DIGOXIN (LANOXIN®)

DESCRIPTION AND INDICATION FOR USE

Digoxin belongs to the class of medications known as cardiac glycosides. Digoxin produces a **positive inotropic** action on the heart resulting in an increased force of myocardial contraction and a **negative chronotropic** action which decreases atrioventricular (AV) nodal conduction, predominantly by its vagotonic effect on the heart which slows the heart rate. Digoxin can also increase the excitability of cardiac muscle, particularly at higher doses, to produce antiarrhythmic effects.

Digibind® (digoxin specific immune antigen binding fragments) is available for the treatment of life-threatening overdoses of digoxin.

DOSE

Use only after discussion with NETS and/or a paediatric cardiologist

Loading Dose:

(*Total of 3 doses* – ONLY REQUIRED FOR THE MANAGEMENT OF ARRHYTHMIAS, otherwise start with maintenance dose)

IV:	CA < 37 weeks	10 microgram/kg stat, then 5 microgram/kg/dose 8 hourly x 2 doses
	CA ≥ 37 weeks	10 microgram/kg stat, then 10 microgram/kg/dose 8 hourly x 2 doses

Maintenance Dose:

IV: 3 – 5 microgram/kg/dose 12 hourly

Dosage may require adjustment in the case of renal impairment

Dosage MUST always be prescribed in MICROGRAM

RECONSTITUTION/DILUTION

Ampoule = 50 microgram/2 mL (25 microgram/mL)
CAUTION: An ADULT strength ampoule of digoxin is also available = 500 microgram/2 mL. Always double check the strength of the ampoule before administration

IV:
1. Withdraw 1 mL of 25 microgram/mL digoxin from ampoule
2. Add to 4 mL of water for injection, or other compatible fluid in a 5 mL syringe **(concentration = 5 microgram/mL)**
4. Discard excess volume to obtain required dose OR withdraw required dose into another syringe

Not for IM or SC use (very irritant)

ROUTE AND METHOD OF ADMINISTRATION

IV: Give slowly over at least 5 minutes

Syringe should not be flushed after administration as inadvertent overdose may occur

COMPATIBILITY INFORMATION

Please contact your ward pharmacist for information on drugs or fluids not appearing in the table below. Medications that are not routinely used in the Special Care Nursery have not been included in this table and may be incompatible.

	Compatible	Incompatible
Fluids	Dextrose 5%, Sodium chloride 0.9%	
Drugs	Aminophylline, Flucloxacillin, Frusemide	Dobutamine

SIDE EFFECTS

- Side effects are principally associated with signs of overdose, including: vomiting, salivation, diarrhea, drowsiness, bradycardia and arrhythmias

SPECIAL PRECAUTIONS

- Very low birth weight and premature infants, response to digoxin is variable, dose may need to be reduced and individualised according to the infant's degree of maturity
- Electrolyte disturbances, especially hypokalaemia as this may predispose to digoxin toxicity
- Hypothyroidism, may be more sensitive and require decreased dose of digoxin
- Hyperthyroidism, may be less sensitive and require increased dose of digoxin
- Ischaemic heart disease, acute myocarditis, severe pulmonary disease, increased sensitivity of the myocardium to the effects of digoxin and increased risk of arrhythmias
- Impaired renal function, increased risk of digoxin toxicity, dose reduction may be required

CONTRAINDICATIONS

- Signs of toxicity
- Ventricular dysrhythmias
- Complete heart block or second degree atrioventricular block

DRUG INTERACTIONS

Always consider the possibility of an interaction whenever concomitant therapy with digoxin is considered. Close monitoring of serum digoxin levels is recommended if any doubt exists regarding a medication related interaction.

Serum levels of digoxin may be increased by concomitant administration with the following medications: *amiodarone*, captopril, spironolactone, erythromycin, gentamicin, trimethoprim, indomethacin*.

* It is recommended to use **half** the normal digoxin dose if co-administering with amiodarone

Serum levels of digoxin may be reduced by concomitant administration with the following medications: *antacids, adrenaline, rifampicin, phenytoin.*

Medications that deplete potassium can predispose digoxin toxicity, therefore careful monitoring of serum potassium is required. For example:
hydrochlorothiazide, frusemide, amphotericin B, corticosteroids, insulin, sodium bicarbonate, glucagon, large doses of dextrose and dextrose-insulin infusions.

Medications that increase potassium can predispose arrhythmias and/or heart block, therefore careful monitoring of serum potassium is required. For example:
ACE inhibitors (captoril), spironolactone, indomethacin, high doses of potassium containing penicillins (Timentin, Augmentin), potassium supplements, suxamethonium.

NURSING RESPONSIBILITIES

- Observations/Monitoring:
  - Cardiorespiratory monitor must be on at all times to monitor response to therapy
  - Observe infant for signs of toxicity eg: vomiting, diarrhea, drowsiness, bradycardia, arrhythmias
  - Serum electrolytes should be monitored
  - Take apical pulse for one fill minute prior to giving digoxin, noting rate, rhythm and quality. Withhold digoxin if change apparent and notify medical officer immediately (especially if heart rate < 90-110 beats/minute)
- Protect from light during storage
- Therapeutic drug monitoring:

	Start Monitoring*	**Samples Required**		**Repeat Monitoring***	**Therapeutic Range**	
		Trough	**Peak**		**Trough**	**Peak**
Digoxin	Day 7	✔ (sample at least **6 hours after** the dose)	Not required	Weekly	Optimal: 1-2.5 nanomol/L	N/A

* Assuming normal renal function and no signs of toxicity. Neonates with renal dysfunction and signs of toxicity require closer monitoring – consider serum level monitoring every 3 -5 days.