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INTRAVENOUS FLUIDS

1. All sites, solutions, additives and volumes are to be checked at the commencement of each nursing shift. Ensure that they correspond to the orders on the fluid chart. Check that 'Maximum Pressure' on the Alaris IVAC and Agilia pump is set at 75mmHg and the 'Volume Limit' is set at the same amount as the 'Set Rate'. Initial time and date in right hand column of fluid chart if the orders correspond.

2. Infusion Alaris IVAC and Agilia pumps are used on all IV lines. The IV site is to be checked carefully every hour. Pumps will continue to infuse solutions into the tissues when extravasation has occurred. Observe for discoloration of any kind, redness, blanching, tenderness, swelling or necrosis. Assess IV site and intervene appropriately. Document IV site condition hourly. Monitor and record pressure trends displayed hourly and document on flow chart. An increase in pressure from baseline may signify a positional IV or other obstruction to flow.

3. Labels are to be used when drugs are added to the IV solution or burettes. All medicines and fluids removed from their original packaging must be identifiable to ensure that POWH and SH/SEH comply with NSW Health PD 2012_007 in regards to labelling of injectable medicines, fluids and lines.

   All containers (eg. bags/bottles, syringes, basins, jugs) containing injectable medicines must be labelled using the state standard pre-printed labels which are colour coded to indicate the route of administration.

   All lines and catheters for administering injectable medicines must be labelled using the state standard pre-printed labels which are colour coded to indicate the route of administration.

   All burettes containing injectable medicines must be labelled using the state standard pre-printed labels which are colour coded to indicate the route of administration.

   Never allow the burette to become empty. Fill in the label correctly and ensure that it is signed by the two people checking the drug. Do not cover any writing on the IV bag when affixing label. Medications can be administered through an IV line. Check the protocol for the administration of each drug.

4. Take care of IV sites as resiting can be difficult and traumatic for the neonate. This can be done by
   a. not lying neonate on IV site
   b. ensuring the IV site is well secured and protected yet allows room to observe site
   c. ensuring all connections are secure, no tension is placed on the tubing and no kinking is present
   d. IV site should be exposed at all times
   e. the fingers and toes are always to be exposed for observation

5. Change the whole giving set when an IV solution needs to be changed. This ensures that the neonate can receive the correct fluids immediately.

6. All fluids and lines should be changed every two days except individual TPN and continuous medication infusion. Refer to NCC guidelines.

7. Observe all OHS and Infection Control principles.

REVISED 14.August 2012
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GUIDELINES FOR INTRAVENOUS THERAPY

1. IV SET-UP
   a. intravenous fluid as ordered
   b. in-line burette
   c. Alaris Ivac or Agilia administration set
   d. Alaris Ivac or Agilia pump

2. CONTAMINATION
   Always check solution before attaching to giving set. Observe for discolouration or foreign particles. Discard contaminated bags.

3. COMMENCING IV THERAPY
   All IV fluids are to be checked before administration with another Registered Nurse. Check the order for-
   a. patient's name
   b. Medical Record Number
   c. correct IV fluid strength and expiry date
   d. correct IV rate
   e. signature of medical officer
   f. order written clearly and legibly
   g. neonate's identification

4. CHANGE OF GIVING SET
   a. After 48 hours if fluids not changed for other reasons
   b. When IV fluid orders are changed to ensure the neonate receives the new fluids promptly
   c. If giving set becomes contaminated

5. ADDITIVE
   a. Check IV fluid protocol.
   b. All additives to be checked with another Registered Nurse.
   c. Only inject into burette or full, unopened bag.
   e. Prepare injection site by use of alcohol swab.
   f. Add solution.
   g. Rotate bag or burette to mix the additive.
   h. Attach label to bag or burette and line.
   i. Do not place label over writing on bag.
   j. Do not add more than one drug to a bag unless specifically ordered by a medical officer. Check compatibility first.

6. BOLUS INJECTION
   a. Refer to IV drug protocol.
   b. Prepare injection site by use of alcohol swab.
   c. Give according to drug protocol.
   d. Stop if any sign or symptom of adverse effect - painful injection site, change of skin colour or leaking of cannula.
   e. Admit errors immediately - there may be an antidote.
   f. Notify the medical officer and prepare a medication incident report.

7. INCOMPATIBILITY MAY BE CAUSED BY
   a. Physical reaction: drugs when mixed may precipitate.
   b. Chemical reaction: two or more drugs when combined together may form a new compound which may be toxic.
   c. Biological inactivation: one drug may inactivate the action of another.
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ADMINISTRATION OF INTRAVENOUS MEDICATION BY NURSING STAFF

GENERAL GUIDELINES


Very few drugs are more dangerous when given IV compared with other routes of administration. The dangers of IV administration are in the following general areas

1. **Allergic reactions**  This may occur when the drugs are given by any route but are often manifested more quickly when administration is by the IV. Giving the first dose of an intravenous drug in a small amount, then administering the remainder slowly while the patient is observed may decrease the risks of morbidity.

2. **Extravasation**  The risk of extravasation can be averted by instruction in good technique of IV administration and by frequent observation of the infusion site during administration.

NURSING STAFF SHOULD ADMINISTER IV DRUGS ONLY WHEN

1. A good IV line has been established.
2. The patency of the line has been checked immediately prior to administration of the drug.
3. A clear prescription of the drug has been written and the medication chart completed by the medical officer.
4. A verbal order has been given by a medical officer in the event of medical emergency.
5. The general nature of the drug is known to the person administering it.
6. The first dose of the drug has been administered by a medical officer or the drug forms part of the list which permanent NCC nursing staff may administer.
7. Accreditation for first dose administration is completed by nursing staff member.
8. The drug and its guidelines are included in the Drug Administration Protocol.
9. The dose and frequency is appropriate for the neonate as per guidelines.

ACCREDITED NURSING STAFF IN NCC MAY ADMINISTER THE FOLLOWING FIRST DOSE IV DRUGS

1. Antibiotics and Antivirals
2. General intravenous drugs
3. Vaccines
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ADMINISTRATION OF INTRAVENOUS MEDICATION BY NURSING STAFF cont

NURSING STAFF SHOULD NOT ADMINISTER IV DRUGS IF
1. A good IV line has not been established.
2. There is any uncertainty as to the patency of the line at the time of administration.
3. The prescription is unclear or incomplete.
4. Nursing staff member is unfamiliar with the nature or effects of the drug.
5. Accreditation for first dose of drug administration has not been completed by the nursing staff member.
6. The patient's condition has changed substantially between the time the drug was prescribed and the dose is due.
7. The drug and its guidelines are not included in the Drug Administration Protocol.
8. The dose and frequency is inappropriate for the neonate as per guidelines.

As with any form of drug dispensing, if any doubt exists, check with the prescriber or another medical officer.

STANDING ORDERS IN NCC
Must be written up within 24 hours of administration.

1. Vitamin K (Konakion) 1mg IM injection
2. Cyclopentolate 2.5% one drop to each eye
3. Phenylephrine 0.5% one drop to each eye
4. Cyclomidryl one drop to each eye

RULES WHEN GIVING MEDICATIONS
1. Check the order for
   a. patient's name
   b. Medical Record Number
   c. correct drug and strength
   d. correct dose
   e. frequency to be given
   f. correct time to be given
   g. signature of Medical Officer
   h. date of signature
   i. order written clearly and legibly
   j. neonate's identification

2. Question all unusual orders.

3. Medications to be given are the responsibility of the Registered Nurse allocated primarily to each neonate, but it is also the responsibility of the team leader to ensure all medications are given.

4. All drugs are to be checked before administration with another Registered Nurse, one being a permanent NCC staff member.

5. Medications should be given as soon as possible after having been ordered.

6. Always check drugs prior to use to ensure they are
   a. correct drug
   b. correct strength
   c. within the expiry date

7. The Registered Nurse drawing up the drug should be the one to administer it.
8. Always sign the drug chart immediately after administering the drug with two signatures, time of administration, and date that the drug was given.

9. All intramuscular injections are to be given into the thigh.

10. Check dilutions carefully before reconstituting drugs.

11. Carefully and accurately work out the drug dose to be given. Use the formula

\[
\text{dose required} \times \frac{x \text{ stock volume}}{\text{stock dose}} = \text{volume to be administered}
\]

If dilution is required as per drug protocol, the drug is drawn up first and then diluent unless specified differently.

12. Medications are always measured in an appropriate size syringe to be able to measure accurately.


14. Dispose of unused portion of antibiotics into purple contaminated sharp bins.

15. Oral medications given with feeds via intra-gastric tube unless ordered otherwise. Ensure drug enters the stomach and does not stay in the intra-gastric tube to ensure absorption at the correct time. Nilstat drops are always given into the mouth after an oral feed so they can act locally.

16. Topical medications are usually applied thinly. Check for the correct use of each preparation.

17. Always report to the medical officer if medications were omitted or if an incorrect dose was given. A medication incident report must be compiled.

18. All drug orders expire after seven days. Check to see if medications need to be re-ordered on a separate drug chart.

19. Refer to MIMS or product information for more detailed information about individual drugs.
FORMULA FOR ADDING 50% DEXTROSE TO BURETTE

To make the required concentration of dextrose from a standard solution the following formula is used for a 100ml burette using 50% dextrose as the additive solution.

\[(\text{REQUIRED CONCENTRATION} - \text{STANDARD SOLUTION CONCENTRATION}) \times 2.5 = \text{ML OF 50% DEXTROSE REQUIRED}\]

Example

1. Using 0.22% sodium chloride + 3.75% dextrose to make up to 10% dextrose
   
   \[(10 - 3.75) \times 2.5 = 15.6\text{ml of 50% dextrose}\]

2. Using 10% dextrose to make up to 12% dextrose
   
   \[(12 - 10) \times 2.5 = 5\text{ml of 50% dextrose}\]

ADDITIVE LABEL TO BE COMPLETED AS SHOWN
FORMULA FOR CALCULATING INTRAVENOUS CONTINUOUS MEDICATION AMOUNT ADDED TO 50ml DILUENT

1. **Hourly medication.**  
   Morphine  
   Midazolam  
   Clonazepam  
   \[
   \text{DOSE (mcg/kg/hr) \times WEIGHT (kg) \times 50 (ml) = 1000 (mcg)}
   \]
   the amount of medication in **MILLIGRAMM** needed to add in a 50ml solution

2. **Hourly medication.**  
   Insulin  
   \[
   \text{DOSE (U/kg/hr) \times WEIGHT (kg) \times 50 (ml) =}
   \]
   the amount of medication in **UNITS** needed to add in a 50ml solution

3. **Minutely medication.**  
   Dopamine  
   Dobutamine  
   Adrenaline  
   Rocuronium  
   \[
   \text{DOSE (mcg/kg/min) \times WEIGHT (kg) \times 50 (ml) \times 60 (min) = 1000 (mcg)}
   \]
   the amount of medication in **MILLIGRAMM** needed to add in a 50ml solution

4. **Minutely medication.**  
   Alprostadil  
   \[
   \text{DOSE (nanogram/kg/min) \times WEIGHT (kg) \times 50 (ml) \times 60 (min) = 1000 (nanogram)}
   \]
   the amount of medication in **MICROGRAMM** needed to add in a 50ml solution

5. **Minutely medication**  
   **Glucose delivery rate**  
   \[
   \text{\% of dextrose \times RATE (ml/hr) = 6 \times WEIGHT(kg)}
   \]
   the amount of glucose delivered by mg/kg/minute  
   the goal is to deliver 10-12mg/kg/min glucose
USEFUL WEBSITES

www.neonatalformulary.com
ACETYLCYSTEINE (MUCOMYST)

DESCRIPTION
Acetylcysteine is an antioxidant drug, the N-acetyl derivative of the naturally-occurring amino acid, cysteine. The compound is a white crystalline powder with the molecular formula C5H9NO3S and chemical name of N-acetyl-L-cysteine.

USE
1. Liquefaction of sputum in TOF patients.
2. Mucolytic agent for patients with abnormal, viscous, or inspissated mucous secretions in such conditions as chronic and acute bronchopulmonary disease and cystic fibrosis.
3. Meconium ileus and distal intestinal obstructive syndrome

PRESENTATION
200mg/ml solution for inhalation

PHARMACOKINETICS
The viscosity of pulmonary mucous secretions depends on the concentrations of mucoprotein and, to a lesser extent, deoxyribonucleic acid (DNA). The latter increases with increasing purulence owing to the presence of cellular debris. The mucolytic action of Acetylcysteine is related to the sulfhydryl group in the molecule. This group probably "opens" disulfide linkages in mucus thereby lowering the viscosity. The mucolytic activity of Acetylcysteine is unaltered by the presence of DNA, and increases with increasing pH. Significant mucolysis occurs between pH 7 and 9. Acetylcysteine undergoes rapid deacetylation in vivo to yield cysteine or oxidation to yield diacetylcysteine.

DOSE
1. TOF 5ml/hr infusion to upper pouch of TOF
2-3. Oral 200-400mg 8 hourly

RECONSTITUTION
1. TOF Add 4ml of Acetylcysteine solution to 100ml of 0.9% sodium chloride.
2-3. Oral Add 3ml of water for injection to 1ml of Acetylcysteine solution to make a 50mg/ml solution.

ADMINISTRATION
1. TOF 5ml/hour infusion via Replogle tube to the upper pouch of TOF.
DO NOT GIVE INTRAVENOUSLY!
2-3. Oral via IG tube

MONITOR
Cardiovascular monitoring.

ADVERSE EFFECT
pulmonary hypertension, vomiting, nausea

CONTRAINDICATION
data not available

DRUG INTERACTION
N/A

SOLUTION COMPATIBILITY
0.9% sodium chloride

REFERENCE
British National Formulary 55, March 2008
NEWBORN USE ONLY  
GIVEN ON DOCTORS ORDER ONLY  

ACICLOVIR

DESCRIPTION  
Anti viral agent, active against herpes simplex virus and to less extent varicella-zoster virus. Inhibits viral DNA polymerase and viral DNA replication. Resistant herpes simplex virus to aciclovir has been reported.

USE  
Mainly for neonatal herpes simplex virus (HSV) types 1 and 2 disease.

PRESENTATION  
250mg/vial  
500mg/vial  
250mg/10ml ampule

PHARMACOKINETICS  
Distributes well throughout body tissues and fluids. Penetrates well into CSF up to 50% of serum concentration. Half-life is about 4 hours in neonates and is related to degree of kidney function and maturity. Eliminated predominantly by the kidneys. Drug will accumulate with renal impairment.

DOSE  
IV STANDARD REGIME

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<th>Route</th>
<th>Duration</th>
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<tr>
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<td>10mg/kg/dose</td>
<td>12 hrly</td>
<td>IV</td>
<td>14 days</td>
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<tr>
<td>≥34 weeks</td>
<td>10mg/kg/dose</td>
<td>8 hrly</td>
<td>IV</td>
<td>14 days</td>
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<tr>
<td>Impaired renal function</td>
<td>10mg/kg/dose</td>
<td>12 hrly</td>
<td>IV</td>
<td>14 days</td>
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IV HIGH DOSE REGIME

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<td>&gt;32 weeks</td>
<td>20mg/kg/dose</td>
<td>8 hrly</td>
<td>IV</td>
<td>21 days</td>
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Particularly more effective in disseminated and CNS HSV disease.

ORAL  
20mg/kg/dose 4-5 times a day. Absorption erratic and the bioavailability of the drug through oral route is only 15-20%. To be discussed with the consultant on call before considering oral regime as it is not recommended in neonatal period.

EYE  
Acyclovir 3% ointment for herpes simplex keratitis. Apply 5 times a day for 2 weeks or for at least 3 days after healing. Systemic absorption is poor with topical therapy.

RECONSTITUTION  
Add 5ml water for injection for 250mg or 10ml for 500mg vials to make a 50mg/ml solution. FURTHER DILUTE 1ml of reconstituted solution to 9ml of 0.9% sodium chloride to make a 5mg/ml solution.

OR  
Add 4ml of water for injection to 1ml of Aciclovir from 250mg/10ml ampoule to make a 5mg/ml solution.

NOTE  
To reduce the risk of phlebitis, maximum recommended concentration for infusion is 7mg/ml.

ADMINISTRATION  
Infusion over one hour via proximal IV bung.
ACICLOVIR  cont

DISCARD
Diluted solution is stable at room temperature for 24 hours. Do not refrigerate either reconstituted or diluted solution. Oral suspension can be stored at room temperature.

MONITOR
Blood counts and renal functions twice a week, particularly in the first few days of therapy.

ADVERSE EFFECT
IV preparation is usually tolerated well.
1. Local irritation and phlebitis at site of injection, rash.
2. Transient decrease in renal function with crystalluria, increased BUN and serum creatinine. Risk may be reduced by:
   -Slow infusion of dose.
   -Adequate hydration and urine output (>2ml/kg/hr), especially for a few hours following infusion, when urine concentrations are at their maximum.
   -Lower dose in patients with renal impairment.
3. Anaemia, neutropenia (<1000/mm³) and thrombocytopenia, with high dose regime. Treat any absolute neutropenia with Filgrastin (G-CSF).
4. Occasionally symptoms of encephalopathy eg lethargy, obtundation, tremors, agitation, seizures.
5. Less frequently vomiting, sweating, haematuria, hypotension, increased liver enzymes.

CONTRAINDICATION
CAUTION in patients with renal impairment. May require adjustment of dose/interval.

DRUG INTERACTION
1. Aminoglycosides - concurrent use can potentiate nephrotoxicity.
2. Vancomycin - as for aminoglycosides.

