache is common. Other CNS effects can include restlessness, dizziness, apprehension, vomiting. CVS side effects include hypotension, reflex tachycardia, palpitations and circulatory collapse.
3. Usual starting dose is 50 μg/min but some patients, particularly those with low blood pressure or pulmonary oedema, may require a lower starting dose.
4. Monitor blood pressure at least 15 minutely until stable.
   Once a blood pressure response is noted increments should be made more cautiously. Titrate rate against patient's tolerance and therapeutic response rather than a precise dose. Cease infusion if the systolic blood pressure falls below 95 mmHg.
5. Avoid skin contact with concentrated solution when preparing infusion.
## MgSO4 Infusion

**Infusion for prevention of eclampsia**

### Syringe Driver - Magnesium 9.88g (40 mmol) / 20 ml (0.5 g/ml)

For Pre-Eclampsia, use 4 ampoules of Magnesium Sulphate (2.47 g [10 mmol] per 5 ml ampoule)

Use 4 ampoules (9.88 g) of Magnesium Sulphate undiluted (20 ml)

Give a loading dose of approx. 4 g (8 ml) over 20 min

Follow the loading dose with an infusion of 1 g/hr (2 ml/hr)

If further seizures occur, give 2 g (4 ml) over 5 minutes (48 ml/hr for 5 minutes)

<table>
<thead>
<tr>
<th>DOSE RANGE</th>
<th>RATE OF INFUSION (Syringe Driver)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loading Dose</td>
<td>4 g (8 ml) 24 ml / hr for 20 mins only</td>
</tr>
<tr>
<td>Maintenance</td>
<td>1 g / hr 2 ml / hr</td>
</tr>
<tr>
<td>If further seizures</td>
<td>2 g (4 ml) 48 ml / hr for 5 mins only</td>
</tr>
</tbody>
</table>

### Dose Range

#### 50 ml syringe

- **Loading Dose**: 4 g (8 ml) 24 ml / hr for 20 mins only
- **Maintenance**: 1 g / hr 2 ml / hr
- **If further seizures**: 2 g (4 ml) 48 ml / hr for 5 mins only

### Precautions and Side Effects

1. **Urine output** should be maintained at > 30 ml/hr.
   
   Caution with fluid administration should be exercised to avoid fluid overload.

2. Magnesium toxicity is suggested by:
   
   - The **disappearance of the patella reflex** (*check hourly*). Disappearance of the patella reflex mandates cessation of the infusion.
   
   Serum magnesium should be measured if possible.
   
   - Respiratory depression (<12/min),
     
     Respiratory rate should ideally be maintained at >16/min and the infusion should be definitely be ceased if the rate drops below 12/min.
     
     - Bradycardia (HR < 60/min) may result from complete heart block.

### Treatment of Mg overdose

- Cease infusion.
  
  - Intravenous administration of 5-10 mEq of 10% Calcium Gluconate (10 - 20 ml) to reverse respiratory depression or heart block.

SEE OVER FOR PRECAUTIONS

SEE OVER FOR DOSING
PRE-RSI CHECKLIST
(can do this whilst pre-oxygenating)

SET UP
Monitoring - BP, ECG, SpO2, ETCO2 CHECK
Nasal Cannulae at 15l/min PLUS Mask O2 CHECK
Pre-oxygenation for FOUR minutes CHECK
Suction checked working & available CHECK
Position optimised CHECK
Ramping needed? CHECK

IV & DRUGS
IV Cannula connected to fluid & running CHECK
NIBP on contralateral arm and BP seen CHECK
Spare cannula in situ CHECK
INDUCTION AGENT drawn up, dose correct CHECK
SUX or ROC drawn up, dose correct CHECK
VASOPRESSORS drawn up, labelled CHECK
POST INTUBATION drugs ready & labelled CHECK

INTUBATION EQUIPMENT
BVM connected to oxygen CHECK
PEEP valve for BMV available CHECK
Guedel airways & two NPO airways ready CHECK
Laryngoscope blade chosen, light working CHECK
ET tube size chosen, cuff tested CHECK
Alternate tube size chosen & cuff tested CHECK
Syringe for cuff inflation CHECK
Stylet & Bougie available CHECK
Gooseneck, filter, inline ETCO2 (or EasyCap) CHECK
Tube Tie available CHECK
Ventilator settings determined CHECK

