Ballarat Health Services

DRUG GUIDELINE

DOBUTAMINE

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 NAMES
Dobutrex® and generic brands.

PHARMACOLOGY AND PHARMACOKINETICS
Dobutamine is a relatively selective beta-1 synthetic catecholamine with a direct positive inotropic effect on the heart leading to increased cardiac output. There is a mild effect on beta-2 or alpha-1 receptors, and no effect on dopamine receptors. Dobutamine usually exerts minimal chronotropic or vasodilatory effects at low doses (less than10 microgram/kg/min). A small rise in blood pressure secondary to increased cardiac output may be seen, or hypotension may occur secondary to vasodilatation. The increase in cardiac output caused by dobutamine may increase renal blood flow, however there is no direct effect on the kidney. Dobutamine has a rapid onset of action (1-2 minutes), with the peak effect occurring within ten minutes of continuous infusion. Dobutamine is metabolised by catechol-o-methyl transferase (COMT) in the liver and tissues. Elimination is fast when the infusion is ceased due to the short half-life of two minutes. Sodium metabisulfite is present in most brands of dobutamine (except Dobutrex®) as a preservative.

INDICATIONS
- Inotropic support in acute heart failure and cardiogenic shock.

CONTRAINDICATIONS
- **Phaeochromocytoma** - dopamine may release catecholamines into the circulation resulting in acute hypertension.
- **Ventricular arrhythmias.**
- **Rapid atrial fibrillation/flutter.**
- **Hypersensitivity to dobutamine.**
- **Idiopathic hypertrophic subaortic stenosis.**

PRECAUTIONS

- **Hypovolaemia with hypotension** - correct before using dobutamine.
- **Non-rapid atrial fibrillation/flutter -** risk of rapid ventricular response as dobutamine facilitates atrioventricular conduction.
- **Excessive increase in heart rate or blood pressure** – up to 10% of patients treated with dobutamine may develop an exaggerated response (increase of over 30 beats/min of heart rate or 50 mm Hg systolic blood pressure). This is more likely to occur in patients with pre-existing hypertension, and will rapidly respond to a decrease in the rate of dobutamine. Untreated post myocardial infarction, this exaggerated response may increase the size of the infarction by increasing myocardial oxygen demand.
- **Hypertrophic obstructive cardiomyopathy (HOCM) and/or severe aortic stenosis and/or risk of systolic anterior motion of the mitral valve and/or dynamic left ventricular outflow tract obstruction.**
- **Ventricular ectopics** – dobutamine may precipitate or exacerbate.
- **Allergy –** dobutamine vials (except Dobutrex®) contain sodium metabisulfite, which can cause severe allergy in susceptible patients (asthmatics are of greatest risk).

PREGNANCY AND BREASTFEEDING

Seek specialist advice before prescribing, information may update regularly.

DRUG INTERACTIONS

- **Drugs which increase blood pressure or heart rate, or cause arrhythmias or vasodilatation** – may have an additive effect with dobutamine, use cautiously.
- **Beta blockers –** may reduce the effect of dobutamine.
- **Entacapone** – can decrease the metabolism of dobutamine leading to an increased effect, monitor carefully**.**
- **Linezolid -** can increase the hypertensive effect of dobutamine, start with lower dose.
- **Entacapone** – may inhibit the metabolism of dobutamine. Monitor carefully and reduce dobutamine dose if necessary.
- **Cocaine -** topical use may potentiate dobutamine's actions.
- **Atomoxetine –** may increase tachycardia and pressor effects of dobutamine. Avoid if possible.
- **Calcium intravenous –** by unknown mechanism may reduce effectiveness of dobutamine.

DOSAGE AND ADMINISTRATION

Requires continuous ECG monitoring.
For administration only

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

Administer via CVC only. A large peripheral vein (antecubital or proximal to this) or midline may be used in an emergency where central access is planned, or short term to avoid insertion of a CVC. If administering peripherally use a dedicated line (a second peripheral line is required for other infusions/access), and the site requires monitoring for extravasation. Do not administer on lines where other infusions may be bolused or flushed.

Dobutamine must be diluted prior to use.

Vial reconstitution:

Two types of vials are available – dry powder 250 mg and 250 mg/20 mL solution. Only the dry powder requires reconstitution prior to infusion preparation. Either can be used to prepare infusions. Add 20 mL of water for injection OR glucose 5% to each dobutamine 250 mg dry powder vial required. Do not use sodium chloride 0.9%.