SOLUTION INCOMPATIBILITY
amino acid solutions

DRUG INCOMPATIBILITY
aztreonam, dobutamine, dopamine and meropenem

TERMINAL INJECTION SITE COMPATIBILITY
amikacin, ampicillin, cefazolin, cefotaxime, cefoxitin, ceftazidine, ceftriaxone, chloramphenicol, cimetidine, clindamycin, dexamethasone, erythromycin lactobionate, fluconazole, gentamicin, heparin, hydrocortisone, imipenem/cilastatin, lorazepam, metoclopramide, metronidazole, morphine, nafcillin, oxacillin, penicillin G, pentobarbital, piperacillin, potassium chloride, ranitidine, sodium bicarbonate, theophylline, ticarcillin/clavulanate, tobramycin, timethoprim-sulfamethoxazole, vancomycin and zidovudine.

REFERENCE
Goodman & Gilman’s The Pharmacologic Basis of Therapeutics. 8th Ed, 1990, P 1184-6.
Kimberlin DW et al. Safety and efficacy of high-Dose intravenous acyclovir in the management of neonatal herpes simplex virus infections.
Neonatal Formulary 5, Drug use in Pregnancy and First Year of Life, 2007, Blackwell Publishing Ltd
ADRENALINE

DESCRIPTION
Stimulates alpha and beta-receptors, thereby increasing heart rate and myocardial contractility. It increases systemic vascular resistance by constriction of arterioles, thereby increasing systolic blood pressure, but this also has the effect of decreasing renal blood flow. It relaxes bronchial smooth muscle.

USE
1. Refractory hypotension
2. Severe bradycardia and cardiac arrest
3. Anaphylactic shock
4. Bronchospasm in older neonate.

PRESENTATION
1:10,000 (1mg/10ml or 100mcg/1ml) ampoule

DOSE
BOLUS IV INJECTION FOR RESUSCITATION 0.1-0.3ml/kg/dose of 1:10,000 adrenaline (10-30mcg/kg/dose) prn.
IV INFUSION FOR HYPOTENSION 0.1mcg/kg/min and adjust to desired response to a maximum of 1mcg/kg/minute
ETT INSTILLATION 0.3-1ml/kg/dose of 1:10,000 adrenaline

ROUTE
IV injection
IV infusion
ETT instillation

ADMINISTRATION
SLOW IV BOLUS INJECTION using the proximal IV bung
CONTINUOUS INFUSION low dose to deliver 0.1mcg/kg/min at 1ml/hr - Weight(Kg) X 300mcg Adrenaline 1:10,000 = Prescribed Amount. Take the prescribed amount and make up to 50ml with 5%dextrose, 10%dextrose or 0.9%sodium chloride to give a 6mcg/kg/ml solution.
CONTINUOUS INFUSION high dose to deliver 0.2mcg/kg/min at 1ml/hr - Weight(Kg) X 600mcg Adrenaline 1:10,000 = Prescribed Amount. Take the prescribed amount and make up to 50ml with 5%dextrose, 10%dextrose or 0.9%sodium chloride to give a 12mcg/kg/ml solution.

ETT INSTILLATION DO NOT DILUTE for instillation in an emergency.

STORAGE Discard unused portion.

MONITORING Heart rate and blood pressure continuously (ie arterial line), watch urine output. Observe IV site for infiltration. Infusion rate >0.3mcg/kg/min monitor cardiac output and consider cardiac echogram.
ADRENALINE cont

ADVERSE EFFECT Cardiac arrhythmias (PVC, ventricular tachycardia), hypertension, tachycardia, increased myocardial oxygen consumption and decreased renal blood flow. Infiltration may cause tissue ischaemia and necrosis.

SOLUTION COMPATIBILITY 5%dextrose, 10%dextrose, 0.9% sodium chloride

TERMINAL INJECTION SITE COMPATIBILITY dextrose, amino acide solution, amikacin, ampicillin, calcium chloride, calcium gluconate, dobutamine, dopamine, fentanyl, frusemide, heparin, hydrocortisone, lorazepam, midazolam, morphine, nitroglycerine, pancuronium, potassium chloride, propofol, prostaglandin E1, ranitidine, vecuronium, vitamin K1.

INCOMPATABILITY aminophylline, sodium bicarbonate

REFERENCE
**ALBUMIN**

**DESCRIPTION**

<table>
<thead>
<tr>
<th>ALBUMEX 4%</th>
<th>Human albumin</th>
<th>4 g/dL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium</td>
<td>14 mmol/dL</td>
<td></td>
</tr>
<tr>
<td>Chloride</td>
<td>12.8 mmol/dL</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ALBUMEX 20%</th>
<th>Human albumin</th>
<th>20 g/dL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium</td>
<td>5-10 mmol/dL</td>
<td></td>
</tr>
</tbody>
</table>

**USE**

1. Hypotension and hypovolemia - 4% Albumin
2. Hypoalbuminemia - 20% Albumin

**PRESENTATION**

- Albumin 4%
- Albumin 20%

**DOSE**

- **HYPOTENSION**: Albumex 4% 10ml/kg/dose
- **HYPOALBUMINEMIA**: Albumex 20% 2-5ml/kg/dose

**ADMINISTRATION**

- IV infusion
  - **HYPOTENSION**: Infuse over 30 minutes.
  - **HYPOALBUMINEMIA**: Infuse over 4 hours.

**STORAGE**

Refrigerate. Discard unused portion.

**ADVERSE EFFECT**

1. Circulatory overload
2. Hypotension and rigors
3. Sodium overload

**SOLUTION COMPATIBILITY**

- 5%dextrose, 10%dextrose, 0.9%sodium chloride

**INCOMPATIBILITY**

- Cefotaxime, ceftriaxone, clindamycin, dobutamine, epinephrine, insulin, penicillin G and phenytoin.

**REFERENCE**

**ALPROSTADIL**
**(PROSTAGLANDIN E 1 OR PGE 1)**

**DESCRIPTION**
Vasodilation of all arterioles and inhibition of platelet aggregation. The smooth muscle of the ductus arteriosus is especially sensitive to its effects, responding with marked dilatation. Maximal improvement in PaO² within 30 minutes in cyanotic lesions, and several hours in acyanotic lesions. Response decreases after 96 hours of infusion.

**USE**
Maintaining the patency of Ductus Arteriosus in ductus dependent cyanotic congenital heart disease.

**PRESENTATION**
500mcg/ml ampoule (1mcg=1000nanogram)

**DOSE**
Starting dose 5–10nanogram/kg/minute. Dose can be as high as 100nanogram/kg/min, but be prepared for intubation at bigger dose and ask cardiologist before prescribing over 10nanogram/kg/min.

<table>
<thead>
<tr>
<th>Infusion strength</th>
<th>Prescribed amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1ml/hr=10 nanogram/kg/min</td>
<td>30mcg/kg Alprostadil to make a 50ml solution</td>
</tr>
</tbody>
</table>

**RECONSTITUTION**
Add 1 ampoule (500mcg) to 49ml of 5%dextrose or 0.9%sodium chloride to yield a 10mcg/ml solution. **FURTHER DILUTE** the prescribed amount of PGE1 with 5%dextrose or 0.9%sodium chloride to make a total of 50ml that make the dose of 1ml/hr=10nanogram/kg/min.

**ROUTE**
IV infusion only

**ADMINISTRATION**
Continuous IV infusion via dedicated cannula. **Ideally use a preductal IV cannula site** (right arm or scalp vein). Infusion solution stable for 24 hours only, therefore change syringe and tubing daily.

**ENSURE STEADY INFUSION RATE DELIVERY TO AVOID BOLUS ADMINISTRATION.**

**STORAGE**
Should be stored in a refrigerator. Discard unused portion.

**MONITORING**
Ensure ventilated bed is available prior to commencing infusion. Closely monitor respiratory and cardiovascular status. Assess for improvement in oxygenation. Ensure reliable IV access. Extravasation may cause tissue sloughing and necrosis. Monitor body temperature.

Blood pressure MUST be recorded hourly for 4 hours then 6 – 8 hourly with cares while drug is in use. Blood pressure MUST BE CHECKED when any change in dosage.
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

ALPROSTADIL (PROSTAGLANDIN E 1 OR PGE 1) cont

ADVERSE EFFECT

Common (6%-15%) Apnoea, fever, cutaneous flushing, and bradycardia. Gastric outlet obstruction and reversible cortical proliferation of long bones after prolonged treatment (>120 hours).

Uncommon (1%-5%) Seizures, hypoventilation, hypotension, tachycardia, cardiac arrest, edema, sepsis, diarrhea and disseminated intravascular coagulopathy.

Rare (<1%) Bronchospasm, hemorrhage, hypoglycemia and hypocalcemia.

SOLUTION COMPATABILITY 5%dextrose, 0.9%sodium chloride

TERMINAL INJECTION SITE COMPATIBILITY aminophylline, atropine, calcium chloride, cefazolin, cimetidine, clindamycin, dexamethasone, digoxin, dopamine, epinephrine, frusemid, gentamicin, heparin, hydralazine, hydrocortisone, lidocaine, metoclopramide, metronidazole, midazolam, morphine, nitroglycerine, nitroprusside, pancuronium, phenobarbital, potassium chloride, penicillin G and ranitidine.

REFERENCE
Neonatal Formulary 5, Drug use in Pregnancy and First Year of Life, 2007, Blackwell Publishing Ltd
AMIKACIN

DESCRIPTION
Aminoglycoside used in the short-term treatment of serious infections due to susceptible strains of gram-negative bacteria (E coli, proteus, klebsiella, providencia, enterobacter, pseudomonas sp, serratia, citrobacter). It must be reserved for the treatment of infections due to micro-organisms that are resistant to other aminoglycosides. Also useful as a second line (not as initial therapy) of defence for serious staphylococcal infection.

PRESENTATION
500mg/2ml vial

DOSE

<table>
<thead>
<tr>
<th>Gestational Age</th>
<th>Dose</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 32 weeks</td>
<td>15mg/kg/dose</td>
<td>36 hours</td>
</tr>
<tr>
<td>≥ 32 weeks</td>
<td>15mg/kg/dose</td>
<td>24 hours</td>
</tr>
</tbody>
</table>

ROUTE
IV infusion, IM injection

RECONSTITUTION
Add 1ml (250mg) of Amikacin to 9ml of 0.9% sodium chloride to make a 25mg/ml solution. FURTHER DILUTE 1ml (25mg) of this solution to 9ml of 0.9% sodium chloride to make 2.5mg/ml solution.

ADMINISTRATION
IV infusion over 30 minutes using the proximal IV bung

STORAGE
Discard unused portion

MONITORING
Serum level prior to third dose (trough level 4-6mg/l or 4-6mcg/ml). Assess renal function.

ADVERSE EFFECT
Potentially ototoxic and nephrotoxic, this risk being increased with impaired renal function. Diuretic treatment also enhances the aminoglycoside toxicity by altering the antibiotic concentration in the serum and tissues.

INCOMPATIBILITY
aminophylline, amphotericin, calcium gluconate, cefotaxime, diazepam, dobutamine, heparin, imipenem, penicillin, phenobarbitone, phenytoin, vancomycin.

REFERENCE
Neonatal Formulary 5, Drug use in Pregnancy and First Year of Life, 2007, Blackwell Publishing Ltd
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

AMOXYCILLIN

DESCRIPTION
Semi-synthetic penicillin. Bactericidal against sensitive organisms during
the stage of active multiplication. It acts by inhibiting cell wall synthesis.
Most of the data on neonates are extrapolated from studies of ampicillin.
Active against common neonatal pathogens such as Listeria
monocytogenes, Streptococcus agalactiae, Streptococcus faecalis and
gram negative bacilli, including non-ß-lactamase-producing
Haemophilus influenzae and Esherichia coli.

USE
The combination with gentamicin is an effective empiric treatment of
suspected neonatal sepsicaemia in the first 48 hours of life.

PHARMACOKINETICS
Stable in the presence of gastric acid. Rapidly and well absorbed from
the gut after oral administration even in the presence of food. Diffuse
rapidly into most body tissues and fluids with the exception of brain and
spinal fluid except when the meninges are inflamed. Excreted mainly via
urine. Particularly in preterm infants <32 weeks gestation, amoxycillin,
like other penicillins, is almost completely cleared by glomerular
filtration, rather than renal tubular secretion.

DOSE
SEPSIS

<table>
<thead>
<tr>
<th>Age</th>
<th>Dose</th>
<th>Interval</th>
<th>Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7 days</td>
<td>50mg/kg/dose</td>
<td>12 hrly</td>
<td>IV/IM</td>
</tr>
<tr>
<td>&gt;7 days</td>
<td>50mg/kg/dose</td>
<td>8 hrly</td>
<td>IV/IM</td>
</tr>
</tbody>
</table>

GROUP B STREPTOCOCCAL DISEASE AND MENINGITIS (Extrapolated from ampicillin)
IV up to 100mg/kg/dose repeated 12 hrly for infants 0-7 days; every 6-8
hours for infants >7 days.

PRESENTATION
IV 500mg/vial, 1g/vial
ORAL 125mg/5ml, 250mg/5ml suspension

RECONSTITUTION
4.6ml of water for injection to 500mg vial to make a 100mg/ml solution
9.2ml of water for injection to 1g vial to make a 100mg/ml solution

DISCARD
Must be used within 1 hour of mixing, discard unused portion.

ADMINISTRATION
IV Slow bolus through proximal IV bung.

ADVERSE EFFECT
(Extrapolated from ampicillin)
1. Hypersensitivity - maculopapular or urticarial rash, fever,
bronchospasm, vasculitis, eosinophilia, interstitial nephritis,
anaphylaxis.
2. Direct toxicity - vomiting, diarrhoea, thrombophlebitis, occasionally
seizures or CNS excitation with high dose.
3. Superinfection with bacteria or fungi.
NEWBORN USE ONLY
GIVEN ON DOCTOR'S ORDER ONLY

AMOXICILLIN cont

CONTRAINDICATION
1. Hypersensitivity to penicillins.
2. CAUTION in patients with history of hypersensitivity to cephalosporins.
3. CAUTION Consider increasing the dose-interval in patients with significant renal impairment.

COMPATIBLE FLUIDS 5%dextrose, 10%dextrose, 0.9%sodium chloride

SOLUTION INCOMPATIBILITY (Extrapolated from ampicillin)
- lipid emulsion, amino acid solutions

INCOMPATIBILITY (Extrapolated from ampicillin) aminoglycosides, erythromycin lactobionate, fluconazole, hydralazine, metoclopramide and midazolam.

REFERENCE
AMPICILLIN

DESCRIPTION
Semi-synthetic penicillin. Bactericidal against sensitive organisms during the stage of active multiplication. It acts by inhibiting cell wall synthesis. Active against common neonatal pathogens such as Listeria monocytogenes, Streptococcus agalactiae, Streptococcus faecalis and gram negative bacilli, including non-ß-lactamase-producing Haemophilus influenzae and Esherichia coli.

USE
The combination with gentamicin is an effective empiric treatment of suspected neonatal septicaemia in the first 48 hours of life.

PHARMACOKINETICS
Diffuse rapidly into most body tissues and fluids with the exception of brain and spinal fluid except when the meninges are inflamed. Actively excreted in urine and partly as a result of this, plasma half life falls from 6 hours to 2 hours during first 10 days of life. Particularly in preterm infants <32 weeks gestation, amoxycillin, like other penicillins, is almost completely cleared by glomerular filtration, rather than renal tubular secretion.

DOSE

<table>
<thead>
<tr>
<th>Age</th>
<th>Sepsis Group B Streptococcus</th>
<th>Meningitis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-7 days</td>
<td>0-7 days</td>
</tr>
<tr>
<td></td>
<td>&gt; 7 days</td>
<td>&gt; 7 days</td>
</tr>
<tr>
<td>Dose</td>
<td>50mg/kg/dose</td>
<td>50-100mg/kg/dose</td>
</tr>
<tr>
<td>Interval</td>
<td>12 hours</td>
<td>12 hours</td>
</tr>
<tr>
<td></td>
<td>8 hours</td>
<td>6-8 hours</td>
</tr>
</tbody>
</table>

PRESENTATION
IV 500mg/vial, 1g/vial

RECONSTITUTION
4.6ml of water for injection to 500mg vial to make a 100mg/ml solution
9.2ml of water for injection to 1g vial to make a 100mg/ml solution

DISCARD
Must be used within 1 hour of mixing, discard unused portion.

ADMINISTRATION
IV Slow bolus through proximal IV bung.

ADVERSE EFFECT
1. Hypersensitivity - maculopapular or urticarial rash, fever, bronchospasm, vasculitis, eosinophilia, interstitial nephritis, anaphylaxis.
2. Direct toxicity - vomiting, diarrhoea, thrombophlebitis, occasionally seizures or CNS excitation with high dose.
3. Superinfection with bacteria or fungi.

CONTRAINDICATION
1. Hypersensitivity to penicillins.
2. CAUTION in patients with history of hypersensitivity to cephalosporins.
3. CAUTION Consider increasing the dose-interval in patients with significant renal impairment.
AMPICILLIN cont

COMPATIBLE FLUIDS  5%dextrose, 10%dextrose, 0.9%sodium chloride

SOLUTION INCOMPATIBILITY  lipid emulsion, amino acid solutions

INCOMPATIBILITY  aminoglycosides, erythromycin lactobionate, fluconazole, hydralazine, metoclopramide and midazolam.

REFERENCE
Neonatal Formulary 5, Drug use in Pregnancy and First Year of Life, 2007, Blackwell Publishing
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY
AMPHOTERICIN B, LIPOSOMAL
(AMBISOME)

DESCRIPTION
Antifungal. Acts by binding to the sterol component of a cell membrane leading to alterations in the cell wall permeability and death. Less nephrotoxic than conventional amphotericin B.

USE
Antifungal

PHARMACOKINETICS
Mean serum half-life is 24-38 hours.

