1. Purpose and scope

To facilitate the safe and effective use of dopamine in the Neonatal Intensive Care Unit (NICU)

2. Drug

Drug	**Dopamine**
Drug action	Dopamine is a catecholamine which exhibits alpha adrenergic, beta adrenergic and dopaminergic agonism. The mechanism in neonates is controversial. Relative effects of dopamine at different doses are uncertain because of developmental differences in endogenous noradrenaline stores, alpha and beta adrenergic and dopamine receptor functions and the ability of the neonatal heart to increase stroke volume. Responses tend to be individualised. Dopamine is metabolised rapidly. Serum half-life is 2 to 5 minutes but clearance is quite variable. 97% is excretes in the urine as metabolites. No information is available on protein binding.[1,2]
Indications	• Hypotension due to impaired cardiac output • To improve splanchnic and renal blood flow[3]
Description	Dopamine hydrochloride; clear colourless solution containing dopamine 200mg/5mL (40mg/mL) ampoules. pH 2.5-4.5 (contains 1% sodium metabisulfite)[3]
Route	Continuous infusion[1] preferable via a central line however peripheral access via a large vein is acceptable during resuscitation[4] (up to 5mcg/kg/min). Administration via the UAC is not recommended[4].
Dose	**2-20mcg/kg/min** by continuous IV infusion [1,4] Usual starting dose of 2.5mcg/kg/min. Begin at a low dose and titrate by monitoring effects[1] Note: Maximum recommended dose is 20mcg/kg/min (however doses of up to 50mcg/kg/min have been used)[4]
Contraindications	• Hypersensitivity to sympathomimetic amines and sulphites • Uncorrected tachyarrhythmias or ventricular fibrillation[3,4]
Precautions	• Hypovolaemia – correct before commencing dopamine • Hyperthyroidism • Caution if administration concurrent with phenytoin as may lower blood pressure[3]
Compatibilities & Incompatibilities	• Compatible with sodium chloride 0.9%, glucose 5% and glucose10%[3,4] • Compatible at Y injection site with dobutamine, morphine, heparin and PGE11 and insulin (providing dopamine concentration does not exceed 3.2mg/mL and insulin (Actrapid) concentration does not exceed 1unit/mL). • Incompatible with acyclovir, indomethacin, insulin (at high concentrations – see above), frusemide and phenytoin[1] • Incompatible with sodium bicarbonate or any other alkaline soluitions[3,4] • No information is available on concurrent use of IVN therefore avoiding co-infusion if possible is recommended. Dopamine and TPN have however been used together in this NICU for many years without incident and is considered a safe practice based on clinical experience.

Adverse effects	• Venous irritation and soft tissue injury at the site of IV infection[4] • Tachycardia, hypotension, vasoconstriction, vomiting[3] and increased pulmonary artery pressure[1] • Less common – bradycardia and hypotension[3] • Infusions > 20mcg/kg/min are associated with an increased risk of dysrhythmias[4]

3. Administration

Competency for administration	This procedure is carried out by, or under, the direct supervision of a registered nurse/ registered midwife who holds generic IV certification **and** Neonatal specific certifications NCV/NAC and NIC2.
Preparation & Administration	**Dilution:** as per 'NICU Drugs' computer software available on all desktops in the NICU. If this resource is unavailable, dilute as per the default dilution below: Dilute 30mg/kg dopamine up to **20mL** with compatible fluid and mix well. **Infusion rate:** 0.1mL/hr = 2.5micrograms/kg/min **Concentration:** should not usually exceed 3.2mg/mL[1,4], however stronger concentrations have been used via a central line if the patient is fluid restricted. **NOTE**: Filter through a PALL (0.2 micron) filter prior to administration Do **NOT** flush line Change fluid and tubing every 24 hours or earlier if discolouration Administer via Guardrails profiled syringe driver
Observations and management	• Continuous blood pressure and cardiorespiratory monitoring • Document vital signs hourly and as required • Monitor for adverse effects and/or possible allergic reaction • Observe IV site for signs of extravasation • Monitor urine output • Do NOT flush line
Special considerations	• Tissue sloughing may occur with IV infiltration. To prevent sloughing and necrosis in areas of extravasation, the area should be infiltrated as soon as possible with a saline solution containing phentolamine mesylate. Inject a 0.5mg/mL solution of phentolamine into the affected area. The usual amount needed is 1 to 5 mL depending on the size of the infiltrate.[1,8]
Storage	• Store at room temperature (<30°C). Protect from light[3] • Diluted solutions are stable for 24 hours at room temperature[1,5] • Coloured solutions (pink, yellow or brown) indicate decomposition of dopamine and should not be used.[5,6]

4. Guardrails Information[7]

Guardrails Drug Name Dopamine
Pump CC

	0.4-1kg	1-2kg	2-3kg	3-5kg
Concentration (mg/mL)				
Minimum	0.6	1	2	3
Maximum	3	6	9	15
Administration Rate (mcg/kg/min)				
Soft minimum	0.5	0.5	0.5	0.5
Default	2.5	2.5	2.5	2.5
Soft maximum	20	20	20	20
Hard maximum	50	50	50	50

5. References

1. Micromedex® 1.0 (Healthcare Series), (electronic version). Paediatrics and Neofax - Dopamine. Truven Health Analytics, Greenwood Village, Colorado, USA. Last accessed 22 April 2015. Available from : http://www.micromedexsolutions.com/
2. Auckland NICU Drug Protocols – Dopamine, November 2011. Available from: http://www.adhb.govt.nz/newborn/DrugProtocols/Default.htm Last accessed 22 April 2015.
3. The New Zealand Medicines and Medical Devices Safety Authority (Medsafe): Dopamine Hydrochloride Injection, Data sheet -New Zealand. Last accessed 8 April 2015. Available from http://www.medsafe.govt.nz/profs/datasheet/SearchResult.asp
4. Phelps SJ, Hak EB, Crill CM, editors. Teddy Bear Book: Pediatric Injectable Drugs. 9th Edition. Dopamine. Bethesda, MD: American Society of Health-System Pharmacists; 2010.
5. New Zealand Hospital Pharmacists Association: Notes on Injectable Drugs, 6th Edition, Dopamine. Published 2010, Wellington NZ.
6. The Royal Children's Hospital Melbourne: Paediatric Injectable Guidelines 4th Edition, Dopamine. Published July 2011, Melbourne Australia.
7. Guardrails Data Sheets, Waikato Hospital, Hamilton, NZ April 2015.
8. Lippincott procedures accessed via Waikato DHB Intranet. http://procedures.lww.com/lnp/view.do?pId=729158&hits=phentolamine&a=false&ad=false . Last accessed 22 July 2015.