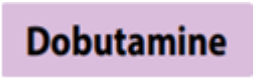
Dobutamine - Fixed concentration

Newborn use only

2023

Alert	Dobutamine fixed concentration preparation is designed to be used in emergencies to manage the delay in the preparation of in-house solution. It is recommended to change over to in-house inotrope preparations as and when the situation permits. It is recommended to infuse the drug using syringe drivers with administration increments at 2 decimal points if available. In conditions with low systemic vascular resistance (SVR) (e.g., septic shock) dobutamine is not the appropriate first drug of choice
Indication	Inotrope to increase cardiac output in neonates with myocardial dysfunction and unchanged or increased systemic vascular resistance.
Action	Catecholamine with beta-1 and beta-2 receptor actions which increases myocardial contractility, heart rate and conduction velocity and decreases SVR 1. Dose dependent effects: • Low dose, 2.5 microgram/kg/min – no significant hemodynamic effects in neonates with cardiovascular compromise • Moderate dose, 5–7.5 microgram/kg/min – increases cardiac output • Higher dose, 5–20 microgram/kg/min – increases cardiac output and blood pressure in hypotensive preterm infants An additional effect of dobutamine on increasing cardiac output has been demonstrated in hypotensive preterm infants receiving dopamine
Drug type	Inotropic agent
Trade name	Dobutamine 1 mg/mL (50mg in 50mL Glucose 5%)
Presentation	50 mg in 50 mL (1000 microgram/mL) premade syringe. Identify the correct inotrope syringe by cross checking the label on the **clear coloured** overpouch: 
Dose	**5–20 microgram/kg/minute** ***NOTE:** The time from the initiation of infusion to the entry of the drug into blood stream may influence the time it takes to see the clinical effect. This lag time can be reduced by (a) starting temporarily at a higher dose by increasing the infusion rate, and/or (b) priming the line as close to the entry point as possible to reduce the dead space – however, care should be taken not to deliver excess volume that may result in tachycardia and hypertension. **Prescriber to:** 1. order the dose in microgram/kg/minute, and 2. calculate in mL/hr using the formula: **mL/hr = dose required (microgram/kg/min) x patient's weight (kg) x 0.06** **Example:** A baby weighing 0.8 kg needing 10 microgram/kg/minute will need the 1000microgram/mL fixed concentration solution infusing at: mL/hr = 10 x 0.8 x 0.06 = 0.48 mL/hr.
Dose adjustment	Therapeutic hypothermia – No specific information. ECMO – No specific information. Titrate the dose to clinical response. Renal impairment – No dose adjustment is required. Hepatic impairment – No dose adjustment is required.
Maximum dose	Use of up to 20 microgram/kg/min reported in neonates.
Total cumulative dose	
Route	Continuous IV infusion
Preparation	Ready to use syringe - No preparation is required.
Administration	Continuous IV infusion preferably via a central line. Do not flush line or suddenly stop infusion.