PRESENTATION
50mg/vial in powder form

DOSE
2mg/kg/dose daily.

Use 5mg/kg/dose when treating meningitis, osteoarthritis, cryptococcal infections and Aspergillosis.

RECONSTITUTION
PLEASE DISCUSS WITH THE PHARMACY REGARDING THE PREPARATION BY BAXTER PREPARED FILTERED.

Add 12ml of water for injection to make a 4 mg/ml solution. Immediately shake the vial for 30 seconds. Check for complete dispersion.

FURTHER DILUTE 1ml of the reconstituted solution with 1ml of 5%dextrose via 1micron filter to make a 2mg/ml solution. Use one filter per vial. Use dilution immediately.

ADMINISTRATION
IV infusion over 1hour
IV lines must be flushed with 5% dextrose prior to infusion if no dedicated line available.

STORAGE
Stable for 24 hours refrigerated. DO NOT FREEZE. Protect from light.

SOLUTION COMPATIBILITY
5%dextrose

TERMINAL INJECTION SITE COMPATIBILITY
Run the infusion separately. Do not mix with other drugs or electrolytes.

ADVERSE EFFECTS
Anaemia, thrombocytopenia, hypokalemia, nausea, vomiting, fever and chills.

MONITORING
Urine output. Periodic FBC, UEC and LFT.

REFERENCE
Neonatal Formulary 5, Drug use in Pregnancy and First Year of Life, 2007, Blackwell Publishing Ltd
ATROPINE  600mcg

DESCRIPTION
An anticholinergic drug. Increases heart rate and relaxes bronchial smooth muscle. Reduces motor activity in the stomach, small and large intestines. Salivary secretion is inhibited.

USE
1. Premedication for neonatal intubation
2. Reversal of severe sinus bradycardia, particularly in cardiopulmonary resuscitation or with parasympathetic influences on the heart (eg. Digoxin, B-blocker drugs).
3. Reversal of neuromuscular blockade.
4. Preoperative inhibition of salivation and reduction of excessive secretions of the respiratory tract.

PRESENTATION
600mcg/ml

DOSE
10mcg/kg 2-3 minutely prn

ROUTE
IV injection, IM injection, ETT instillation

RECONSTITUTION
Dilute 1ml (600mcg) of atropine with 5ml of water for injection to make 100mcg/ml solution.

ADMINISTRATION
Slow IV bolus injection using the proximal IV bung. May be given via ETT if IV access is not available.

STORAGE
Discard unused portion.

MONITORING
Continuous cardio-respiratory monitoring.

ADVERSE EFFECT
Tachycardia, hyperthermia, abdominal distension with decreased bowel activity, eosophageal reflux, urinary retention, mydriasis.

SOLUTION COMPATIBILITY
5%dextrose, 10%dextrose, 0.9%sodium chloride

INCOMPATABILITY
No information available.

REFERENCE
Neonatal Formulary 5, Drug use in Pregnancy and First Year of Life, 2007, Blackwell Publishing Ltd
BENZYL PENICILLIN (PENICILLIN G)

DESCRIPTION
Bactericidal and active against most gram-positive organisms and gram negative cocci. Inhibits synthesis of bacterial cell wall.

USE
First line drug along with gentamicin in treating sepsis of unknown etiology in the first 48 hours of life.

PHARMACOKINETICS
Rapidly absorbs after IM administration. Widely distributed throughout the body. Primarily excreted unchanged in urine by tubular secretion. Poor CSF penetration, except in inflamed meninges.

DOSE
IV or IM injection

<table>
<thead>
<tr>
<th>Age</th>
<th>Dose</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sepsis</td>
<td>60mg/kg/dose</td>
<td></td>
</tr>
<tr>
<td>Meningitis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group B Streptococcus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-7 days</td>
<td></td>
<td>12 hours</td>
</tr>
<tr>
<td>&gt; 7 days</td>
<td></td>
<td>8 hours</td>
</tr>
<tr>
<td>&gt; 28 days</td>
<td></td>
<td>6 hours</td>
</tr>
<tr>
<td>Congenital syphilis</td>
<td>30mg/kg/dose for 14 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>12 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 hours</td>
</tr>
<tr>
<td>Gonococcal infection(only for proven penicillin-susceptible isolates)</td>
<td>60mg/kg/dose</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>12 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 hours</td>
</tr>
</tbody>
</table>

PRESENTATION
600mg/vial (1 millionU)

RECONSTITUTION
Add 3.6ml of water for injection to 600mg vial to make a 150mg/ml solution.

ADMINISTRATION
Slow IV bolus injection using the proximal IV bung

MONITORING
Not necessary

ADVERSE EFFECT
1. Hypersensitivity – Very rare. Has not been seen in neonates.
2. Very high dose (> 60mg/kg/dose) may cause CNS toxicity (lethargy, twitching, seizures) and hyponatremia (each 60mg contains 0.17mmol sodium).
3. Bone marrow depression, granulocytopenia, hepatitis rare.

COMPATIBLE FLUIDS
5%dextrose, 10%dextrose, 0.9%sodium chloride
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

BENZYL PENICILLIN (Penicillin G) cont

INCOMPATIBLE FLUIDS  dextrose/amino acid solution

TERMIAL INJECTION SITE COMPATIBILITY  acyclovir, aminophylline, calcium gluconate,
calcium chloride, clindamycin, erythromycin, fluconazole, frusemide,
heparin, hydrocortisone, methicillin, metronidazole, morphine, ranitidine

INCOMPATIBLE DRUGS  amphotericin, dopamine, phenobarbitone, phenytoin, sodium
bicarbonate.

REFERENCE
Stoll BJ. Congenital syphilis: evaluation and management of neonates born to mothers with reactive serologic tests for
Neonatal Formulary 5, Drug use in Pregnancy and First Year of Life, 2007, Blackwell Publishing Ltd
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

BUDESONIDE

DESCRIPTION
Inhaled steroid with strong glucocorticoid and negligible mineralocorticoid activity. Budesonide has local anti-inflammatory effects with low systemic corticosteroid side effects over a wide dose range. Cochrane Reviews of inhaled vs systemic steroid use in ventilator-dependent preterm infants have not shown significant evidence of short or long-term benefit or advantage over systemic steroids.

USE
Severe chronic lung disease

PRESENTATION
0.5mg/2ml Respules for nebulisation

PHARMACOKINETICS
First-pass metabolism in the liver after systemic absorption. A proportion of the drug may be swallowed. The percentage of the inhaled dose reaching the lung will depend upon the method and delivery of the nebulised budesonide. After a single dose, improvement of the lung function is achieved within a few hours. The duration of effect is more than 12 hours. Full effect is not achieved until after a couple of days.

DOSE
500mcg Respules twice daily via nebuliser

ADMINISTRATION
Inhaled via spacer device (aerochamber) or nebulizer. COVER INFANTS’ EYES AND FACE DURING ADMINISTRATION!

ADVERSE EFFECTS
1. mild irritation in the throat
2. candida infection in the oropharynx
3. facial skin irritation
4. bronchoconstriction (rare)
5. gastrointestinal (nausea and vomiting)
6. suppression of the pituitary-adrenal axis
7. posterior subcapsular cataracts

PRECAUTION
1. Known sensitivity to budesonide
2. Caution neonates with fungal and viral infections in the airways
3. Caution neonates who are being transferred from oral corticosteroids to budesonide
4. Caution, may need to wean dose, do not stop suddenly

DRUG INTERACTION
After oral administration of ketoconazole, a potent inhibitor of CYP3A4, the mean plasma concentration of orally administered budesonide increased. Concomitant administration of other known inhibitors of CYP3A4 (eg, itraconazole, clarithromycin, erythromycin, etc.) may inhibit the metabolism of, and increase the systemic exposure to budesonide. Care should be exercised when budesonide is coadministered with long-term ketoconazole and other known CYP3A4 inhibitors. Omeprazole did not have effects on the pharmacokinetics of oral budesonide, while cimetidine, primarily an inhibitor of CYP1A2, caused a slight decrease in budesonide clearance and a corresponding increase in its oral bioavailability.
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

BUDESONIDE cont

REFERENCES
Neonatal Formulary 5, Drug use in Pregnancy and First Year of Life, 2007, Blackwell Publishing
S Shah, A Ohlsson, H Halliday, VS Shah. Inhaled versus systemic corticosteroids for preventing chronic lung disease in ventilated very low birth weight preterm neonates Cochrane Review 2004
V Shah, A Ohlsson, HL Halliday, MS Dunn Early administration of inhaled corticosteroids for preventing chronic lung disease in ventilated very low birth weight preterm neonates Cochrane Review 2007
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

CAFFEINE BASE

USE
1. Management of apnoea of prematurity.
2. Prevent/treat postoperative apnoea following general anaesthesia in preterm neonates.

ACTION
Decreases apnoea of prematurity by
1. Stimulation of central inspiratory drive
2. Increased sensitivity of medullary respiratory centre to CO₂

OTHER EFFECTS
1. Relaxation of pulmonary airway smooth muscle.
2. Increased renal blood flow, diuresis and increased urine calcium excretion.

PHARMACOKINETICS
Rapidly and well absorbed from the GI tract. Metabolised mainly in the liver and excreted predominantly in urine. Rapidly distributed in the brain, with CNS levels approximating plasma levels. Half-life varies from 40 to 230 hours, decreasing with advancing age. Half life is prolonged in infants with cholestatic hepatits. Caffeine appears to have similar efficacy on apnoeas/bradycardias, but it has better therapeutic advantages over theophylline because of caffeine’s higher therapeutic ratio, less side effects, more reliable enteral absorption and a longer half life.

PREPARATION
IV 50mg/5ml of caffeine base ampoule.
Oral 10mg/1ml of caffeine base solution.

DOSE
IV Loading dose 10-20mg/kg/dose of caffeine
Maintenance dose 5mg/kg/day once a day. Commence 24 hours after the loading dose.
ORAL Loading dose 10-20mg/kg/dose of caffeine base.
Maintenance dose 5mg/kg/day once a day. Commence 24 hours after the loading dose.

RECONSTITUTION
IV Add 2ml (20mg) of caffeine injection to 8ml of water for injection to make a 2mg/ml solution.

ADMINISTRATION
IV Infuse over 30 minutes using the proximal IV bung.
ORAL Give with feeds.

NOTE
Some preparations (not used in our unit) contain caffeine citrate. The dose of caffeine citrate is approximately twice the dose of caffeine base (e.g. 10mg of caffeine citrate contains 5mg of caffeine base).

SERUM LEVEL
Therapeutic 5-30mcg/ml (26-156micromol/l)
Toxicity >50mg/l
Serum levels are to be done only when clinically indicated. Usual sampling time is midway between doses to reflect average serum levels. Steady state is probably achieved after 4-6 days of maintenance dose. Dose adjustments prior to steady state being reached may be inappropriate.
CAFFEIN BASE cont

CEASING CAFFEINE Consider ceasing Caffeine if infant has had >1 week without documented apnoea.

RESTARTING CAFFEINE Use loading dose if >72 hours passed after ceasing. Recomence maintainence dose if <72 hours passed after ceasing.

ADVERSE EFFECT

1. Sinus tachycardia
2. Vomiting
3. Restlessness, irritability, twitching, tremors, seizures
4. Diuresis, dehydration.
5. Hyperglycaemia, glycosuria.
6. Increased oxygen consumption and metabolic rate and reduced weight gain.

SOLUTION COMPATIBILITY 5%dextrose, 0.9%sodium chloride

TERMINAL INJECTION SITE COMPATIBILITY 10%dextrose, amino acid, calcium gluconate

INCOMPATIBILITY No data available

REFERENCE


Neonatal Formulary 5, Drug use in Pregnancy and First Year of Life, 2007, Blackwell Publishing Ltd
CAFFEINE CITRATE

USE
1. Management of apnoea of prematurity.
2. Prevent/treat postoperative apnoea following general anaesthesia in preterm neonates.

ACTION
Decreases apnoea of prematurity by
1. Stimulation of central inspiratory drive
2. Increased sensitivity of medullary respiratory centre to CO₂

OTHER EFFECTS
1. Relaxation of pulmonary airway smooth muscle.
2. Increased renal blood flow, diuresis and increased urine calcium excretion.

PHARMACOKINETICS
Rapidly and well absorbed from the GI tract. Metabolised mainly in the liver and excreted predominantly in urine. Rapidly distributed in the brain, with CNS levels approximating plasma levels. Half-life varies from 40 to 230 hours, decreasing with advancing age. Half life is prolonged in infants with cholestatic hepatits. Caffeine appears to have similar efficacy on apnoeas/bradycardias, but it has better therapeutic advantages over theophylline because of caffeine’s higher therapeutic ratio, less side effects, more reliable enteral absorption and a longer half life.

PREPARATION
IV 40mg/2ml of caffeine citrate vial.
Oral not yet available

DOSE
IV Loading dose 20-40mg/kg/dose of caffeine
Maintenance dose 10mg/kg/day once a day. Commence 24 hours after the loading dose.
ORAL Loading dose 20-40mg/kg/dose of caffeine base.
Maintenance dose 10mg/kg/day once a day. Commence 24 hours after the loading dose.

RECONSTITUTION
IV Add 2ml (40mg) of caffeine to 8ml of water for injection to make a 4mg/ml solution.

ADMINISTRATION
IV Infuse over 30 minutes using the proximal IV bung.
ORAL Give with feeds.
Consider withholding dose if >180 heart beats/minute!

NOTE
The dose of caffeine citrate is approximately twice the dose of caffeine base (e.g. 10mg of caffeine citrate contains 5mg of caffeine base).

SERUM LEVEL
Therapeutic 5-30mcg/ml (26-156micromol/l)
Toxicity >50mg/l
Serum levels are to be done only when clinically indicated. Usual sampling time is midway between doses to reflect average serum levels. Steady state is probably achieved after 4-6 days of maintenance dose. Dose adjustments prior to steady state being reached may be inappropriate.
CAFFEIN CITRATE  cont

CEASING CAFFEINE  Consider ceasing Caffeine if infant has had >1 week without documented apnoea.

RESTARTING CAFFEINE  Use loading dose if >72 hours passed after ceasing. Recomence maintainence dose if <72 hours passed after ceasing.

ADVERSE EFFECT
1. Sinus tachycardia
2. Vomiting
3. Restlessness, irritability, twitching, tremors, seizures
4. Diuresis, dehydration.
5. Hyperglycaemia, glycosuria.
6. Increased oxygen consumption and metabolic rate and reduced weight gain.

SOLUTION COMPATIBILITY  5%dextrose, 0,9%sodium chloride

TERMINAL INJECTION SITE COMPATIBILITY  10%dextrose, amino acide, calcium gluconate, lipid, amikacin, aminophillyne, cefotaxime, cinetidine, fentanyl, dexamethasone, dobutamine, dopamine, gentamycin, heparin, morphine, sodium bicarbonate, vancomycin, panceronium, penicillin G, phenobarbitone, clindamycin, epinephrine, nitroprusside.

INCOMPATIBILITY  acyclovir, furosemide, lorazepam, oxacillin, nitroglycerin

REFERENCE
Neonatal Formulary 5, Drug use in Pregnancy and First Year of Life, 2007, Blackwell Publishing Ltd
CALCIUM GLUCONATE

DESCRIPTION
Essential for the functional integrity of nervous, muscular, skeletal and cardiac systems and for clotting function. Hypocalcemia is common in asphyxiated infants, premature infants, infants of diabetic mothers, and following exchange transfusion. Signs suggestive of hypocalcemia in neonates include muscle twitching, jitteriness, generalised seizures or QTc above 0.40 seconds.

USE
Treatment and prevention of hypocalcaemia.

PHARMACOKINETICS
Well absorbed from the GI tract after oral administration. Rapidly incorporated into skeletal tissues with 99% of the body's calcium found in bone. Ionised calcium is the physiologically active fraction, accounting for 50% of total blood calcium. The remainder is bound to albumin (40%) or complexed with citrate, phosphate and bicarbonate (10%). Calcium chloride may be more bioavailable than calcium gluconate, but it also is more likely to cause metabolic acidosis.

PRESENTATION
9mg/ml Calcium Gluconate 10% ampoule with elemental calcium (0.22mmol/ml or 0.45mEq/ml). Can be used orally.

DOSE
The following dose are for 10% calcium gluconate injection

<table>
<thead>
<tr>
<th>Condition</th>
<th>Pre-dilution dose</th>
<th>Route</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute symptomatic hypocalcaemia</td>
<td>1-2ml/kg</td>
<td>IV</td>
<td>6-8 hourly if necessary</td>
</tr>
<tr>
<td>Asymptomatic hypocalcaemia</td>
<td>1-2ml/kg</td>
<td>IV</td>
<td>6-8 hourly if necessary</td>
</tr>
<tr>
<td>Maintenance treatment</td>
<td>2-8ml/kg/day</td>
<td>IV</td>
<td>In 4 divided dose or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO</td>
<td>continuous infusion</td>
</tr>
<tr>
<td>Exchange transfusion</td>
<td>1ml/dose not per kilo!</td>
<td>IV</td>
<td>After every 100ml citrated blood exchanged</td>
</tr>
<tr>
<td>Rickets therapy*</td>
<td>17ml/kg/day</td>
<td>PO</td>
<td>In 4-6 divided dose with feeds</td>
</tr>
</tbody>
</table>

*Preferable to use other oral preparations with higher concentration of elemental calcium.

ADMINISTRATION

1. Doctors to write the pre-dilution dose in ml of 10% calcium gluconate on the medication chart.
2. Dilute 5ml of 10% calcium gluconate with 5ml of water for Injection to make a 1ml calcium gluconate in 2ml solution.
3. Then infuse double the prescribed volume slowly over 10-30 minutes using the proximal IV bung.
4. MONITOR for bradycardia and other arrhythmias. **Stop infusion if heart rate is less than 100 beats per minute!**

IF CONTINUOUS INFUSION IS ORDERED, THE MAXIMUM CONCENTRATION RANGE PERMITTED IS 10ML OF 10% CALCIUM GLUCONATE PER 100ML MAINTENANCE FLUID.