TEAM BRIEF
In-line immobilisation person briefed CHECK
Cricoid pressure person briefed CHECK
Drug giver briefed CHECK
Difficult airway plans A/B/C/D discussed CHECK
Post RSI brief & ongoing anaesthesia ready CHECK
Anaesthetic assistant ready CHECK

DIFFICULT AIRWAY KIT READY TO USE CHECK

[ see overleaf for Plans A-B-C-D ]
PRE-RSI CHECKLIST
(can do this whilst pre-oxygenating)

SET UP
- Monitoring - BP, ECG, SpO2, ETCO2  
  - Nasal Cannulae at 15l/min PLUS Mask 02  
  - Pre-oxygenation for FOUR minutes  
  - Suction checked working & available  
  - Position optimised  
  - Ramping needed?  

IV & DRUGS
- IV Cannula connected to fluid & running  
- NIBP on contralateral arm and BP seen  
- Spare cannula in situ  
- INDUCTION AGENT drawn up, dose correct  
- SUX or ROC drawn up, dose correct  
- VASOPRESSORS drawn up, labelled  
- POST INTUBATION drugs ready & labelled  

INTUBATION EQUIPMENT
- BVM connected to oxygen  
- PEEP valve for BMV available  
- Guedel airways & two NPO airways ready  
- Laryngoscope blade chosen, light working  
- ET tube size chosen, cuff tested  
- Alternate tube size chosen & cuff tested  
- Syringe for cuff inflation  
- Stylet & Bougie available  
- Gooseneck, filter, inline ETCO2 (or EasyCap)  
- Tube Tie available  
- Ventilator settings determined  

TEAM BRIEF
- In-line immobilisation person briefed  
- Cricoid pressure person briefed  
- Drug giver briefed  
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- Post RSI brief & ongoing anaesthesia ready  
- Anaesthetic assistant ready  

DIFFICULT AIRWAY KIT READY TO USE  

[ see overleaf for Plans A-B-C-D ]

PREPARE TEAM & EQUIPMENT

RSI dump kit and checklist  
RSI drugs in ED fridge  
Airway trolley in Theatre  

DIRECT LARYNGOSCOPY

PLAN A
Initial Intubation Strategy

PLAN B
Alternative Intubation Strategy

PLAN C
Maintenance of Oxygenation & Ventilation

PLAN D
Rescue techniques  
“Can’t Intubate Can’t Ventilate”

SURGICAL AIRWAY

BMV or LMA
Classic or Supreme LMA  
or Intubating LMA (AirQ II)

KING VISION VL

PRE-RSI CHECKLIST
(can do this whilst pre-oxygenating)

SET UP
- Monitoring - BP, ECG, SpO2, ETCO2  
- Nasal Cannulae at 15l/min PLUS Mask 02  
- Pre-oxygenation for FOUR minutes  
- Suction checked working & available  
- Position optimised  
- Ramping needed?  

IV & DRUGS
- IV Cannula connected to fluid & running  
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- INDUCTION AGENT drawn up, dose correct  
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- POST INTUBATION drugs ready & labelled  

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- BVM connected to oxygen  
- PEEP valve for BMV available  
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DIFFICULT AIRWAY KIT READY TO USE  