Monitoring	Continuous heart rate, ECG and blood pressure monitoring preferable. Assess urine output and peripheral perfusion frequently.
Contraindications	Contraindicated in patients with idiopathic hypertrophic sub aortic stenosis and previous hypersensitivity to dobutamine.
Precautions	May cause hypotension therefore ensure adequate circulating blood volume prior to commencement.
Drug interactions	No evidence of drug interactions demonstrated in clinical studies. Exert caution when co-administering with drugs which can cause hypertension or tachycardia.
Adverse reactions	The positive inotropic and chronotropic effects of dobutamine may cause hypertension, tachyarrhythmias, myocardial ischaemia and ventricular fibrillation. Hypotension may result from vasodilation. May cause hypokalaemia. Phlebitis has been reported
Compatibility	**Fluids by Y-site:** Glucose 5%, glucose 10%, glucose 5% in sodium chloride solutions 0.9%, glucose 5% in sodium chloride 0.45%, glucose 5% in lactated Ringers, Lactated Ringer's, sodium chloride 0.9%, sodium chloride 0.45%, amino acid solutions **Y-site:** Adrenaline hydrochloride, Alfentanil HCL, alprostadil, amifostine, amikacin, anidulafungin, ascorbic acid, atenolol, atracurium, atropine sulfate, azithromycin, aztreonam, bivalirudin (dobutamine concentrations up to 4 mg/mL), calcium gluconate, calcium chloride, caspofungin, ciprofloxacin, cisatracurium, clindamycin phosphate, clonidine, cyclophosphamide, cyclosporin, daptomycin, dexmedetomidine, digoxin, diltiazem, dopamine HCL, doripenem, doxycycline, enalaprilat, ephedrine sulfate, epinephrine HCL, eptifibatide, epoietin alfa, erythromycin lactobionate, esmolol, fentanyl citrate, fluconazole, Fosfomycin sodium, gentamicin sulfate, glyceryl trinitrate, granisetron, hydromorphone hydrochloride, insulin aspart, ketamine, labetalol, levofloxacin, lidocaine, linezolid, lorazepam, magnesium sulfate, metaraminol bitartrate, methadone hydrochloride, methylprednisolone sodium succinate, metoprolol tartrate, metronidazole, milrinone, mycophenolate, mofetil hydrochloride, morphine sulfate, naloxone, nitroglycerin, noradrenaline, octreotide, ondansetron hydrochloride, pamidronate, pancuronium, papaverine, pentoxifyilline, phenylephrine HCL, potassium acetate, potassium chloride, propranolol, protamine, pyridoxine, ranitidine, remifentanil, rocuronium bromide, sodium acetate, streptokinase, succinylcholine chloride, tacrolimus, thiamine, tigecycline, tirofiban, tobramycin, urokinase, valproate sodium, vancomycin HCL, vasopressin, vecuronium, verapamil hydrochloride, voriconazole, zidovudine.
Incompatibility	**Fluids by Y-site:** Alkaline solutions, diluents that contain sodium bisulfite and ethanol. **Y-site:** Aciclovir, alteplase, aminophylline, ampicillin, amphotericin B, amphotericin B liposome, amphotericin B lipid complex, azathioprine, benzylpenicillin, cefazolin, cefotaxime, cefoxitin, ceftriaxone, cefuroxime, chloramphenicol, cloxacillin, dexamethasone sodium phosphate, diazepam, diazoxide, ertapenem, esomeprazole, , folic acid, foscarnet, fosphenytoin sodium, ganciclovir, hydrocortisone sodium succinate, ibuprofen lysine, indometacin, ketorolac, meropenem, micafungin, oxacillin, pantoprazole, penicillin G potassium, penicillin G sodium, pentobarbital sodium, phenobarbital sodium, phenytoin, piperacillin, piperacillin-tazobactam (EDTA-free), potassium chloride, sodium bicarbonate, sulfamethoxazole/trimethoprim, thiopental, ticarcillin-clavulanate, warfarin **Caution/variable:** Amiodarone, cefepime hydrochloride, ceftazidime, furosemide, heparin sodium, imipenem, regular insulin, midazolam, propofol, sodium nitroprusside.
Stability	Dobutamine 1mg/mL (50mg in 50mL Glucose 5%) is stable for 90 days in the refrigerator (2-8°C) and 48 hours at room temperature. (Refer to practice points)
Storage	Store in refrigerator (2-8°C).
Excipients	Glucose 5%.
Special comments	

Dobutamine 1000 microgram/mL fixed concentration solution

Dose microgram/kg/min		5	10	15	20
		Rate mL/hour			
weight (Kg)	0.5	0.15	0.3	0.45	0.6
	1	0.3	0.6	0.9	1.2
	1.5	0.45	0.9	1.35	1.8

	2	0.6	1.2	1.8	2.4
	2.5	0.75	1.5	2.25	3
	3	0.9	1.8	2.7	3.6
	3.5	1.05	2.1	3.15	4.2
	4	1.2	2.4	3.6	4.8

Evidence

Efficacy

Treatment of hypotension in preterm infants

Dobutamine is less effective than dopamine at increasing blood pressure in hypotensive infants but this may not change the clinical outcome. A single study[2] reported left ventricular output increased with dobutamine compared to a decrease with dopamine (LOE I, GOR C).[3]

Treatment of low systemic blood flow

Dobutamine increased superior vena cava (SVC) flow with little change in blood pressure, whereas dopamine increased blood pressure with little change in SVC flow. There was no difference in clinical outcome (LOE II, GOR C).[4-6]

Summary: Dobutamine is recommended to increase cardiac output in neonates with myocardial dysfunction and unchanged or increased systemic vascular resistance (SVR). In conditions with low SVR (e.g., septic shock) dobutamine is not the appropriate first drug of choice.[1]

Safety

No evidence of an effect on the incidence of adverse neuroradiological sequelae (severe periventricular haemorrhage and/or periventricular leukomalacia), or on the incidence of tachycardia. There is insufficient data confirming long term benefit and safety of dobutamine.[3] Common side effects reported were ventricular arrhythmias, tachycardia, hypotension and chest pain (children) (LOE III-2, GOR B).[7]

Pharmacokinetics

Dobutamine concentrations are positively correlated with infusion dosages. Range of values vary widely between patients despite similar doses.[7] Short half-life around 2 minutes.[8]

Practice points

Fixed concentration preparations are designed to be used in emergencies to manage the delay in the preparation of in-house solution. As per the drug infusion policy in New South Wales, solution needs to be changed every 24 hours. It is recommended to change over to in-house inotrope preparations as and when the situation permits.

References

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