ORAL
Give oral dose with feeds.
CALCIUM-GLUCONATE  cont

DISCARD
Discard unused portion.

MONITORING
Continuous cardio-respiratory monitoring. Observe IV site closely for extravasation. Avoid hypercalcemia during treatment. Correct hypermagnesemia if present.

ADVERSE EFFECT
1. Rapid administration is associated with bradycardia or cardiac standstill.
2. Cutaneous necrosis or calcium deposition with extravasation. See strategy for extravasation in NCC Procedure Manual.
3. Gastric irritation and diarrhoea may occur during oral therapy.

COMPATIBLE FLUIDS
5%dextrose, 10%dextrose, 0.9%sodium chloride, amino acid

INCOMPATIBLE FLUIDS
lipid emulsion

TERMINAL INJECTION SITE COMPATIBILITY
amikacin, aminophylline, ampicillin, aztreonam, cefazolin, dobutamine, epinephrine, furosemide, heparin, hydrocortisone, meropenem, methicillin, midazolam, netilmicin, phenobarbital, propofol, tobramycin, vancomycin.

INCOMPATIBLE DRUGS
amphotericin B, clindamycin, cefotaxime, cephalothin, fluconazole, indomethacin, methylprednisolone, metoclopramide, sodium bicarbonate, and solutions containing carbonates, phosphates, or sulphates.

REFERENCE
Neonatal Formulary 5, Drug use in Pregnancy and First Year of Life, 2007, Blackwell Publishing Ltd
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY
CAPTOPRIL

DESCRIPTION
Angiotensin-converting enzyme inhibitor.

USE
1. Treatment of congestive cardiac failure. Acts by reducing the afterload on the heart. Babies with left to right shunts rarely seem to benefit.
2. Hypertension, but IV Labetalol followed by oral Nifedipine offers a more secure and reliable strategy for controlling serious hypertension in infancy.

PREPARATION
25mg/5ml solution

DOSE
10mcg/kg/dose 8 hourly
The dose can be increased progressively.

ADMINISTRATION
ORAL

MONITORING
Monitor blood pressure carefully!

SIDE EFFECTS
1. Apnoea
2. Seizure
3. Renal failure
4. Hyperkalemia is a hazard in patients on potassium sparing diuretics like Spironolactone or on potassium supplement.

NOT RECOMMENDED IN PRETERM INFANTS OR INFANTS UNDER 1 MONTH OF AGE!
Neonatal response to treatment with ACE inhibitors is very variable and some babies become profoundly hypotensive on even a small dose. It is essential to give a small test dose and then increase the dose cautiously.

CONTRAINDICATED IN RENO-VASCULAR DISEASE!

REFERENCES
Neonatal Formulary 5, Drug use in Pregnancy and First Year of Life, 2007, Blackwell Publishing Ltd
CEFOTAXIME

DESCRIPTION
Third generation cephalosporin antibiotic. Widely distributed in the tissues. Metabolised in liver to active compound, decacetylcefotaxime. Half-life of cefotaxime is 3-6 hours, whereas half-life of decacetylcefotaxime is about 9 hours.

USE
Treatment of sepsis/meningitis caused by gram-negative organisms (e.g. E coli, H influenzae, Klebsiella, and Pseudomonas), gonococcal infections.

PRESENTATION
500mg/vial or 1g/vial

DOSE

<table>
<thead>
<tr>
<th>Age</th>
<th>Dose</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7 days</td>
<td>50mg/kg/dose</td>
<td>12 hours</td>
</tr>
<tr>
<td>&gt;7 days</td>
<td>50mg/kg/dose</td>
<td>8hrly</td>
</tr>
</tbody>
</table>

ROUTE
IV injection, IM injection.

RECONSTITUTION
Add 1.8ml of water for injection to 500mg vial to make a 250mg/ml solution.
Add 9.6ml of water for injection to 1g vial to make a 100mg/ml solution.

ADMINISTRATION
Slow IV bolus injection using proximal bung.

STORAGE
Discard unused portion

MONITORING
Not necessary

ADVERSE EFFECT
Side effects are rare but can include rash, phlebitis, diarrhoea, leukopenia, granulocytopenia and eosinophilia.

SOLUTION COMPATIBILITY
5%dextrose, 10%dextrose, 0.9%sodium chloride

INCOMPATIBILITY
aminophylline, fluconazole, sodium bicarbonate, vancomycin

REFERENCE
Neonatal Formulary 5, Drug use in Pregnancy and First Year of Life, 2007, Blackwell Publishing Ltd
**DESCRIPTION**
Third generation cephalosporin. Bactericidal. Inhibits cell wall synthesis. Distributes widely in body fluids. Excreted unchanged in urine. It is stable to most beta-lactamases produced by Gram-positive and Gram-negative organisms, therefore is active against many ampicillin and cephalothin resistant strains (but not methicillin resistant strains). Synergistic with aminoglycosides.

**USE**
Used in the treatment of sepsis/meningitis caused by Gram-negative organisms (e.g. Pseudomonas, E coli, H influenzae, Neisseria, Klebsiella, and Proteus, Enterobacter sp., citrobacter sp., Serratia sp., Acinetobacter sp., Haemophilus influenzae).

**PRESENTATION**
1g/vial

**DOSE**

<table>
<thead>
<tr>
<th>Age</th>
<th>Dose</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7 days</td>
<td>50mg/kg/dose</td>
<td>12 hours</td>
</tr>
<tr>
<td>&gt;7 days</td>
<td>50mg/kg/dose</td>
<td>8hrly</td>
</tr>
</tbody>
</table>

**ROUTE**
IV injection, IM injection.

**RECONSTITUTION**
Add 10ml of water for injection to 1g vial to make a 90mg/ml solution.

**ADMINISTRATION**
Slow IV bolus injection using the proximal IV bung

**STORAGE**
Discard unused portion

**MONITORING**
Not necessary

**ADVERSE EFFECT**
Uncommon, but include rash, diarrhea, elevated hepatic transaminases, eosinophilia, and positive Coomb’s test.

**SOLUTION COMPATIBILITY**
5%dextrose, 10%dextrose, 0.9%sodium chloride

**INCOMPATIBILITY**
fluconazole, gentamicin, midazolam, vancomycin.

**REFERENCES**
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

CEFTRIAXONE

DESCRIPTION
Third generation cephalosporin with a long half-life. Excellent in vitro activity against many gram negative enteric bacilli, H influenzae, gonococci and meningococci. No adequate anti-pseudomonas activity. L monocytogenes and enterococci are resistant. The most attractive features of ceftriaxone are its long half-life, which allows for a single daily administration, and its excellent bactericidal activity against susceptible bacteria. However, its usage is limited in the newborns because of the concerns about its displacing ability of albumin binding sites for bilirubin leading to hyperbilirubinemia.

USE
1. Neonatal sepsis and meningitis caused by gram negative organisms (E coli, Klebsiella, H influenzae)
2. Gonococcal infections

CONTRAINDICATION
Not recommended for neonates with hyperbilirubunemia. Ceftriaxone must not be mixed or administered within 48 hours simultaneously with calcium containing solutions or products such as TPN, Hartmann's and Ringer's solution even via different infusion lines.

PHARMACOKINETICS
The drug distributes widely (CSF, bile, bronchial secretions, lung tissue, ascitic fluid, middle ear). It has a long half-life of 8-34 hours in neonates. About 70% is excreted in urine unchanged. The remainder is cleared from the body by hepatic mechanisms. Dose adjustment is necessary only for patients with combined hepatic and renal failure.

DOSE
SEPSIS AND DISSEMINATED GONOCOCCAL INFECTION
50mg/kg/dose daily
MENINGITIS
100mg/kg loading dose followed 24 hours later by 80mg/kg daily maintenance dose
UNCOMPLICATED GONOCOCCAL OPHTHALMIA
50mg/kg (maximum 125mg) single dose

PRESENTATION
0.25g/vial, 0.5g/vial, 1g/vial

ADMINISTRATION
IV injection over 2-4 minutes
IM injection Can be painful. Some centres reconstitute the drug with 1% lidocaine to reduce pain.

IV INJECTION

<table>
<thead>
<tr>
<th>Vial size</th>
<th>0.25g</th>
<th>0.5g</th>
<th>1g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reconstitute with water for injection</td>
<td>2.4 ml</td>
<td>4.8 ml</td>
<td>9.6 ml</td>
</tr>
<tr>
<td>Resultant concentration</td>
<td>100mg/ml</td>
<td>100mg/ml</td>
<td>100mg/ml</td>
</tr>
</tbody>
</table>

IM INJECTION

<table>
<thead>
<tr>
<th>Vial size</th>
<th>0.25g</th>
<th>0.5g</th>
<th>1g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reconstitute with water for injection</td>
<td>0.9 ml</td>
<td>1.8 ml</td>
<td>3.6 ml</td>
</tr>
<tr>
<td>Resultant concentration</td>
<td>250 mg/ml</td>
<td>250mg/ml</td>
<td>250mg/ml</td>
</tr>
</tbody>
</table>
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

CEFTRIAXONE cont

USE
Reconstituted solution is stable for 6 hours at room temperature and 24 hours under refrigeration. Discard unused portion.

ADVERSE EFFECT
1. Hyperbilirubinemia. Displaces bilirubin from albumin binding sites.
   CAUTION – Preterm infants with unconjugated jaundice!
2. Eosinophilia, thrombocythemia, leukopenia.
3. Increase in bleeding time.
4. Increase in BUN and creatinine.
5. Increase in AST and ALT.
6. Transient gallbladder precipitations.
7. Skin rash.

COMPATIBLE FLUIDS
5%dextrose, 10%dextrose, 0.9%sodium chloride

SOLUTION INCOMPATIBILITY
amino acids, calcium gluconate

COMPATIBLE VIA Y SITE
acyclovir, aztreonam, clindamycin, heparin, lidocaine, metronidazole, morphine, potassium chloride, propofol, sodium bicarbonate, zidovudine.

INCOMPATIBILITY
aminophylline, clindamycin, fluconazole, vancomycin.

REFERENCE
CEPHALEXIN

DESCRIPTION
First generation cephalosporin. Active against many gram positive and a few gram negative bacteria. Poor CNS penetration.

USE
Prophylaxis and treatment of mild bacterial infections.

PRESENTATION
250mg/ml suspension

DOSE

<table>
<thead>
<tr>
<th>Age</th>
<th>Dose</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7 days</td>
<td>25mg/kg/dose</td>
<td>12 hours</td>
</tr>
<tr>
<td>&gt;7 days</td>
<td>50mg/kg/dose</td>
<td>8hrly</td>
</tr>
</tbody>
</table>

RENAL PROPHYLAXIS 10mg/kg/dose nocte

ADMINISTRATION
Oral

MONITORING
Not necessary

ADVERSE EFFECTS
Diarrhoea, nausea, vomiting
Hypersensitivity
Eosinophilia, neutropenia
Abnormal LFT

REFERENCES
Neonatal Formulary 5, Drug use in Pregnancy and First Year of Life, 2007, Blackwell Publishing Ltd
CEPHALOTHIN

DESCRIPTION
First generation cephalosporin. Active against gram-positive organisms but limited activity against gram-negative bacteria. Susceptible organisms include streptococci, staphylococci (except MRSA), and penicillin sensitive pneumococci. Enterococci and L monocytogenes are resistant. It has some activity against gram-negative bacteria such as coliforms, but other antibiotics are preferred for this. It has poor CNS penetration.

USE
Cephalosporin antibiotic active against gram-positive (less active against gram negative) staphylococci (except MRSA), strep. pneumoniae, haemophilus influenzae, E coli, klebsiella and proteus mirabilis.

PRESENTATION
1g/vial

DOSE

<table>
<thead>
<tr>
<th>Age</th>
<th>Dose</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7 days</td>
<td>20 mg/kg/dose</td>
<td>12 hrly</td>
</tr>
<tr>
<td>≥7 days</td>
<td>20 mg/kg/dose</td>
<td>8 hrly</td>
</tr>
</tbody>
</table>

ROUTE
IV injection, IM injection

RECONSTITUTION
Add 9.4ml of water for injection to vial to make a 100mg/ml solution.

ADMINISTRATION
Slow IV bolus injection using proximal IV bung.

STORAGE
Discard unused portion.

MONITORING
Evaluation of renal status is recommended, especially in seriously ill neonates.

ADVERSE EFFECT
Anaphylaxis is rare. Other effects may include a maculopapular rash and urticaria.

INCOMPATIBILITY
Adrenaline, amikacin, aminophylline, calcium chloride, calcium gluconate, chlorpromazine, diphenhydramine, erythromycin, gentamicin, hyaluronidase, kanamycin, lignocaine, metoclopramide, oxytocin, penicillin G, phenobarbitone, phenytoin, phytomenadione, prochlorperazine, ranitidine, ticarcillin.

REFERENCES
CEPHAZOLIN

DESCRIPTION
First generation cephalosporin. Active against many gram positive and a few gram negative bacteria. Poor CNS penetration. Renally excreted.

USE
Perioperative infection prophylaxis and treatment of urinary tract infections caused by susceptible organisms.

DOSE

<table>
<thead>
<tr>
<th>Age</th>
<th>Dose</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7 days</td>
<td>20 mg/kg/dose</td>
<td>12 hrly</td>
</tr>
<tr>
<td>≥7 days</td>
<td>20 mg/kg/dose</td>
<td>8hrly</td>
</tr>
</tbody>
</table>

PRESENTATION
1g/vial

RECONSTITUTION
Add 2.5ml of water for injection to 1g cephazolin vial to make 330mg/ml solution. **FURTHER DILUTE** 1ml (330mg) of the above solution with 9ml water for injection to make a final concentration of 33mg/ml.

ADMINISTRATION
Slow IV bolus injection via proximal IV bung

MONITORING
Not necessary

ADVERSE EFFECTS
1. Phlebitis
2. Eosinophilia

SOLUTION COMPATIBILITY
dextrose, 0.9% sodium chloride

INCOMPATIBILITY
amiodarone, cimetidine, pentobarbital, vancomycin

REFERENCES
CHLORAMPHENICOL EYE DROPS and OINTMENT

DESCRIPTION
Topical antibiotic

USE
Infective Conjunctivitis

DOSE
DROPS  2 drops to each eye 4hourly.
OINTMENT  1 squeeze of eye ointment along inside of lower eyelid 6hourly

PRESENTATION
5mg/ml chloramphenicol eye drops
10mg/g chloramphenicol in oculatum base cream

ADMINISTRATION
Topical to each eye. Always treat both eyes unless expressly told not to.
Wipe away any discharge starting at the inner corner of the eye.
DROPS  Place one drop of medication at the inner angle of the open eye.
OINTMENT  Place one squeeze of eye ointment along inside of lower eyelid
Make sure the drops and ointment containers do not themselves become infected by letting them touch the eye

STORAGE
Store below 25°C.
Single patient use only, label medications with patients ID labels.
KEEP MEDICATION WITH PATIENT AT THE BEDSIDE.

SIDE EFFECTS
Chemical conjunctivitis
Possible small risk of aplastic anaemia (unsubstantiated)

MONITORING
Post-neonatal conjunctivitis is often viral rather than bacterial and even when it is bacterial there is little good evidence that it clears more rapidly as a result of treatment with antibiotic eye drops.
A chronic watery/sticky discharge is usually due to blockage of the naso-lacrimal duct which is common in the first months after birth and usually resolves spontaneously without treatment. Massaging the tear duct from the inner canthus to the nose may help to clear any discharge blocking the flow of tears and to open up the tear duct.

REFERENCES
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

CLEXANE

SEE UNDER
ENOXAPARIN SODIUM
Low Molecular Weight Heparin
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

CLONAZEPAM
Schedule 8 Medication

DESCRIPTION
Benzodiazepine which enhances the polysynaptic inhibitory process blocking spread of electrical activity from a focal lesion.

USE
Seizures unresponsive to conventional therapy

PRESENTATION
1mg/ml ampoule plus 1 ml of water for injection as a diluent

DOSE
10-30mcg/kg/dose 8 hourly

DR A BYE REGIME
LOADING DOSE 30mcg/kg/dose
MAINTENANCE 5mcg/kg/hr

<table>
<thead>
<tr>
<th>Infusion strength</th>
<th>Prescribed amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1ml/hr=5mcg/kg/hr</td>
<td>0.25mg/kg Clonazepam to make a 50ml solution</td>
</tr>
</tbody>
</table>

ROUTE
IV Injection, IV Infusion

RECONSTITUTION
BOLUS Add 1ml of diluent to make a 500mcg/ml solution.
FURTHER DILUTE 0.2ml (100mcg) of reconstituted clonazepam to 0.8ml of 0.9%sodium chloride to make a 100mcg/ml solution.

INFUSION Add the prescribed amount of clonazepam as calculated to 5%dextrose to make a total of 50ml solution.

ADMINISTRATION
BOLUS Slow IV bolus injection using the proximal IV bung
INFUSION Continuous IV infusion at 1ml/hr=5mcg/kg/hr

STORAGE
Discard unused portion.

MONITORING
Cardio-respiratory monitoring, seizure activity chart

ADVERSE EFFECT
Sedation, muscle relaxation, hypersalivation. Reduced dose may be necessary if renal function is impaired.

DRUG INTERACTION
Potentiates the sedative effects of CNS depressants. Concomittant administration with phenobarbitone or phenytoin may enhance the metabolism of clonazepam.

