ISOPRENALINE

SCOPE (Area): FOR USE IN: Critical Care Unit, ED and Theatre
EXCLUSIONS: Paediatrics (seek Paediatrician advice) and General Wards
SCOPE (Staff): Medical, Nursing and Pharmacy

BRAND NAME
Isuprel®.

PHARMACOLOGY AND PHARMACOKINETICS
Isoprenaline is a synthetic sympathomimetic non-selective beta agonist with no alpha effects. Cardiac output is increased by the positive inotropic and chronotropic effects of isoprenaline on the heart (beta₁) and by increased venous return. This increase in cardiac output usually maintains or increases systolic blood pressure, whilst vasodilatation (beta₂) may lower diastolic blood pressure. Bronchodilation may also occur from the beta₂ effects, and isoprenaline may also inhibit antigen-induced histamine release. Isoprenaline is 50% excreted unchanged in the urine and also metabolised by catechol-o-methyl transferase (COMT) in the liver, lungs and tissues. Isoprenaline has a half-life of around 3 minutes. Sodium metabisulfite has been present in the injection as a preservative, however it has recently been removed by the manufacturer (check stock carefully as product is in changeover phase).

INDICATIONS
- Atrioventricular block (complete heart block).
- Bradycardia with haemodynamic compromise.

CONTRAINDICATIONS
- Phaeochromocytoma.
- Tachyarrhythmias.
- Tachycardia or atrioventricular block associated with digoxin toxicity.
- Hypersensitivity to isoprenaline.

PRECAUTIONS:
- Recent myocardial infarction - isoprenaline may produce an increase in myocardial workload and oxygen consumption resulting in increased infarct size. In addition, ventricular ectopic activity may increase. Avoid isoprenaline.
- Hypovolaemia - correct before using isoprenaline.
- Ventricular hyperexcitability (extrasystoles, polymorphic extrasystoles or sustained ventricular tachycardia) – if these occur during administration, reduce the dose of isoprenaline.
▪ **Excessive heart rate increase** – if isoprenaline increases the heart rate above 110 beats per minute the infusion may need decreasing or temporarily ceasing. Heart rate above 130 beats per minute may induce ventricular arrhythmia.

▪ **Hyperthyroidism** - increased risk of tachycardia and arrhythmias.

▪ **Ischaemic heart disease** – isoprenaline may exacerbate angina.

▪ **Hypertension** - isoprenaline may increase systolic blood pressure, monitor closely and decrease isoprenaline dose if necessary.

▪ **Elderly** – may require lower doses of isoprenaline.

▪ **Allergy** – older isoprenaline ampoules contain sodium metabisulfite, which can cause severe allergy in susceptible patients (asthmatics are of greatest risk) - see Pharmacology.

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**PREGNANCY AND BREASTFEEDING**

Seek specialist advice before prescribing, information may update regularly.

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**DRUG INTERACTIONS**

▪ **Drugs that increase heart rate or cause arrhythmias** – may have an additive effect with isoprenaline, monitor carefully.

▪ **Drugs that alter blood pressure** – may have an additive effect with isoprenaline (lowers diastolic blood pressure, steadies or raises systolic blood pressure).

▪ **Beta blockers** - may reduce the beta effect of isoprenaline.

▪ **Entacapone** - inhibits the metabolism of isoprenaline resulting in increased heart rate and potential for arrhythmias. Reduce isoprenaline dose and monitor carefully.

▪ **Theophylline or aminophylline (converts to theophylline in vivo)** – may increase hypokalaemia caused by isoprenaline, monitor potassium carefully. Secondly, isoprenaline may decrease the concentration of theophylline, monitor theophylline concentration and increase dose if necessary.

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**DOSAGE AND ADMINISTRATION**

Requires continuous ECG monitoring.

For administration only

- in Critical Care Unit, ED and Theatre
- by MET or Code Blue

Administer via CVC, midline or large peripheral vein. If using peripherally a second peripheral line is required to ensure continuity of the infusion. Avoid administration on lines where other infusions may be bolused.

Isoprenaline must be diluted before use.