[ see overleaf for Plans A-B-C-D ]
### RICHMOND AGITATION SEDATION SCALE

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMBATIVE</td>
<td>overtly combative, violent, immediate danger to self/others</td>
<td>+4</td>
</tr>
<tr>
<td>VERY AGITATED</td>
<td>pulls or removes tube(s), catheter(s), aggressive</td>
<td>+3</td>
</tr>
<tr>
<td>AGITATED</td>
<td>frequent non-purposeful movement, fights ventilator</td>
<td>+2</td>
</tr>
<tr>
<td>RESTLESS</td>
<td>anxious but movements not aggressive or vigorous</td>
<td>+1</td>
</tr>
<tr>
<td>ALERT &amp; CALM</td>
<td>You, the epitome of cool</td>
<td>0</td>
</tr>
<tr>
<td>DROWSY</td>
<td>Not fully alert, but sustained awakening to voice (eyes open &gt; 10s)</td>
<td>-1</td>
</tr>
<tr>
<td>LIGHT SEDATION</td>
<td>briefly awakens with eye contact to voice &lt; 10s</td>
<td>-2</td>
</tr>
<tr>
<td>MODERATE SEDATION</td>
<td>movement or eye opening to voice but no eye contact</td>
<td>-3</td>
</tr>
<tr>
<td>DEEP SEDATION</td>
<td>no response to voice, but movement or eye opening to physical stimulation</td>
<td>-4</td>
</tr>
<tr>
<td>UNROUSABLE</td>
<td>no response to voice or physical stimulation</td>
<td>-5</td>
</tr>
</tbody>
</table>

### CONSIDER

<table>
<thead>
<tr>
<th>MENTAL HEALTH SAFETY/RISK</th>
<th>LOW</th>
<th>MEDIUM</th>
<th>HIGH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>thin, fit, fasted</td>
<td>ASA II - III</td>
<td>old, sick, difficult airway OSA etc</td>
</tr>
<tr>
<td>LOW</td>
<td>flat, depressed, no Hx violence, “happy” drunk, thought disordered but compliant</td>
<td>low risk re assures mild anxiolytic</td>
<td>restraint monotherapy longer acting agents 1:1 nursing</td>
</tr>
<tr>
<td>MEDIUM</td>
<td>intoxicated / disinhibited unpredictable delusional with poor insight anxious +++</td>
<td>sedation needed single agent antipsychotic (+/- benzo)</td>
<td>as above heavier sedation airway adjuncts to hand</td>
</tr>
<tr>
<td>HIGH</td>
<td>violence / weapons physical threats persecutory delusions around care “big guy” whom you cannot restrain</td>
<td>as above then ketamine sedation or RSI/ETT</td>
<td>as orange but delay until fasted</td>
</tr>
</tbody>
</table>

### ANAESTHETIC RISK

<table>
<thead>
<tr>
<th>NO IV ACCESS</th>
<th>IV access obtained</th>
</tr>
</thead>
<tbody>
<tr>
<td>oral olanzapine 10-20mg stat and/or IMI midazolam 5-10mg and/or IMI ketamine 4mg/kg</td>
<td>IV midazolam 2-5mg and/or IV haloperidol 5-10mg and/or IV ketamine 1-1.5mg/kg</td>
</tr>
</tbody>
</table>

### RAPID ASSESSMENT

Airway - Breathing - Circulation
Disability, Drugs?
Environment ECG
Full Bladder?
Glucose?
Head Injury?

No IV ACCESS

<table>
<thead>
<tr>
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<td>IV midazolam 2-5mg and/or IV haloperidol 5-10mg and/or IV ketamine 1-1.5mg/kg</td>
</tr>
</tbody>
</table>

repeat every 5-10 mins, target RASS 0 to -3
ISOPRENALINE

Bradycardia with poor perfusion. Most commonly for CHB

Syringe Driver
Isoprenaline 1 mg / 50 ml (20 mcg / ml)

Use Isoprenaline hydrochloride 1 mg in 5 ml ampoules
Dilute 1 mg (5 ml) up to 50 ml with 5% Dextrose
Give 20 µg (1ml), repeated according to clinical response, followed by an infusion at 1–4 µg/min (3-12 ml/hr)

<table>
<thead>
<tr>
<th>50 ml syringe</th>
<th>DOSE RANGE</th>
<th>RATE OF INFUSION (Syringe Driver)</th>
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</thead>
<tbody>
<tr>
<td>1 mcg / min</td>
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<td>12 ml / hr</td>
<td></td>
</tr>
</tbody>
</table>

See over for side effects

ISOPRENALINE

1. Side effects include palpitations, headache, flushing of the skin, angina, nausea, vomiting, tremor, dizziness, weakness and sweating.

2. If heart rate exceeds 80 or patient develops chest pain or other arrhythmias decrease dose or temporarily discontinue infusion.

3. Administer with caution in the elderly, diabetic, hyperthyroid, patients with ischaemic heart disease or concurrently with other inotropes.