INCOMPATABILITY
No data available

REFERENCE
CUROSURF
Poractant Alfa

DESCRIPTION
Natural surfactant from pig lungs. It lowers surface tension on alveolar surfaces and stabilises the alveoli against collapse. Has a high concentration of phospholipids in a low volume.

PHARMACOLOGY
Curosurf contains only polar lipids (mainly phospholipids) and the essential hydrophobic proteins SP-B and SP-C. It does not have any synthetic additives, need smaller volumes to administer, faster acting and less wastage than Survanta.

USE
1. Respiratory distress syndrome
2. Meconium aspiration syndrome
3. Surfactant deficiency

PRESENTATION
1.5 ml/vial contains 80mg/ml phospholipids
3ml/vial contains 80mg/ml phospholipids

DOSE
STANDARD DOSE
1.25ml/kg (100mg/kg) dose can be given 12 hourly.

Maximum number of vials to be used based on birthweight

<table>
<thead>
<tr>
<th>Birthweight</th>
<th>Number of Vials</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1250gm</td>
<td>2 x 1.5ml vials</td>
</tr>
<tr>
<td>1250-2500gm</td>
<td>3 x 1.5ml vials</td>
</tr>
</tbody>
</table>

HIGH DOSE
2.5ml/kg (200mg/kg) dose followed by 100mg/kg for subsequent doses. The advantage of high dose is shorter duration of the need of FiO2 >0.40. **High dose can be given at the discretion of neonatologist.**

ROUTE
Intratracheal instillation

ADMINISTRATION
Before administration, allow to stand drug in room temperature for 20 minutes or warm in the hand for at least 8 minutes. **ARTIFICIAL WARMING METHODS SHOULD NOT BE USED. DO NOT FILTER OR SHAKE.**

Before administration, assure proper placement of ETT and assess need to suction same.

Using sterile technique shorten a 5F end-hole catheter (feeding tube) that tip of catheter does not protrude beyond the tip of ETT above carina. Withdraw the contents of vial into a plastic syringe through a large (>20 gauge) drawing up needle. Attach shortened catheter to syringe. Fill catheter that only dose to be given remains in syringe.

Administer the dose in 2 aliquots, each over 10-20 seconds. Wait for 30 seconds or until the baby is stable, saturations and heart rate returned to previous baseline. Repeat the next aliquot. During instillation baby may need to be disconnected from the ventilator. Alternatively, it can be given via neonatal suction valve without disconnecting. Endotracheal tube reflux of the drug is common with second method. **The use of bagging is not recommended and that stabilisation occurs through parameter changes on the ventilator.**

Do not suction for at least eight hours after administration unless signs of significant airway obstruction occur.
CUROSURF cont.

STORAGE  24 HOURS IN REFRIGERATOR (2-8°C). DO NOT FREEZE.  
Discard the used vial and do not reuse the leftover Curosurf!

MONITORING  Continuous cardio-respiratory monitoring and SaO₂ in place. Intra-arterial monitoring desirable.

ADVERSE EFFECTS  During administration transient episodes of bradycardias and decreased oxygen saturation can occur. If this occurs, stop dosing procedure and initiate appropriate measures to alleviate condition. Resume dosing once stabilized. Other transient side effects, although rare, include endotracheal tube reflux or blockage, pallor, vasoconstriction, hypotension, hypertension, hypocarbia, hypercarbia, and apnoea.

INCOMPATIBILITY  Not applicable.

REFERENCES

First Randomized Trial

Single versus Multiple Doses

High versus Low Doses

Early versus Late Treatment

Prophylaxis versus Rescue Treatment
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

CYCLOMYDRIL EYE DROPS

DESCRIPTION
Mydriatic ophthalmic solution used to dilate the pupils for fundus examination. It is not licensed in Australia and so “SAS – Category B form” should be filled for TGA for each patient and informed parental consent should be obtained prior to use. Ask NUM for the relevant documents.

PHARMACOLOGY
Cyclopentolate is anticholinergic. Phenylephrine is alpha-adrenergic. Conventional eye drops licensed in Australia have cyclopentolate 0.5% and phenylephrine 2.5%. Both these solutions are of high strength and side effects are not uncommon. Cyclomydril is a single preparation which has both these ingredients in lower strength and causes less side effects.

PREPARATION
0.2% cyclopentolate HCl and 1% phenylephrine HCl/1ml

DOSE
1-2 drops in the eye 10-30 minutes prior to fundoscopy. Apply pressure to lacrimal sac during and for 2 minutes after instillation to minimize systemic absorption. Without lacrimal sac occlusion, approximately 80% of each drop may pass through the nasolacrimal system and be available for rapid systemic absorption by the nasal mucosa. Observe infants closely for at least 30 minutes.

SIDE EFFECTS
Anticholinergic side effects include fever, tachycardia, vasodilation, dry mouth, restlessness, delayed gastric emptying and decreased gastrointestinal motility and urinary retention. Alpha adrenergic side effects include decreased pulmonary compliance, tidal volume, and peak airflow in babies with chronic lung disease. Do not use in babies receiving beta-blockers (propranolol).

REFERENCES
ALCON Laboratories Drug Info. April 1999.
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

CYCLOPENTOLATE EYE DROPS

DESCRIPTION
Anticholinergic. Produces pupillary dilation (mydriasis) and cyclopegia (paralysis of accommodation).

USE
In fundoscopy and other diagnostic and therapeutic ophthalmic procedures.

PREPARATION
Cyclopentolate Hydrochloride 0.5%

DOSE
1-2 drops in the eye 10-30 minutes prior to fundoscopy.
Apply pressure to lacrimal sac during and for 2 minutes after instillation to minimize systemic absorption. Without lacrimal sac occlusion, approximately 80% of each drop may pass through the nasolacrimal system and be available for rapid systemic absorption by the nasal mucosa.

SIDE EFFECTS
Anticholinergic side effects include fever, tachycardia, vasodilation, dry mouth, restlessness, delayed gastric emptying, decreased gastrointestinal motility and urinary retention.

REFERENCES
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

DEXAMETHASONE

DESCRIPTION
A synthetic adrenocorticosteroid with potent long-acting glucocorticoid activity. It has little if any mineralocorticoid activity. Dexamethasone has anti-inflammatory and immunosuppressant activity. It potentially improves lung function and myocardial performance. Pulmonary oedema is reduced along with relaxation of bronchospasm.

USE
1. Severe and high risk of chronic lung disease
2. Prevention and management of post-extubation stridor

PRESENTATION
4mg/1ml vial
0.5mg/ml suspension

DOSE
1. Chronic lung disease 10 days regime
   0.15 mg/kg/day in 2 divided doses for 3 days followed by
   0.10 mg/kg/day in 2 divided doses for 3 days followed by
   0.05 mg/kg/day daily for 2 days followed by
   0.02 mg/kg/day daily for 2 days
Higher doses up to 0.25 mg/kg/day and/or longer duration is the discretion of the treating neonatologist.

2. Post extubation stridor
   0.25 mg/kg/dose 4 hours prior to extubation and 8 hourly for a total of up to 3 doses.

ROUTE
IV injection, IM injection, oral

RECONSTITUTION
Add 1ml (4mg) of dexamethasone to 19ml of 0.9% sodium chloride to make a 0.2mg/ml solution.

ADMINISTRATION
Slow IV bolus injection using the proximal IV bung

STORAGE
Discard unused portion.

MONITORING
Dextrostix, urinalysis, serum electrolytes, blood pressure and gastric pH

ADVERSE EFFECT
ACUTE
Hyperglycemia, glycosuria
Hypertension
GI bleeding, gastric perforation

INTERMEDIATE
Infection
Growth failure
Adrenal suppression
Cardiomyopathy

LATE
Impaired neurodevelopmental outcome

COMPATIBLE FLUIDS
5%dextrose, 10%dextrose, 0.9%sodium chloride

TERMINAL INJECTION SITE COMPATIBILITY
acyclovir, amikacin, aminophylline, aztreonam, cimetidine, famotidine, fluconazole, frusemide, heparin, hydrocortisone, lidocaine, lorazepam, meropenem, metoclopramide, morphine, nafcillin, netilmicin, potassium chloride, propofol, prostaglandin E1, ranitidine, sodium bicarbonate, zidovudine.

INCOMPATABILITY
midazolam, vancomycin.
DEXAMETHASONE  cont.

REFERENCE
DIGOXIN

DESCRIPTION
Exerts a positive inotropic effect on the myocardium. It enhances contractility by increasing myocardial catecholamine levels. Indirectly increases vagal activity, thereby slowing SA node firing and AV node conduction.

USE
1. Treatment of heart failure
2. Supraventricular tachycardia (SVT), atrial flutter and atrial fibrillation

PRESENTATION
50mcg/2ml ampoule, PAEDIATRIC INJECTION
50mcg/ml elixir

DOSE
Dr Steve Cooper’s regime
LOADING 10mcg/kg/dose for 3 doses 12 hrly followed by MAINTENANCE 8 mcg/kg/dose daily 12 hrs after loading.

NOTE
MAINTENANCE MUST BE COUNTERSIGNED BY A CONSULTANT WITHIN 24 HOURS!

ROUTE
IV injection, oral

RECONSTITUTION
Add 2ml (50mcg) of digoxin to 8ml of 0.9%sodium chloride to make a 5mcg/ml solution.

ADMINISTRATION
Slow IV bolus over 10 minutes using proximal IV bung.

DOCUMENT APEX BEAT ON MEDICATION CHART PRIOR TO ADMINISTRATION AND ASK FOR A REVIEW BY THE MEDICAL OFFICER IF HEART RATE IS <80/MINUTE.

STORAGE
Discard unused portion

MONITORING
Continuous cardio-respiratory monitor. Assess renal function. Monitor electrolytes, avoiding hypokalaemia and hypercalcaemia as this predisposes to digitalis toxicity. In some cases, serum levels may be assessed after 48 hours. Therapeutic concentration is 1-2nanogram/ml.

ADVERSE EFFECTS
1. Sinus bradycardia, atrial or nodal ectopic beats and ventricular arrhythmias
2. Feed intolerance, vomiting, diarrhoea and lethargy.
3. Hypokalaemia and if the toxicity is life threatening, renal dialysis must be considered.

SOLUTION COMPATIBILITY
5%dextrose, 10%dextrose, 0.9%sodium chloride, water for injection
DIGOXIN cont

COMPATIBILITY VIA Y SITE  dextrose, amino acid, fat emulsion, cimetidine, famotidine, frusemide, heparin, hydrocortisone succinate, insulin, lidocaine, meropenem, midazolam, morphine, potassium chloride, propofol, prostaglandin E1, ranitidine.

INCOMPATABILITY  dobutamine, fluconazole

REFERENCE
DOBUTAMINE

DESCRIPTION
A synthetic catecholamine with primarily beta-1 adrenergic activity. An inotropic vasopressor which increases myocardial contractility, cardiac index, oxygen delivery and oxygen consumption. It decreases systemic and pulmonary vascular resistance (adults). Dobutamine has a more prominent effect on cardiac output than dopamine but less of an effect on blood pressure. There is no evidence of a significant difference between dopamine and dobutamine in terms of left ventricular output, tachycardia, neonatal mortality, incidence of periventricular leukomalacia or severe periventricular haemorrhage. Dopamine was more successful than dobutamine in treating systemic hypotension, with fewer infants having treatment failure.

USE
Hypoperfusion and hypotension

PHARMACOKINETICS
Onset of action is 2-4 minutes with peak effect in 10 minutes. Duration of action is 7 minutes, necessitating a continuous IV infusion. Half-life is 2 minutes. Rapidly metabolised in the liver. Pharmacokinetic studies have demonstrated wide variations in plasma concentrations between individuals for a given dose of dobutamine. This is likely to be related to differences in plasma clearance rates which are independent of birthweight and gestational age. In addition, there is a poor correlation between plasma dobutamine concentration and blood pressure response.

PRESENTATION
250mg/20ml solution vial

DOSE
2-20mcg/kg/min depending on patient’s response

<table>
<thead>
<tr>
<th>Infusion strength</th>
<th>Prescribed amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1ml/hr=20mcg/kg/min</td>
<td>60mg/kg Dobutamine to make a 50ml solution</td>
</tr>
</tbody>
</table>

RECONSTITUTION
SOLUTION Add prescribed amount to 5% or 10% dextrose to make a total of 50ml solution.

ADMINISTRATION
Continuous IV infusion only!

DOBUTAMINE SHOULD ALWAYS HAVE ITS OWN LINE AND NOT BE MIXED WITH ANYTHING TO AVOID ACCIDENTAL BOLUS.

STORAGE
Diluted solution is stable for 24 hours. Dobutamine solution may exhibit a pink colour that, if present, will increase with time. This is due to slight oxidation of the drug but does not lose its potency.

MONITORING
Continuous cardio-respiratory and intra-arterial blood pressure monitoring is preferable. Observe IV site closely for extravasation.

ADVERSE EFFECT
1. May cause hypotension if patient is hypovolemic.
2. Tachycardia and arrhythmia.
3. Tissue sloughing may occur with IV infiltration.
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

DOBUTAMINE cont

SOLUTION COMPATIBILITY  5%dextrose, 10%dextrose

INCOMPATIBILITY  acyclovir, aminophylline, amphotericin B, diazepam, digoxin, furosemide, indomethacin, phenytoin, and sodium bicarbonate.

TERMINAL INJECTION SITE COMPATIBILITY  dextrose, amino acid and fat emulsion, atropine, amiodarone, calcium chloride and gluconate, dopamine, epinephrine, fluconazole, heparin, hydrocortisone, lidocaine, magnesium sulphate, meropenem, midazolam, morphine, pancuronium, penicillin G, potassium chloride, propofol, ranitidine, vecuronium.

REFERENCE
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

DOMPERIDONE
Maternal use only!

DESCRIPTION
Peripheral dopamine antagonist generally used as an antiemetic. It is a galactogogue that is known to produce increases of prolactin levels at the pituitary level. It does not cross the blood brain barrier therefore there are less maternal extrapyramidal and depression side effects. It cross less freely into breast milk.

USE
Augment milk secretions in mothers with inadequate breast milk output.

PRESENTATION
10mg/tablet

DOSE
10 mg 3 x day for 2-3 days then increase to 20 mg 3 x day until milk supply well established. Decrease dose to 10 mg 3 x day for 1 week before stopping the medication altogether.

ADMINISTRATION
Oral

NOTE
1. Mothers should have been breastfeeding or expressing 6–8 times a day prior commencement of Domperidon.
2. Double-pumping (milk yields are higher when both breasts are expressed simultaneously) and increased skin-to-skin contact (pouching, allowing baby to nuzzle the breast) have a positive effect.
3. Adequate diet, fluid intake and rest are important.
4. Reassurance, positive support, consistent advice from NICU staff, family and friends is crucial to maternal self-esteem and positive outcomes.
5. Galactogogues will increase milk supply ONLY in concert with all of the above.
6. There is little evidence to support prolonged treatment i.e. more than a month.

STORAGE
Room temperature

ADVERSE EFFECTS
Infant None
Mother Dry mouth, skin rash, itching, headache, thirst, bowel disturbances and seizures are rare

INCOMPATIBILITY
cimetidine, famotidine, nizatidine, ranitidine, sodium bicarbonate

REFERENCE
Australian Breastfeeding Association 2006. Breastfeeding...naturally, p 112-117
Hale, TW. (2010). Medications and Mother’s Milk, 14th Ed.

REVISED 26. September 2011
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

DOPAMINE

DESCRIPTION
Naturally occurring precursor of noradrenaline. It has specific dopaminergic action in addition to alpha and beta adrenergic effects. It is generally accepted that the inotropic and peripheral vasoconstrictor effects of dopamine predominate in the newborn period, although there is considerable controversy surrounding the existence of any vasodilator effects in renal, coronary and cerebral circulations. There is no evidence of a significant difference between dopamine and dobutamine in terms of left ventricular output, tachycardia, neonatal mortality, incidence of periventricular leukomalacia or severe periventricular haemorrhage. Dopamine was more successful than dobutamine in treating systemic hypotension, with fewer infants having treatment failure.

USE
To treat systemic hypotension. Also used as a renal vasodilator.

PHARMACOKINETICS
Onset of action is 2-4 minutes. Half-life is 2 minutes. Rapidly metabolised in the liver, kidneys and plasma. Metabolites excreted via the kidneys. There can be wide variations in plasma concentrations between individuals for a given dose of dopamine. This is likely to be related to differences in plasma clearance rates which are independent of birthweight and gestational age. In addition, there is a poor correlation between plasma dopamine concentration and blood pressure response.

PRESENTATION
200mg/5ml vial

DOSE
2-20mcg/kg/min depending on the desired action
LOW DOSE
2-4mcg/kg/minute acts directly on dopaminergic receptors to produce renal and mesenteric vasodilation. Increases urine output and sodium excretion. Decreases peripheral vascular resistance. For a diuretic effect, 2mcg is as good as 4mcg dose.

INTERMEDIATE DOSE
5-10mcg/kg/minute β₁-adrenergic effects become prominent, resulting in an increase in myocardial contractility, heart rate, cardiac output and possibly an increase in blood pressure (mainly systolic). Also increases renal blood flow.

HIGH DOSE
10-20mcg/kg/minute stimulates α-adrenergic receptors. Increases peripheral and possibly pulmonary vascular resistance. Increases myocardial contractility, blood pressure (mainly systolic), and heart rate. May cause renal vasoconstriction and reduce renal perfusion.

<table>
<thead>
<tr>
<th>Infusion strength</th>
<th>Prescribed amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1ml/hr=20mcg/kg/min</td>
<td>60mg/kg Dopamine to make a 50ml solution</td>
</tr>
</tbody>
</table>

RECONSTITUTION
Add prescribed amount to 5% or 10% dextrose to make a total of 50ml solution.