**IV injection for emergency situations (via CVC or large peripheral vein):**

Isoprenaline 200 microgram (1 mL from ampoule) **diluted to** 10 mL with sodium chloride 0.9%.

**Total volume:** 10 mL.

**Final concentration:** 20 microgram/mL.

**Dose:** 10-20 microgram (0.5-1 mL of prepared solution).

Repeat every 3-5 minutes as needed.
IV infusion (via CVC or large peripheral vein):
Withdraw 30 mL from a 100 mL sodium chloride 0.9% minibag. Isoprenaline 6 mg (30 mL from SIX ampoules) added to remaining 70 mL sodium chloride 0.9% in the minibag.

**Total Volume:** 100 mL.
**Final concentration:** 60 microgram/mL.
**Starting rate:** 1-3 microgram/min (1-3 mL/hr).
**Rate increase:** Can increase rate every 3-5 minutes. Use heart rate and cardiac rhythm to titrate dose.
**Usual rate range:** 1-20 microgram/min (1-20 mL/hr).
**Maximum rate:** 20 microgram/min (20 mL/hr).

**Syringe Pump IV infusion (via CVC or large peripheral vein):**
**For use in ED only**
Isoprenaline 3 mg (15 mL from THREE ampoules) diluted to 50 mL with sodium chloride 0.9% in a luer lock syringe.

**Total Volume:** 50 mL.
**Final concentration:** 60 microgram/mL.
**Rate:** as for IV infusion above.

**General Administration Information**
- **Infusion preparation:**
  - Mix infusion thoroughly after adding isoprenaline to avoid inadvertently giving a more concentrated dose.
  - Discoloured solutions (pink or brown) or solutions containing precipitates should not be used.
  - Sodium chloride 0.9% can be substituted for different compatible IV fluid as requested by the Medical Officer.
  - Infusion stable for 24 hours.
- **Infusion pump:** Volumetric pump
- **Routes of administration:**
  - IV injection: Yes, diluted
  - IV intermittent infusion (15-60 minutes): Yes
  - IV continuous infusion: Yes
  - IM injection: Yes, but slower onset
  - Subcut injection: Yes, but slower onset
- **Compatible/incompatible IV drugs/fluids:**
  - Consult the Australian Injectable Drugs Handbook (‘Yellow book’) in your ward area. **Assume all unlisted drugs and IV fluids are incompatible – contact Pharmacy for further advice.**

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**MONITORING (INCLUDING BLOOD TESTS)**
- Monitor for excessive heart rate increase – see Precautions.
- Monitor electrolytes (especially potassium) at baseline and at least daily.
- Dose range and clinical goals should be documented by the Medical Officer.
- A diminished therapeutic effect may occur with prolonged isoprenaline infusions due to down-regulation of receptors.

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**NURSING PRACTICE POINTS**
- Continuous ECG monitoring – monitor for arrhythmias.
- Baseline 12 lead ECG, and then daily.
- Baseline blood pressure, heart rate and rhythm.
- When patient is unstable or infusion rate requires adjustment, monitor blood pressure, heart rate and rhythm every 2-5 minutes, or continuously via arterial line.
- When blood pressure, heart rate and rhythm stable, monitor every 30-60 minutes, or continuously via arterial line.

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**ADVERSE EFFECTS**

- **Common** – palpitations, tachycardia, hypotension, flushing, headache, nervousness, restlessness and fine tremor.
- **Infrequent** – arrhythmias, Stokes-Adams attacks, angina, hypertension, sweating, dizziness, weakness, nausea, dry mouth, insomnia, rash, itch and wheeze.
- **Rare** - allergic reaction (sodium metabisulfite in older product), skin necrosis.

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**DRUG PRESENTATIONS, LOCATION AND STORAGE**

Isoprenaline 1 mg/5 mL ampoules.

Imprint locations (at the time of guideline development): CCU, ED, Theatre, JGU and MET/Code Blue resuscitation drug pack.

Stock is currently in a changeover phase, check carefully.

Old Stock: Store at 2-8°C. Protect ampoules from light. Unopened ampoules are stable for 2 months at room temperature.

New Stock: Store below 25°C. Protect ampoules from light.