IV infusion (via CVC):

Withdraw 57 mL from a 100 mL glucose 5% minibag.
Dobutamine 500 mg (40 mL from TWO reconstituted vials) added to remaining 43 mL glucose 5% in the minibag.
Total Volume: 83 mL.
Final concentration: 6 mg/mL (approximately 6000 microgram/mL).
Starting rate: 2.5-5 microgram/kg*/min.
Rate increase: gradually by 2.5 microgram/kg*/min.
Usual rate range: 2.5-20 microgram/kg*/min.
Use blood pressure and cardiac output to titrate dose where appropriate.
Maximum rate: 20 microgram/kg*/min.
Ceasing infusion: Wean slowly with clinical assessment.
*Use ideal bodyweight. Calculate using https://amhonline.amh.net.au.acs.hcn.com.au/calculators/adultidealweight.

Syringe Unit/Pump IV infusion (via CVC):

Dobutamine 250 mg (20 mL from ONE reconstituted vial) diluted to 42 mL with glucose 5% in a luer lock syringe.
Total Volume: 42 mL.
Final concentration: 6 mg/mL (approximately 6000 microgram/mL).
Rate: as for IV infusion above.

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

Rate table for dobutamine 6 mg/mL (6000 microgram/mL) IV infusion usual range:

Note 100 microg/min = 1 mL/hr. Rates are rounded as per Guardrails LVP calculations (note: syringe unit may vary by 0.1-0.2 mL/hr as it rounds slightly differently allowing for 2 decimals and the slight concentration difference).

Weight*	2. 5 microgram/kg/min		5 microgram/kg/min		10 microgram/kg/min		15 microgram/kg/min		20 microgram/kg/min	
	microg/min	mL/hr	microg/min	mL/hr	microg/min	mL/hr	microg/min	mL/hr	microg/min	mL/hr
50 kg	125	1.2	250	2.5	500	5	750	7.5	1000	10
60 kg	150	1.5	300	3	600	6	900	9	1200	12
70 kg	175	1.7	350	3.5	700	7	1050	10.5	1400	14
80 kg	200	2	400	4	800	8	1200	12	1600	16
90 kg	225	2.2	450	4.5	900	9	1350	13.5	1800	18
100 kg	250	2.5	500	5	1000	10	1500	15	2000	20

*Use ideal bodyweight. Calculate using https://amhonline.amh.net.au.acs.hcn.com.au/calculators/adultidealweight

General Administration Information

- **Infusion preparation:**
  Mix infusion thoroughly after adding dobutamine to avoid inadvertently giving a more concentrated dose.
  Glucose 5% can be substituted for different compatible IV fluid as requested by the Medical Officer.
  Dobutamine solutions may have a pink colour which increases over time as slight oxidation occurs. This does not alter potency if infusion is used within 24 hours. Solutions which are hazy or contain particulate matter are to be discarded.
  Infusion stable for 24 hours.
- **Infusion pump:** Alaris® LVP or syringe unit with Guardrails® or syringe pump in ED.
- **Routes of administration:**
  IV injection: No
  IV intermittent infusion (15-60 minutes): No
  IV continuous infusion: Yes
  IM injection: No
  Subcut injection: No
- **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 electrolytes (especially potassium and magnesium) at baseline and at least daily.
- Monitor lactate at baseline and as clinically indicated.
- Dose range and clinical goals should be documented by the Medical Officer.
- Consider invasive cardiac output monitoring.
- A diminished therapeutic effect may occur with prolonged dobutamine infusions due to down-regulation of receptors.

NURSING PRACTICE POINTS

- Continuous ECG monitoring during infusion.
- Baseline 12 lead ECG, and then daily**.**
- With unstable patients or when increasing the infusion continuously- monitor heart rate, rhythm and blood pressure (preferably by arterial line).
- Document and report any dysrhythmias or haemodynamic effects.
- At the start of the infusion, monitor vital signs (including oxygen saturation) half hourly for 2 hours.
- When blood pressure stable, monitor vital signs 2 hourly for 4 hours, and then 2-4 hourly.
- Monitor arterial blood gases as intrapulmonary shunting may occur.
- Monitor central venous pressure if CVC is in situ.
- Monitor urine output and fluid balance.
- All injections and infusions are to be labelled as per CPP0022 Labelling of Injectable Medicines and Lines.

ADVERSE EFFECTS

- **Common -** tachycardia, excessive increase in BP, ventricular ectopic activity.
- **Infrequent -** nausea, headache, angina, palpitations, ventricular tachycardia or fibrillation, hypotension, shortness of breath, rash, fever, eosinophilia, bronchospasm, mild hypokalaemia,

urinary urgency, thrombocytopenia, hyperglycaemia, lactic acidaemia, phlebitis and local inflammatory changes following extravasation.

- **Rare -** allergic reaction (sodium metabisulfite in most products), tissue ischaemia or necrosis due to vasoconstriction.

DRUG PRESENTATIONS AND STORAGE

Dobutamine 250 mg (powder) vials and dobutamine 250 mg/20 mL vials.
Store below 25°C. Protect ampoules from light.