ADMINISTRATION
Continuous IV infusion only!

DOPAMINE SHOULD ALWAYS HAVE ITS OWN LINE AND NOT BE MIXED WITH ANYTHING TO AVOID ACCIDENTAL BOLUS.

STORAGE
Discard unused portion.

MONITORING
Continuous cardio-respiratory and intraarterial blood pressure monitoring is preferable. Observe IV site closely for blanching and extravasation.
DOPAMINE  cont

ADVERSE EFFECT
1. Tachycardia and arrhythmias. May increase pulmonary artery pressure.
2. Tissue sloughing may occur with IV infiltration. **Suggested treatment:** Inject a 1mg/ml solution of phentolamine into the affected area. The usual amount needed is 1-5 ml depending on the size of the infiltrate.

PRECAUTION
IV administration of phenytoin to patients receiving dopamine may result in severe hypotension and bradycardia. **Use with extreme caution.**

SOLUTION COMPATIBILITY  5%dextrose, 10%dextrose, 0.9%sodium chloride

INCOMPATIBILITY  acyclovir, amphotericin B, furosemide, indomethacin, insulin and sodium bicarbonate

TERMINAL INJECTION SITE COMPATIBILITY  dextrose, amino acid and fat emulsion, aminophylline, ampicillin, amiodarone, caffeine, calcium chloride, chloramphenicol, dobutamine, epinephrine, fluconazole, gentamicin, heparin, hydrocortisone, lidocaine, meropenem, metronidazole, midazolam, morphine, oxacillin, pancuronium, penicillin G, potassium chloride, PGE1, propofol, ranitidine, tobramycin, vecuronium.

REFERENCE
**NEWBORN USE ONLY**
**GIVEN ON DOCTORS ORDER ONLY**

**ENOXAPARIN SODIUM**
**LOW MOLECULAR WEIGHT HEPARIN**

**DESCRIPTION**
Enoxaparin is a fractionated, low molecular weight heparin with a longer duration of action than heparin. This anticoagulant activates antithrombin III that progressively inactivates both thrombin and factor Xa. Efficacy in neonates is decreased due to low antithrombin plasma concentrations.

**Advantages of fractionated Low Molecular Weight Heparin over unfractionated heparin sodium**
- Once daily dosing, rather than a continuous infusion
- No need for monitoring of the APTT coagulation parameter
- Possibly a smaller risk of bleeding
- Smaller risk of heparin-induced thrombocytopenia
- Anticoagulant effects are reversible with protamine sulfate

Enoxaparine is rapidly absorbed. Its bioavailability is 90%. Metabolised by the liver, eliminated by the kidneys.

Data on the safety and efficacy of enoxaparin in the neonate are limited because of the infrequent nature of neonatal thrombosis.

**USE**
- Deep vein thrombosis
- Pulmonary embolus
- Arterial thromboses

**PRESENTATION**
20mg/0.2ml pre-filled syringes

**DOSE**
1.5 mg/kg every 12 hours
Adjust dosage to maintain anti-factor Xa levels between 0.5 - 1 U/ml.

**USE ONLY AFTER CONSULTATION WITH HAEMATOLOGY DEPARTMENT AT SCH**

**ADMINISTRATION**
Subcutaneous injection

**STORAGE**
Discard unused portion

**MONITORING**
Measure anti-factor Xa concentrations 4 hours after a dose.

**Guidelines for adjusting LMWH Therapy in Neonates**

<table>
<thead>
<tr>
<th>Anti-factor Xa concentration U/ml</th>
<th>Dose adjustment</th>
<th>Next anti-factor Xa measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;0.35</td>
<td>increase next dose by 25%</td>
<td>4 hr following dose adjustment</td>
</tr>
<tr>
<td>0.35 - 0.49</td>
<td>increase next dose by 10%</td>
<td>4 hr following dose adjustment</td>
</tr>
<tr>
<td>0.5 - 1.0</td>
<td>no change</td>
<td>Weekly 4 hr following a dose</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If change in renal function, addition of antibiotics, signs of bleeding, check level 4 hr after next dose</td>
</tr>
<tr>
<td>1.1 - 1.3</td>
<td>decrease next dose by 20%</td>
<td>Before next dose and 4 h following dose adjustment</td>
</tr>
<tr>
<td>1.4 to 2.0</td>
<td>hold dose until anti-factor Xa level &lt;1 then decrease next dose by 30%</td>
<td>4 hr following dose adjustment</td>
</tr>
<tr>
<td>&gt;2.0</td>
<td>hold dose until anti-factor Xa level &lt;0.5 then decrease next dose by 40%</td>
<td>12 h until anti-factor Xa level &lt;0.5, then 4 hr following reinstitution of therapy</td>
</tr>
</tbody>
</table>
ADVERSE EFFECTS
Local irritation, pain, bruising following subcutaneous injection
Haemorrhage - blood leakage, bruises, induration, or hematoma at the
site of the indwelling catheters, minor bleeding found in gastric feeding
tubes
Thrombocytopenia
Elevation of liver enzymes (AST & ALT)
Osteopenia

ANTIDOTE
If anticoagulation with LMWH must be terminated for any reason,
discontinuation of the subcutaneous injections usually is sufficient. At
least two doses of LMWH should be withheld and anti-factor Xa
measured, if possible, prior to the performance of lumbar punctures and
other invasive procedures.
Protamine sulfate neutralizes the anti-factor Xa activity only partially,
but has been shown to reverse bleeding due to LMWH in animal
models. The recommended dose of protamine sulfate is 1 mg for 100 U
of LMWH given within 4 hours.

CONTRAINDICATIONS
Infants with active bleeding
Evidence of intracranial or GI bleeding
Thrombocytopenia < 50,000
Renal failure

DRUG INTERACTIONS
1. Platelet inhibitors acetylsalicylic acid, ibuprofen,
indomethacin may induce bleeding and should be used with caution.
2. Other interactions digoxin, tetracyclines, or antihistamines
may partially counteract the anticoagulant action of heparin.

SOLUTION COMPATIBILITY 0.9% sodium chloride, water for injection

TERMINAL INJECTION SITE COMPATIBILITY No data available

REFERENCES
4. Michaels L, Gurian M et al. Low Molecular Weight Heparin in the Treatment of Venous and Arterial Thromboses
5. Monagle et al. Low molecular weight heparin
6. Malowany J, Knoppert D. Enoxaparin Use in the Neonatal Intensive Care Unit: Experience Over 8 Years
7. Pharmacotherapy 2007;27: 11
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY
EPO

See under HUMAN RECOMBINANT ERYTHROPOIETIN
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY
ERYTHROMYCIN

DESCRIPTION
Macrolide antibiotic. Acts by inhibition of protein synthesis. It binds to 50S ribosomal subunits of susceptible organisms. Bacteriostatic at low concentration and bactericidal at high concentration. Active against a number of gram positive cocci and bacilli. It is also motilin receptor agonist and induces stomach and small intestine motor activity. Drug is concentrated in liver and bile and is excreted via bowel.

USE
1. Treatment of infections caused by Chlamydia, Mycoplasma, and ureaplasma
2. Treatment and prophylaxis against Bordetella Pertussis
3. Substitute for penicillin in situations of significant allergic intolerance.
4. Low dose therapy for feed intolerance

PRESENTATION
IV 300mg/vial
Oral 200mg/5ml of erythromycin ethylsuccinate. May vary.

DOSE
1. Pertussis 10mg/kg/dose orally 6hrly for 10 days
2. Chlamydial pneumonia 10mg/kg/dose orally 6hrly for 2-3 weeks
3. Chlamydial conjunctivitis 10mg/kg/ orally 6hrly for 3 weeks
4. Other infections and prophylaxis of pertussis 10mg/kg/dose orally 6hrly for 10 days
5. Feed intolerance in preterm babies 2.5mg/kg/dose orally 6 hrly
6. IV therapy for serious infections when oral route is not available 5-10mg/kg/dose 6 hrly

RECONSTITUTION
IV Add 5.6ml water for injection to vial to make a 50mg/ml solution. Diluted drug should be used within 8 hours.
FURTHER DILUTE 1ml (50mg) of reconstituted erythromycin to 9ml of 0.9% sodium chloride to make a 5mg/ml solution.

ADMINISTRATION
IV Slow IV infusion over one hour using the proximal IV bung.
ORAL

MONITORING
Monitor heart rate and blood pressure closely during IV administration. Liver function should be assessed.

ADVERSE EFFECT
Hypertrophic pyloric stenosis has been reported in 4% of neonates who received oral erythromycin for pertussis prophylaxis. Intrahepatic cholestasis. Venous irritation is common with IV dose.

DRUG INTERACTION
Erythromycin may increase plasma concentrations of digoxin, midazolam, theophylline and carbamazepine because of prolongation of their half-life. Contraindicated in patients receiving cisapride due to the possibility of life threatening arrhythmias.

SOLUTION COMPATIBILITY
0.9% sodium chloride, water for injection
ERYTHROMYCIN cont

SOLUTION INCOMPATIBILITY dextrose solutions

INCOMPATIBILITY ampicillin, fluconazole, furosemide, metoclopramide

REFERENCE
DESCRIPTION
Iron supplement needed for the production of haem proteins.

USE
Treatment and prevention of iron deficiency anaemia.

PRESENTATION
150/5ml of Ferrous Sulphate equivalent to 30mg/5ml of elemental iron

DOSE
1. 2mg/kg/dose of elemental iron (0.3ml/kg of Ferro-Liquid) daily commencing at 4-6 weeks of age. This is the dose recommended for routine supplementation to prevent iron deficiency.
2. Up to 6mg/kg/day (1ml/kg Ferro-Liquid) in iron deficiency anaemia or when using recombinant erythropoietin. **This dose needs to be written only after discussion with consultant on call.**

ADMINISTRATION
Give orally or via IGT with feed

ADVERSE EFFECT
Gastro-intestinal irritation and constipation have been reported. Black or dark green stools may also be evident.

REFERENCE
FLUCLOXACILLIN

DESCRIPTION
Semisynthetic penicillin and penicillinase resistant. Bactericidal and inhibits the biosynthesis of cell wall mucoproteins. Reliably absorbed by oral route. Major route of excretion is renal.

USE
Narrow spectrum antibiotic used in the treatment of gram-positive organisms, especially penicillinase producing staph aureus and penicillin sensitive staph epidermidis.

PRESENTATION
250mg/vial, 500mg/vial
250mg/5ml powder for suspension

DOSE
ORAL 25mg/kg/dose regardless of age or gestation
IV 50mg/kg/dose (100mg/kg/dose can be prescribed for treatment of staphylococcal meningitis or cerebral abscess.)

<table>
<thead>
<tr>
<th>Postnatal age</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7 days</td>
<td>12hrly</td>
</tr>
<tr>
<td>&gt;7 days</td>
<td>8hrly</td>
</tr>
</tbody>
</table>

ROUTE
IV injection
Oral

RECONSTITUTION
Add 4.8ml water for injection to 250mg vial to make a 50mg/ml solution.
Add 4.6ml water for injection to 500mg vial to make a 100mg/ml solution.

ADMINISTRATION
Slow IV bolus injection using proximal IV bung.

STORAGE
Discard unused portion.

MONITORING
Irritating to veins, observe IV site for signs of extravasation.

ADVERSE EFFECT
Rare.
1. Nausea, vomiting, diarrhea, dyspepsia
2. Rashes. May develop more than 48 hours after treatment.
3. Interstitial nephritis
4. Cholestatic hepatitis has been reported following prolonged therapy. May manifest up to 6 weeks after therapy and may last for months.
5. Bone marrow depression. Rare. Reversible after discontinuation of therapy. Believed to be hypersensitivity phenomena.
FLUCLOXACILLIN cont

CAUTION
Dose may need modification in patients with renal failure as it is excreted predominantly via kidneys.

SOLUTION COMPATIBILITY  5%dextrose, 10%dextrose, 0.9%sodium chloride

INCOMPATIBILITY  amikacin, gentamicin, kanomycin.

REFERENCE
FLUCONAZOLE

DESCRIPTION
Antifungal agent. Inhibits cytochrome P-450-dependent ergosterol synthesis. Effective against Candida, Cryptococcus neoformans, Coccidioides and dermatophytes. Primarily excreted unchanged in urine. Its use in neonates is limited. Wiest et al used fluconazole in a premature infant with disseminated candidiasis unresponsive to amphotericin B and 5-fluorocytosine. There is a case report of successful use of fluconazole in a premature infant with candidial meningitis. Other reports suggest fluconazole is effective and associated with fewer side effects than amphotericin B.

USE
Candidial systemic infections, meningitis and severe superficial mycoses caused by Candida species. Note that Amphotericin is still the drug of choice for serious and life threatening candidiasis.

PHARMACOKINETICS
Well absorbed after oral administration (bioavailability over 90%). Good penetration into CSF and skin after both oral and IV administration. In premature infants, half-life is about 74 hours before 36 hours of birth, 53 hours 6 days later, and 47 hours 12 days later. A loading dose on day 1 will help achieve steady plasma levels much faster by day 2. Primarily excreted unchanged in urine.

RESENTATION
IV  2mg/ml vial as a premixed solution
ORAL 50mg/5ml powder for suspension

DOSE
SYSTEMIC INFECTIONS, MENINGITIS 12mg/kg loading dose, then 6mg/kg/dose maintenance

<table>
<thead>
<tr>
<th>Age</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–7 days</td>
<td>72 hrly</td>
</tr>
<tr>
<td>8-14 days</td>
<td>48 hrly</td>
</tr>
<tr>
<td>&gt;15 days</td>
<td>24 hrly</td>
</tr>
</tbody>
</table>

THRUSH 6mg/kg on day one, then 3mg/kg/dose every 24 hours orally.

ADMINISTRATION IV Infusion over 30 minutes using the proximal IV bung.

STORAGE Discard unused portion.

MONITORING Assess renal function. Follow AST, ALT, and FBC for eosinophilia.
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

FLUCONAZOLE cont

ADVERSE EFFECT Limited data in neonates. Reversible elevations of transaminases. Rarely clinical hepatitis has been reported.

COMPATIBLE FLUIDS 5%dextrose, Hartman’s, Ringer’s, 0.9%sodium chloride.

COMPATIBLE DRUGS acyclovir, cefazidime, cephazolin, gentamicin, heparin sodium, morphine, potassium chloride, ranitidine.

COMPATIBLE VIA Y SITE acyclovir, allopurinol, aztreonam, benzylpenicillin, cefazolin, cefotetan, cefoxitin, chlorpromazine, dexamethasone, droperidol, famotidine, fosfamid, ganciclovir, gentamicin, heparin, hydrocortisone, metoprolol, metronidazole, midazolam, morphine, pethidine, phenytoin, promethazine, ranitidine, vancomycin, zidovudine.

INCOMPATIBLE DRUGS amphotericin B, ampicillin, calcium gluconate, cefotaxime, cefazidime, ceftriaxone, chloramphenicol, clindamycin, digoxin, erythromycin, furosemide, imipenem, piperacillin, ticarcillin, and trimethoprim-sulfamethoxazole.

REFERENCE
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

FRUSEMIDE

DESCRIPTION
Inhibits the active chloride transport in the ascending limb of the loop of Henle and inhibits tubular sodium transport using a major loss of sodium and chloride. It also increases loss of potassium and calcium, and increases urinary pH. Also decreases pulmonary transvascular fluid filtration.

USE
1. Fluid overload, pulmonary oedema, congestive heart failure
2. Prevent fluid overload during blood transfusion
3. Chronic lung disease
4. Patent ductus arteriosus

PRESENTATION
20mg/2ml ampoule
10mg/1ml oral suspension

DOSE
IV BOLUS and ORAL 1mg/kg/dose 12 hrly for term infants, 24 hrly for preterm infants. Dose may be increased to 6mg/kg/dose and intervals can vary in some clinical situations.

IV INFUSION 0.5-1mg/kg/hr in severe renal failure

ROUTE
IV injection, oral

ADMINISTRATION
IV BOLUS Slow IV bolus injection using the proximal IV bung
IV INFUSION 24-hour dose diluted in appropriate amount of 0.9%sodium chloride depending on the fluid regime as per consultant's order.

STORAGE
Discard unused portion
Discard oral solution bottle 21 days after opening.

MONITORING
Urine output, specific gravity and serum electrolytes
DAILY WEIGHTS ARE NEEDED AFTER COMMENCEING THERAPY!

ADVERSE EFFECT
Hypokalaemia, hypocalcaemia, hyponatraemia and hypochloremic alkalosis. Hypercalciuria and development of renal calculi occur with long term therapy. Ototoxicity when combined with vancomycin and aminoglycosides. Cholelithiasis also has been reported with long term therapy.

SOLUTION COMPATIBILITY
0.9%sodium chloride, water for injection
Dextrose cause frusemide to degrade when mixed together for several hours!

INCOMPATABILITY
dobutamine, dopamine, erythromycin, fluconazole, gentamicin, hydralazine, isoproterenol, metoclopramide, midazolam, netilmicin, vecuronium.
FRUSEMIDE cont

TERMINAL INJECTION SITE COMPATIBILITY amikacin, aminophylline, ampicillin, atropine, aztreonam, bumetanide, calcium gluconate, cimetidine, dexamethasone, digoxin, epinephrine, famotidine, heparin, hydrocortisone, indomethacin, lidocaine, lorazepam, meropenem, morphine, nitroglycerine, penicillin G, potassium chloride, propofol, prostaglandin E1, ranitidine, sodium bicarbonate, tobramycin and tolazoline.