4. Administer via a central line or into a large peripheral venous line (extreme caution peripherally because of the risk of vasoconstriction, ischaemic pain and local necrosis).

See over for infusion regimen
Use Morphine 15 mg/ml or Morphine 10 mg/ml and Midazolam 15 mg/3 ml.

Dilute 30 mg Morphine plus 30 mg Midazolam up to 30 ml with Normal Saline (or 50mg + 50mg made up to 50 ml with N saline)

Administer a loading dose of 2 - 10 ml

Commence infusion at 2.5 - 5 ml/hr

<table>
<thead>
<tr>
<th>30 ml Syringe</th>
<th>DOSE RANGE</th>
<th>RATE OF INFUSION - Syringe Driver</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.5 + 2.5 mg/hr</td>
<td>2.5 ml/hr</td>
</tr>
<tr>
<td></td>
<td>5.0 + 5.0 mg/hr</td>
<td>5 ml/hr</td>
</tr>
<tr>
<td></td>
<td>10 + 10 mg/hr</td>
<td>10 ml/hr</td>
</tr>
<tr>
<td></td>
<td>15 + 15 mg/hr</td>
<td>15 ml/hr</td>
</tr>
</tbody>
</table>

Precautions and Side Effects

Side effects include hypotension, CNS and respiratory depression

Special Notes

Adjust rate according to clinical response.
KETAMINE

**Ketamine Induction**
- 1-2 mg/kg IV
- 5-10 mg/kg IM

**Ketamine Sedation**
- 0.2-0.5 mg/kg IV sedation
- 2-4 mg/kg IM sedation

**Ketamine Infusion**
- 0.25 mg/kg/hour

**Ketamine/Midazolam Infusion**
- 200 mg Ketamine : 50 mcg fentanyl in 50 ml run @ 2-5 ml/hr

INTRA NASAL

**Ketamine IN Analgesia**
- 0.5 - 1.0 mg/kg

**Ketamine IN Sedation**
- up to 10 mg/kg

**USE THE MAD**
(mucosal atomisation device)
**PRE-RSI CHECKLIST**  
*(can do this whilst pre-oxygenating)*

**SET UP**
- Monitoring - BP, ECG, SpO2, ETCO2  
  
- Nasal Cannulae at 15l/min PLUS Mask O2  
  
- Pre-oxygenation for FOUR minutes  
  
- Suction checked working & available  
  
- Position optimised  
  
- Ramping needed?  

**IV & DRUGS**
- IV Cannula connected to fluid & running  
  
- NIBP on contralateral arm and BP seen  
  
- Spare cannula in situ  
  
- INDUCTION AGENT drawn up, dose correct  
  
- SUX or ROC drawn up, dose correct  
  
- VASOPRESSORS drawn up, labelled  
  
- POST INTUBATION drugs ready & labelled  

**INTUBATION EQUIPMENT**
- BVM connected to oxygen  
  
- PEEP valve for BMV available  
  
- Guedel airways & two NPO airways ready  
  
- Laryngoscope blade chosen, light working  
  
- ET tube size chosen, cuff tested  
  
- Alternate tube size chosen & cuff tested  
  
- Syringe for cuff inflation  
  
- Stylet & Bougie available  
  
- Gooseneck, filter, inline ETCO2 (or EasyCap)  
  
- Tube Tie available  
  
- Ventilator settings determined  

**TEAM BRIEF**
- In-line immobilisation person briefed  
  
- Cricoid pressure person briefed  
  
- Drug giver briefed  
  
- Difficult airway plans A/B/C/D discussed  
  
- Post RSI brief & ongoing anaesthesia ready  
  
- Anaesthetic assistant ready  

**DIFFICULT AIRWAY KIT READY TO USE**  

[ see overleaf for Plans A-B-C-D ]

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**PREPARE TEAM & EQUIPMENT**
- RSI dump kit and checklist  
  
- RSI drugs in ED fridge  
  
- Airway trolley in Theatre  

**DIRECT LARYNGOSCOPY**
- Position - Bougie - Blade  

**KING VISION VL**
- BMV or LMA  
  - Classic or Supreme LMA  
  - or Intubating LMA (AirQ II)  

**SURGICAL AIRWAY**
- Bags 1 - 3 on airway trolley