Ballarat Health Services

DRUG GUIDELINE

ISOPRENALINE

SCOPE (Area): **FOR USE IN:** Intensive Care Unit, Coronary Care Unit, ED, CVS 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 (beta$_1$) and by increased venous return. This increase in cardiac output usually maintains or increases systolic blood pressure, whilst vasodilatation (beta$_2$) may lower diastolic blood pressure. Bronchodilation may also occur from the beta$_2$ 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 2.5-5 minutes, an immediate onset of action and a 10-15 minute duration of action.

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

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

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 causing hypotension** - 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.

PREGNANCY AND BREASTFEEDING

Seek specialist advice before prescribing, information may update regularly.

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.
- **Cocaine -** topical use may potentiate isoprenaline's actions.
- **Linezolid -** can increase the hypertensive effect of isoprenaline
- **Atomoxetine –** may increase tachycardia hypertensive effects of isoprenaline.

DOSAGE AND ADMINISTRATION

Requires continuous ECG monitoring.
For administration only

- **in Intensive Care Unit, Coronary Care Unit, ED, CVS and Theatre**
- **by MET or Code Blue**

Administer via CVC, midline or large peripheral vein (antecubital or proximal to this). If administering peripherally use a dedicated line (a second peripheral line is required for other infusions/access). Avoid administration on lines where other infusions may be bolused or flushed.

Isoprenaline must be diluted before use.

Note: due to the usual low rate of infusion 100 mL minibags are no longer in this guideline.

IV injection for emergency situations (via CVC or large peripheral vein):
****not for use in Coronary Care Unit****
Use 200 microg/1 mL ampoules (if unavailable may use 1 mg/5 mL ampoule) – both are 200 microg/mL.
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.

Syringe Unit/Pump IV infusion (via CVC or large peripheral vein):

Use 1 mg/5 mL ampoules (if unavailable may use 200 microg/1 mL ampoule) – both are 200 microg/mL.

Isoprenaline 3 mg (15 mL from THREE 1 mg in 5 mL ampoules OR FIFTEEN 200 microg/mL ampoules) diluted to 50 mL with glucose 5% in a luer lock syringe.

Total Volume: 50 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 by 0.5-1 microg/min (0.5-1 mL/hr). Use heart rate and cardiac rhythm to titrate dose.

Coronary Care Unit dose range: 1-10 microgram/min (1-10 mL/hr).

Coronary Care Unit maximum rate: 10 microgram/min (10 mL/hr).

ICU, ED, Theatre and CVS usual rate range: 1-20 microgram/min (1-20 mL/hr).

ICU, ED, Theatre and CVS maximum rate: 20 microgram/min (20 mL/hr).

Process for changing syringes to minimise disruption to infusions given the short drug half-life:

- Prepare the replacement syringe and prime a new syringe line
- Attach a second syringe pump module to the controller (AKA 'the brain') and program as per the currently running infusion
- Commence new infusion on the pump and then changeover the connected line with the replacement line
- Stop completed infusion pump

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.
  Glucose 5% can be substituted for different compatible IV fluid as requested by the Medical Officer.
  Infusion stable for 24 hours.
- **Infusion pump:** Alaris® syringe unit with Guardrails® or syringe pump in ED.
- **Routes of administration:**
  IV injection: Yes, diluted
  IV intermittent infusion (15-60 minutes): No
  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.**

MONITORING (INCLUDING BLOOD TESTS)

- Monitor for excessive heart rate increase – see Precautions.
- Monitor electrolytes (especially potassium and magnesium) 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.

NURSING PRACTICE POINTS

- Continuous ECG monitoring – monitor for arrhythmias.
- Baseline 12 lead ECG, and then daily.
- 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.
- Monitor fluid balance.
- All injections and infusions are to be labelled as per CPP0022 Labelling of Injectable Medicines and Lines.

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 -** skin necrosis.

DRUG PRESENTATIONS AND STORAGE

Isoprenaline 1 mg/5 mL ampoules, 200 microg/1 mL ampoules.
Store below 25°C. Protect ampoules from light.