REFERENCE
Brion LP, Primhak RA. Intravenous or enteral loop diuretics for preterm infants with (or developing) chronic lung disease. Cochrane Database Syst Rev. 2002;(1):CD001453.
GENTAMICIN

DESCRIPTION
Aminoglycoside antibiotic. Bactericidal against many aerobic, gram negative bacilli. Binds irreversibly to bacterial ribosomes (30 S ribosomal subunit) and thus inhibits protein synthesis. Synergistic action when given with penicillin.

USE
Gram negative infections. First line drug along with penicillin group in treating sepsis of unknown etiology.

PHARMACOKINETICS
Variable absorption with IM injection. Distributes widely throughout the body, but negligible penetration into CSF. High concentrations are found in the renal cortex and in the endolymph and perilymph of the inner ear; this may contribute to the nephrotoxicity and ototoxicity. Excreted almost entirely by glomerular filtration. Serum half-life is prolonged in premature, asphyxiated newborns, significant PDA or on indomethacin.

DOSE

<table>
<thead>
<tr>
<th>Corrected Gestational Age*</th>
<th>Dose</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;33 wks</td>
<td>3.5mg/kg</td>
<td>36 hours</td>
</tr>
<tr>
<td>≥33 wks</td>
<td>3.5 mg/kg</td>
<td>24 hours</td>
</tr>
</tbody>
</table>

*Corrected gestational age (wks) = gestational age (wks) at birth + postnatal age (wks)

PRESENTATION
10mg/ml ampoule
2mg/ml pre-made syringe

RECONSTITUTION
Add 1ml (10mg) of gentamicin to 9ml of 0.9% sodium chloride to give a 1mg/ml solution.

OR
Use pre-made syringe undiluted.

ADMINISTRATION
IV infusion over 30 minutes using proximal IV bung. Administer as a separate infusion from penicillin-containing compounds.

NOTE
Ampicillin and Amoxicillin may degrade gentamicin when in the same blood sample tube causing a falsely low serum gentamicin concentration reading. Separate ampicillin and gentamicin administration by 2 hours or give ampicillin after gentamicin levels have been drawn.

MONITORING
Trough levels prior to third dose.
0.5ml of blood is to be collected in green top plasma tube. The lab testing is available 24 hours a day and the result will be available within 1-2 hours. Results of the levels must be obtained and discussed with medical team prior to 3rd dose.

In renal disfunction trough level to be checked prior to each dose.

Acceptable trough level <1mg/l
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

GENTAMICIN  cont

ADVERSE EFFECT  Toxicity is rare in the newborn but can include
1. Nephrotoxicity  Associated with excessive accumulation of gentamicin. The initial symptoms may be due to renal tubular concentrating defect. These include excessive losses of sodium, calcium and magnesium. This may progress to proteinuria, casts, increased BUN, oliguria, increased serum creatinine. Renal impairment is most often reversible.
2. Ototoxicity  Both vestibular and auditory toxicity. Associated with excessive high plasma gentamicin concentrations levels and duration of therapy. May be irreversible.
3. Neuromuscular blockade  Muscular paralysis, respiratory failure may occur particularly when used with other neuromuscular blockers such as pancuronium.

NEPHROTOXICITY AND OTOTOXICITY ARE MORE PRONOUNCED WITH ADDITION OF OTHER NEPHROTOXIC AGENTS SUCH AS FRUSEMIDE AND VANCOMYCIN.

CONTRAINDICATION 1.CAUTION in patients with renal impairment. Adjust dose.
2.CAUTION concurrent therapy with other ototoxic or nephrotoxic drugs.

COMPATIBLE FLUIDS  5%dextrose, 10%dextrose, 0.9%sodium chloride, Hartman’s, amino acid solution

TERMINAL INJECTION SITE COMPATIBILITY acyclovir, aztreonam, clindamycin, dopamine, fluconazole, insulin, heparin (concentration ≤ 1 U/ml), meropenem, methicillin, metronidazole, midazolam, morphine, pancuronium, ranitidine, vecuronium, zidovudine.

INCOMPATIBLE DRUGS amoxycillin, ampicillin, amphotericin B, cefotaxime, ceftazidime, cephalothin, flucloxacinil, frusenem, heparin (concentration >1U/ml), imipenem, indomethacin, oxacillin, propofol and ticarcillin.

REFERENCE
Goodman & Gilman’s The Pharmacologic Basis of Therapeutics. 8th Ed, 1990, P 1099-1110.
GLUCAGON

DESCRIPTION
A hormone produced by the alpha cells of the pancreas that causes increased breakdown of glycogen to form glucose and inhibition of glycogen synthetase. Inhibit small bowel motility and gastric acid secretion.

USE
Hypoglycaemia unresponsive to routine treatment, or in cases of glucagon deficiency. Should not be used in SGA infants.

PRESENTATION
1U(1mg)/vial with a diluent

DOSE
BOLUS
200mcg/kg/dose (0.2mg/kg/dose)
MAXIMUM DOSE IS 1MG! Not per kilogram!

IV
5-20mcg/kg/hr

<table>
<thead>
<tr>
<th>Infusion strength</th>
<th>Prescribed amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1ml/hr=20mcg/kg/hr</td>
<td>1mg/kg Glucagon to make a 50ml solution</td>
</tr>
</tbody>
</table>

RECONSTITUTION
Add 1ml of accompanying diluent to 1mg vial to make 1mg/ml solution. For continuous IV infusion FURTHER DILUTE prescribed amount shown in above table with 5% or 10% dextrose to make total of 50ml solution.

ROUTE
IV, IM, SC injections

ADMINISTRATION
IM, SC Slow injection
IV BOLUS Slow IV bolus using the proximal IV bung.
IV INFUSION Continous IV infusion via syringe pump.

STORAGE
Discard unused portion.

MONITORING
Blood glucose level. The rise in blood glucose will last approximately 2 hrs. Watch for rebound hypoglycaemia.

ADVERSE EFFECT
Hypersensitivity, nausea and vomiting, possible paralytic ileus due to decreased small bowel motility.

COMPATIBILITY
Dextrose

INCOMPATIBILITY
All drugs including electrolytes.

REFERENCE
HBIG is prepared from blood obtained from voluntary donors. It contains a hepatitis B antibody titre of not less than 100 IU/ml. Passive immunization agent. It contains specific neutralizing antibodies (mainly IgG) against Hepatitis B surface antigen (HBS Ag). Peak serum levels of antibodies are usually obtained 2-3 days after intramuscular injection. The serum half-life is 3-4 weeks.

Prophylaxis for neonates born to mothers who are HBS Ag positive or with acute hepatitis B infection at the time of delivery.

100U/1ml ampoule.

1ml (100U) administered preferably within 12 hrs of delivery.

IM injection only

IM injection into upper thigh muscle. When given at the same time as the first dose of hepatitis B vaccine, use a separate syringe and a different site.

Local pain and tenderness

Isolated IgA deficiency. Severe thrombocytopenia or severe coagulation deficiencies as intramuscular injections may cause bleeding.

NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

HEPATITIS B VACCINE (RECOMBINANT)

USE
Prophylaxis for infants against Hepatitis B infection.

PREPARATION

Monovalent vaccines
These have only hepatitis B vaccine. Primarily used at birth.
1. **H-B VaxII** Commonly used monovalent vaccine in NICU.
2. Engerix-B (alternative to H-B VaxII).

Multivalent (combined) vaccines
1. **Infanrix-HepB** Commonly used combined DTPa-Hep B vaccine. Primarily used as a booster dose at 2, 4 and 6 months.
2. Comvax Combined Hib–HepB vaccine. Rarely used.

DOSE
0.5ml IM in the anterolateral aspect of thigh. The dose is the same for all the above vaccines.

NOTE
If using infanrix-Hep B right thigh must be used.

INFORMED CONSENT SHOULD BE OBTAINED FROM PARENTS PRIOR ADMINISTRATION!

RECOMMENDED SCHEDULE

NHMRC recommends a universal hepatitis B immunisation to all infants starting at birth except for preterm infants <32 weeks gestation at birth.

For hepatitis B vaccination of babies <32 weeks gestation there are two options
1. If the mother is hepatitis B carrier an extra dose of hepatitis B vaccine is given commencing at birth (at birth, 2, 4, 6, 12 month schedule).
2. If no risk factors, delay vaccination until 2 months of age and use a 4-dose (2,4,6,12 month) schedule.

<table>
<thead>
<tr>
<th>No Risk Factors</th>
<th>Maternal Hepatitis B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth</td>
<td></td>
</tr>
<tr>
<td>&lt;32 weeks</td>
<td>H-B-Vax II</td>
</tr>
<tr>
<td>≥32 weeks</td>
<td>H-B-Vax II</td>
</tr>
<tr>
<td></td>
<td>HBIG*</td>
</tr>
<tr>
<td>2 Months</td>
<td>Infanrix – Hep B</td>
</tr>
<tr>
<td></td>
<td>Pedvax HIB</td>
</tr>
<tr>
<td>4 Months</td>
<td>Infanrix – Hep B</td>
</tr>
<tr>
<td></td>
<td>Pedvax HIB</td>
</tr>
<tr>
<td>6 Months</td>
<td>Infanrix – Hep B</td>
</tr>
<tr>
<td></td>
<td>Pedvax HIB</td>
</tr>
<tr>
<td>12 Months</td>
<td>Pedvax HIB Priorix</td>
</tr>
<tr>
<td></td>
<td>H-B-Vax II Priorix</td>
</tr>
</tbody>
</table>

*HBIG Hepatitis B Immunoglobulin

ADVERSE EFFECT
Swelling, warmth and erythema at injection site. Fever in up to 3.7% of neonates.

REFERENCE
HUMAN RECOMBINANT ERYTHROPOIETIN (EPO)

DESCRIPTION
Erythropoietin (EPO) is an endogenous glycoprotein that stimulates red blood cell production normally produced by the kidney.

USE
To decrease the need for RBC transfusions in extremely low birth weight babies.

PHARMACOKINETICS
Adequate iron and protein intake is necessary for EPO to be effective. Subcutaneously administered drug appears to be pharmacodynamically as effective as IV, despite only 40% bioavailability. Half-life in preterm infants is approximately 12 hours.

PRESENTATION
1000U/0.5ml

DOSE
400U/kg 3 times weekly (Mon/Wed/Fri). Can be commenced as early as 4 days after birth and can be continued through 35th postmenstrual week. Infants should be given a weekly intravenous infusion of 5mg/kg iron dextran until they have an enteral intake of at least 60ml/kg/day. Once they are on enteral feeds of 60mg/kg/day, they can be given 3mg/kg/day of enteral iron. Once the baby's enteral intake is 120ml/kg/day, increase the elemental iron to 6mg/kg/day.

ADMINISTRATION
SC INJECTION preferred
IV INJECTION over 1-2 minutes using the proximal IV bung
For IV administration, the drug can be diluted 1in 10 with 0,9%sodium chloride.

STORAGE
Discard unused portion

MONITORING
Continuous cardio-respiratory monitoring. Monitor blood pressure. Full blood and reticulocyte count weekly.

ADVERSE EFFECT
Hypertension, seizures, neutropaenia, and thrombocytosis. Transient erythema at site of sc injection

INCOMPATIBILITY
No data available

REFERENCE
HYDRALAZINE

DESCRIPTION
Antihypertensive agent. Causes relaxation of smooth muscle in the arteriolar resistance vessels. Decrease in systemic vascular resistance and increase in cardiac output. Increase in renal, coronary, cerebral and splanchnic blood flow.

USE
Mild to moderate hypertension.

NOTE
1. Nifedipine is now increasingly the preferred option to treat hypertension.
2. If hydralazine is used it is recommended to use it with a beta-blocker to enhance the antihypertensive effect and decrease the side effect of reflex tachycardia. This is expected to reduce the hydralazine IV dosage requirement to < 0.15mg/kg per dose

PHARMACOLOGY
When administered orally hydralazine has low bioavailability because of extensive first pass metabolism by the liver and intestines. The rate of enzymatic metabolism is genetically determined by the acetylator phenotype – slow acetylators have higher plasma concentrations and a higher incidence of adverse effects.

PRESENTATION
20mg/ml ampoules
25mg/ tablets

DOSE
IV 250-1000mcg/kg/dose 6-8 hourly titrated to respons.
ORAL 500mcg/kg 8 hourly increase as necessary to a maximum of 2-3mg/kg 8 hourly.

ROUTE
IV via proximal IV bung
Oral with feeds

MONITORING
heart rate
blood pressure as per NCC blood pressure monitoring protocol 2010.

ADVERSE EFFECTS
Tachycardia, emesis, and temporary agranulocytosis in neonates. Nausea, lupus-like syndrome, GI irritation and bleeding, fever, rash, conjunctivitis and bone marrow suppression in adults.

SOLUTION COMPATIBILITY
5% and 10% dextrose, 0.9% sodium chloride

TERMINAL INJECTION SITE COMPATIBILITY
amino acid, dobutamine, heparin, hydrocortisone succinate, potassium chloride, prostaglandine

INCOMPATIBILITY
aminophylline, ampicillin, diazoxide, frusemide, phenobarbital

REFERENCES
Neonatal Formulary 5, Drug use in Pregnancy and First Year of Life, 2007, Blackwell Publishing
Watkinson M. Hypertension in the Newborn baby. (Review) Arch Dis Child 2002;86:F78-81
Young TE. Mangum B. Neofax 19th edition 2008
NEWBORN USE ONLY  
GIVEN ON DOCTORS ORDER ONLY  

HYDROCHLOROTHIAZIDE

DESCRIPTION  
Enhance the excretion of sodium chloride and water by interfering with transport of sodium ions across the renal tubular epithelium in the distal nephron. Potassium, bicarbonate, magnesium, phosphate and iodine excretion are also enhanced, while calcium excretion is decreased. It also inhibits the pancreatic release of insulin. Onset of action is 1-2 hours.

USE  
1. mild to moderate oedema from mild congestive heart failure  
2. chronic lung disease  
3. mild to moderate hypertension  
4. nephrocalcinosis induced by calciurics such as frusemide

PHARMACOKINETICS  
Variable absorption from GI tract. Onset of action within 1 hour. Elimination half-life is about 5 hours. Decreases calcium excretion. Displaces bilirubin from albumin binding sites.

PRESENTATION  
5mg/ml mixture

DOSE  
1–2mg/kg/dose 12 hourly

ROUTE  
Oral, with feeds for better absorption.

MONITORING  
Serum electrolytes, blood glucose, urine output and blood pressure

ADVERSE EFFECT  
Hypokalaemia, other electrolyte abnormalities, and hyperglycaemia.  

Do not use in patients with significant impairment of renal or hepatic function.

REFERENCE
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

HYDROCORTISONE

DESCRIPTION
Hydrocortisone is a steroid possessing primarily glucocorticoid activity. It increases the expression of adrenergic receptors in the vascular wall, thereby enhancing vascular reactivity to other vasoactive substances.

USE
1. Inotrope resistant hypotension
2. Adrenal insufficiency
3. Persistent hypoglycemia

PRESENTATION
100mg/powdered via

DOSE
1. ADRENAL INSUFFICIENY
   Replacement dose as per Endocrinologist on call.
2. INOTROPE-RESISTANT HYPOTENSION, HYPOGLYCEMIA
   2-5mg/kg/day in 2-4 divided doses

ROUTE
IV injection, IM injection

RECONSTITUTION
Add 2ml of water for injection to vial (100mg) to make a 50mg/ml solution. FURTHER DILUTE 1ml of the above solution with 9ml of water for injection to make a 5mg/ml solution.

ADMINISTRATION
Slow IV bolus injection using the proximal IV bung

STORAGE
24 hours in refrigerator

MONITORING
Blood glucose level for hyperglycaemia. Urinalysis for glycosuria.

ADVERSE EFFECT
Increased susceptibility to infection due to its immunosuppressive action. Hyperglycaemia, salt and water retention. Acute adrenal insufficiency, Candidal infections.

SOLUTION COMPATIBILITY
5%dextrose, 10%dextrose, 0.9%sodium chloride

TERMINAL INJECTION SITE COMPATIBILITY
acyclovir, amikacin, aminophylline, amphotericin B, ampicillin, atropine, aztreonam, calcium chloride, calcium gluconate, chloramphenicol, clindamycin, dexamethasone, digoxin, dopamine, erythromycin, famotidine, fluocxacillin, lignocaine, lincomycin, magnesium sulphate, metronidazole, metilimcin, noradrenaline, piperacillin, potassium chloride, vancomycin, verapamil.

INCOMPATIBILITY
midazolam, nafcillin, pentobarbital, phenobarbital, phenytoin.

REFERENCE
Seri I, et al. Cardiovascular effects of hydrocortisone in preterm infants with pressor-resistant hypotension
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

IBUPROFEN (PEDEA)

DESCRIPTION Ibuprofen is a non-steroidal anti-inflammatory agent. It is a non-selective inhibitor of cyclo-oxygenase, leading to reduced synthesis of prostaglandins. A regimen of 10/5/5 mg/kg dose resulted in closure of 75% ducts in neonates of 27-29 weeks GA and 33% in 24-26 weeks GA. Ibuprofen half-life is extremely variable at birth (10-80hrs).

USE Treatment of haemodynamically significant patent ductus arteriosus in preterm newborn infants

PRESENTATION 10mg/2ml ampoule

DOSE Three intravenous doses of Ibuprofen given at 24 hr interval
- 1st infusion 10mg/kg
- 2nd infusion 5mg/kg
- 3rd infusion 5mg/kg

If ductus arteriosus does not close after the first course or it re-opens, a second course of 3 doses, as above, maybe given.

ROUTE IV infusion ONLY

RECONSTITUTION Add 2ml of 0.9% sodium chloride to 2ml of Ibuprofen (10mg/2ml) to make a 2.5mg/ml solution.

ADMINISTRATION IV infusion over 15 mins using the proximal IV bung.

STORAGE Discard unused portion.

MONITORING Serum electrolytes, full blood count, signs of bleeding, gastric aspirates, urine output, creatinin, serum bilirubin, gentamicin level.

ADVERSE EFFECTS Thrombocytopenia, Neutropenia
- Intraventricular haemorrhage, Periventricular Leukomalacia
- Bronchopulmonary dysplasia, Pulmonary haemorrhage
- Hypoxemia with Pulmonary Hypertension if administered prophylactically in the first 6 hrs of birth.
- Necrotizing enterocolitis, Intestinal perforation.
- Oliguria, fluid retention, haematuria. Acute renal failure is uncommon. If anuria occurs after 1st or 2nd dose, the next dose should be withheld until urine output returns to normal.
- Decreased blood sodium, increased creatinine
- Overdose 100mg/kg can lead to CNS depression, seizures, GI disturbances and renal impairment.

DRUG INTERACTIONS
- Increases gentamicin levels in blood
- May increase risk of GI bleeding if used with corticosteroids
- Increased risk of bleeding when used with iNO (Inhibit platelet function)
IBUPROFEN cont.

CONTRAINDICATIONS
Life threatening infection.  
Active bleeding, especially intracranial or gastrointestinal haemorrhage  
Thrombocytopenia or coagulation defects  
Significant renal impairment  
Infants who are significantly jaundiced  
Known or suspected Necrotising enterocolitis  
Infants with congenital heart disease in whom the patency of the PDA is necessary for satisfactory pulmonary or systemic blood flow (eg Transposition of the Great Arteries; preductal coarctation of the aorta; pulmonary atresia; Tetralogy of Fallot).

PRECAUTIONS
Prophylactic use in first 3 days in preterms iIncrease incidence of pulmonary and renal adverse events.
Ibuprofen displaces bilirubin from its binding site on albumin which increases the risk of bilirubin encephalopathy. To use it with caution in preterms with marked unconjugated hyperbilirubinemia  
Can mask infection related signs and symptoms.  
Ibuprofen may decrease the clearance of gentamicin and strict surveillance of its serum levels is recommended.

SOLUTION COMPATIBILITY  0.9% sodium chloride, 5% dextrose

INCOMPATIBILITY  Do not infuse with any other drugs or solutions

REFERENCE
PEDEA Drug Company product information
Young TE, Mangum BM. Neofax 2008 21st Edition
Ohlsson A, Walia R, Shah SS. Ibuprofen for the treatment of patent ductus arteriosus in preterm and/or low birth weight infants. Cochrane Database of Systematic Reviews 2008, Issue 1
Gournay V, Savagner C et al. Pulmonary hypertension after ibuprofen prophylaxis in very preterm infants The Lancet 359;9316:1486-1488
IMIPENEM

DESCRIPTION
Broad spectrum carbapenem antibiotic. Bactericidal and inhibits cell wall synthesis. About 98% of unselected bacterial pathogens isolated from humans are susceptible to this drug. Active against most aerobic and anaerobic gram positive and gram-negative bacteria including most streptococci and staphylococci (MRSA, MRSE), L. monocytegenes, Clostridium, Peptococcus, Peptostreptococcus, E coli, Klebsiella, Proteus species, Citrobacter and Enterobacter species.

USE
Restricted to the treatment of NON-CNS infections due to multiresistant organisms, primarily Enterobacteriaceae and anaerobes. (Risk of drug related seizures in patients with meningitis!).

PHARMACOLOGY
Imipenem is combined in a 1:1 ratio with cilastatin. Cilastatin has no intrinsic antibacterial activity but is a potent inhibitor of renal dehydropeptidase-I, an enzyme that metabolises imipenem. The co-administration of both drugs increases the urinary concentrations of imipenem, prolongs the imipenem serum half life, and appears to prevent the nephrotoxicity induced by high dose of imipenem. 70-80% of imipenem is excreted unchanged in urine. The mean serum half-life is 2 hours, whereas that of cilastatin is 5.1 to 6.4 hours. The half-lives are inversely related to birthweight and gestational age. Although it can penetrate well in inflamed meninges, it may induce seizures in infants with bacterial meningitis and so not to be used in meningitis. Meropenem has not been shown to cause seizures in infants with meningitis and so, a better alternative in cases with multi-resistant organisms.

PRESENTATION
250mg/vial in powder form
500mg/vial in powder form

DOSE
20-25mg/kg/dose 12 hourly

ROUTE
IV infusion only

RECONSTITUTION
Add 4.7ml of 0.9%sodium chloride to 250mg vial to make a 50mg/ml solution.
Add 9.4ml of 0.9%sodium chloride to 500mg vial to make a 50mg/ml solution.
FURTHER DILUTE 1ml (50mg) of reconstituted imipenem to 9ml of 0.9%sodium chloride to make a 5mg/ml solution.

ADMINISTRATION
Infuse over 30 minutes using the proximal IV bung.

STORAGE
Discard unused portion.

MONITORING
Not applicable

ADVERSE EFFECT
1. Seizures in patients with meningitis or pre-existing CNS pathology or severe renal dysfunction
2. Local reaction at the injection site
3. Thrombocytosis
4. Eosinophilia, elevated hepatic transaminases and diarrhea in over 5% of patients.
IMIPENEM cont

COMPATIBLE FLUIDS  5%dextrse, 10%dextrose, 0.9%sodium chloride

TPN COMPATIBILITY  No information. It is at the discretion of the consultant on-call.

COMPATIBLE DRUGS  No information.

COMPATIBILITY VIA Y SITE  acyclovir, diltiazem, famotidine, foscarnet, heparin, ondanesetron, tacrolimus.

INCOMPATIBLE DRUGS  allopurinol, amikacin, fluconazole, gentamicin, lorazepam, midazolam, pethidine, sodium bicarbonate, tobramycin.

REFERENCE
INDOMETHACIN

DESCRIPTION

USE
1. Closure of patent ductus arteriosus in preterm infants.
2. Prevention of intraventricular haemorrhage in extremely low birth weight infants.

CONTRAINDICATION
Infants with active bleeding such as GI bleeding or IVH, significant thrombocytopaenia, or coagulation defects, necrotizing enterocolitis, significantly impaired renal function and/or PDA dependent congenital heart defects.

PHARMACOKINETICS
Decreases cerebral, renal and GI blood flow. Metabolised in the liver to inactive compounds and excreted in the urine and faeces.

PRESENTATION
1mg (1000mcg)/powdered vial
0.5ml of Indomethacin 500mcg/ml pre-made syringe

DOSE
CLOSURE OF PDA 100mcg/kg/dose 24 hourly. Usually 6 doses are given, but fewer dose may be required depending on the clinical or echocardiographic findings.

PREVENTION OF IVH This is at the discretion of neonatologist on-call. 100mcg/kg 24 hourly for 3 doses beginning at 6-12 hours of age.

ROUTE
IV injection

RECONSTITUTION
VIAL Add 2ml of water for injection to vial to make a 500mcg/ml solution. FURTHER DILUTE 1ml of reconstituted solution (500mcg/ml) with 9ml of water for injection to give a 50mcg/ml solution.

PRE-MADE SYRINGE Add 4.5ml of water for injection to 0.5ml of pre-made indomethacin (500mcg/ml) to make a 50mcg/ml solution.

ADMINISTRATION
IV infusion over 20-30 minutes

STORAGE
Discard unused portion

MONITORING
Urine output, serum electrolytes, creatinine and platelet count. Medical assessment prior to each dose; assess cardiac murmur, pulse pressure and renal effects. Note colour of gastric aspirates and stool for blood. Test urine for specific gravity, and full dip-stick test daily.

ADVERSE EFFECT
1. Decreases renal and gastrointestinal blood flow
2. Platelet dysfunction
3. Hyponatraemia
INDOMETHACIN  cont

DRUG INTERACTION Digitalis and aminoglycoside effects may be enhanced, therefore monitor levels of these drugs closely. Concomitant use of frusemide and indocid may increase glomerular filtration rate and therefore urinary output.

SOLUTION COMPATIBILITY  water for injection

COMPATIBILITY VIA Y SITE  furosemide, insulin, nitroprusside, potassium chloride and sodium bicarbonate.

INCOMPATIBILITY  dextrose, amino acid solution, calcium gluconate, cimetidine, dobutamine, dopamine, gentamicin, tobramycin and tolazoline.

REFERENCE
INSULIN (ACTRAPID)  HYPERGLYCAEMIA

DESCRIPTION
The principal hormone derived from the beta cells of the pancreas and is required for glucose utilization in the body. It enhances glycogen and fat synthesis, the uptake of glucose by insulin-sensitive tissues, amino acid uptake by muscle tissue and cellular uptake of potassium. It inhibits lipolysis and gluconeogenesis. Its plasma half-life is about 9 minutes in adults. Insulin degrades in liver and kidneys.

IV insulin infusion administration improves glycaemic control, increases calorie intake and weight gain and a possibly decreases incidence of sepsis.6,7

USE
USE ONLY AFTER INFORMING AND DISCUSSING WITH CONSULTANT
1. Hyperglycaemia >10mmol/l in <1500g infants with persistent glucose intolerance confirmed by formal blood glucose in blood gas machine.
2. Hyperkalaemia – see separate protocol
3. Neonatal Diabetes

PRECAUTIONS
Consider and treat underlying cause first!
Infection, PDA, NEC, postnatal steroid, excessive glucose load, acute post-surgery stress.

PRESENTATION
100U/ml multiuse vial marked with opening date

DOSE
AIM FOR BLOOD GLUCOSE 6-10MMOL/L WITH GLYCOSURIA ≤1+

1. HYPERGLYCAEMIA

<table>
<thead>
<tr>
<th>Infusion strength</th>
<th>Prescribed amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1ml/hr=0.1U/kg/hr</td>
<td>5U/kg Insulin to make a 50ml solution</td>
</tr>
</tbody>
</table>

Starting dose is 0.05U/kg/hr titrated according to the infants’ blood glucose level as per insulin sliding scale between 0.01-0.15U/kg/hr.

Note
Glucose IV load should not be reduced below 6 mg/kg/min (equivalent of 10%dextrose running at 90 ml/kg/day) before insulin is commenced.

INSULIN SLIDING SCALE

<table>
<thead>
<tr>
<th>Blood Glucose</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 15 mmol/l</td>
<td>INCREASE infusion by 0.02 U/kg/hr</td>
</tr>
<tr>
<td>&gt; 10 mmol/l</td>
<td>INCREASE infusion by 0.01 U/kg/hr</td>
</tr>
<tr>
<td>8 -10 mmol/l</td>
<td>KEEP infusion THE SAME</td>
</tr>
<tr>
<td>6 - 8 mmol/l</td>
<td>REDUCE infusion by 0.01 U/kg/hr</td>
</tr>
<tr>
<td>&lt; 6 mmol/l</td>
<td>STOP INFUSION</td>
</tr>
</tbody>
</table>

If there is a SHARP fall in blood glucose insulin infusion rate MUST be reduced by 0.02-0.04 U/kg/hr or halved if the drop is significant.
INSULIN HYPERGLYCAEMIA cont

2. HYPERKALEAMIA see separate protocol

3. NEONATAL DIABETES 0.02-0.12 U/kg/hr
   This rare condition presents with acidosis, dehydration and hyperglycaemia (usually > 20mmol/l), but little ketosis responds to a very low dose insulin infusion.

ROUTE
IV infusion

RECONSTITUTION
Add 0.5ml of 100U/ml Actrapid HM insulin to 24.5ml of 5%dextrose to make a 2U/ml solution.

FURTHER DILUTE the calculated insulin amount with 5%dextrose to make a total of 50ml solution that makes 0.1U/kg/hr = 1ml/hr.

The solution concentration can be doubled if > 1ml/hr infusion is required.

ADMINISTRATION
1. Continuous IV infusion via same line as intravenous fluid therapy to be able to administer or cease both at the same time.
2. Before commencing infusion, prime the line with 20ml of prepared solution to saturate the plastic binding sites. 8,9
3. Change solution and tubing every 48 hours with TPN.

4. DO NOT INFUSE THE INSULIN SOLUTION THROUGH AN IN-LINE FILTER!
5. Run the infusion as extra to maintenance fluids.
6. Administer IV bolus medication via separate IV access to avoid insulin bolus administration.

STORAGE
Store in refrigerator protected from light.
Discard unused portion after 30 days.

MONITORING
1. Blood glucose estimation 1-2 hourly until stable, then 6 hourly. If alteration is made to the insulin infusion rate, blood glucose MUST be repeated within 1 hour.
2. Urinalysis 4 hourly.
3. Signs of hypoglycaemia.
4. UEC.

ADVERSE EFFECTS
1. Hypoglycaemia causing coma or severe CNS injury.
2. Hypokalaemia
3. Hyponatraemia
4. Rebound hyperglycaemia
5. Urticaria and anaphylaxis (extremely rare)
6. Insulin resistance may develop resulting in a larger dose requirement

COMPATIBLE FLUIDS Dextrose, 0.9% and 0.45% sodium chloride
INSULIN HYPERGLYCAEMIA cont

INCOMPATIBILITY  aminophylline, dopamine, chlorthiazide, lignocaine, nafcillin, phenobarbitone, phenytoin, sodium bicarbonate.

TERMINAL INJECTION SITE COMPATIBILITY amino acid and fat emulsion, amiodarone, ampicillin, aztreonam, dobutamine, cefazolin, cefotaxime, cimetidine, digoxin, esmolol, famotidine, gentamicin, heparin, hydrocortisone, imipenem, indomethacin, meropenem, metoclopramide, midazolam, milrinone, morphine, nitroglycerine, pentobarbital, potassium chloride, propofol, ranitidine, sodium nitroprusside, ticarcillin, tobramycin, vancomycin.

REFERENCES
INSULIN (ACTRAPID) HYPERKALAEMIA PRETERM INFANTS

< 35 weeks gestation

DEFINITION

Serum Potassium (K⁺) ≥ 7 mmol/l obtained from venous or arterial line.

Hyperkalaemia > 5.5mmol/l is common in the newborn. Capillary blood samples are often haemolysed, therefore it is important to confirm high serum potassium with a non-haemolysed venous or arterial blood sample. In general, elevated potassium levels even above 7mmol/l are well-tolerated.

In premature infants serum potassium usually peaks at 24 hours of age and declines to normal values by 72 hours of age. ECG changes, such as peaked T waves and arrhythmias indicate severe hyperkalaemia and require urgent treatment. The most common complications are bradycardia and ventricular tachycardia which can be life-threatening.

RISK FACTORS FOR PREMATURE INFANTS

1. Extreme prematurity < 27 weeks – especially if no antenatal steroids given
2. Perinatal asphyxia
3. Hypotension
4. Oliguria - urine output <0.5-1ml/kg/hr
5. Rising creatinine levels - > 40mcg/l/24hrs
6. Sepsis
7. Severe bruising or haemorrhage may contribute to raised potassium levels

PREVENTION

1. Avoid potassium in all infusions in the first day of life, except for babies on TPN! Potassium can be given only if hypokalaemia confirmed and adequate renal function with good urine output present.

2. Infants < 27 weeks gestation should have serum potassium level 6 hourly from 12-48 hours of age. Blood gas analyser provides a reliable estimation of serum potassium.

3. Laboratory measurement should be performed at least 8-12 hourly for the first 48 hours.

4. If serum potassium level is > 6 mmol/l without ECG changes, monitor serum potassium 2 hourly using blood gas analyser. Babies in whom regular blood samples are being taken should have an arterial line.
INSULIN HYPERKALAEMIA PRETERM INFANTS <35 WEEKS OF GESTATION cont

TREATMENT

1. **ABNORMAL ECG SHOULD BE TREATED IMMEDIATELY** with
   10% calcium gluconate 0.5ml/kg IV infusion

2. **Insulin + 12.5%dextrose continuous IV infusion**
   Insulin 0.2 unit/kg/hr + 12.5%dextrose 5ml/kg/hr (0.5g/kg/hr)
   *Insulin + Dextrose infusion can be ordered at higher strength by consultants only as the insulin effect is dose related.*

3. Remove potassium from IV infusion.

4. Consider exchange transfusion or peritoneal dialysis as a last resort.

5. **Polystyrene Sulphonate Resins (Calcium Resonium, Sodium Resonium A)**
   *NOT* recommended as they are **ineffective** and potentially **dangerous** causing bowel perforation in the premature infant.¹⁰,¹¹

6. **Sodium Bicarbonate**
   *NOT* recommended - underlying causes of acidosis should be treated¹.

7. **Salbutamol**
   *NOT* recommended as there is a lack of data on safety and efficacy.¹³

MONITORING

1. Blood glucose level for hyperglycaemia and hypoglycaemia.
2. Blood sugar estimation initially ½ -1 hourly until stable and when weaning.
3. Cardio-respiratory monitoring.
INSULIN (ACTRAPID) HYPERKALAEMIA TERM INFANTS

≥ 35 weeks gestation

DEFINITION

Serum Potassium (K⁺) ≥ 7 mmol/l obtained from venous or arterial line.

The management of hyperkalaemia in term infants is different from preterm infants (see Hyperkalaemia protocol for PRETERM INFANTS < 35 weeks gestation).

Term infants are more prone to hypoglycaemia when using insulin + dextrose infusions, but tolerate Polystyrene Sulphonate Resins (Calcium Resonium, Sodium Resonium A).

ECG changes, such as peaked T waves and arrhythmias indicate severe hyperkalaemia and require urgent treatment. The most common complications are bradycardia and ventricular tachycardia which can be life-threatening.

RISK FACTORS FOR TERM INFANTS

1. Perinatal asphyxia
2. Hypotension
3. Oliguria - urine output <0.5-1ml/kg/hr
4. Rising creatinine levels - > 40mcg/l/24hrs
5. Sepsis
6. Severe bilateral congenital renal anomalies, such as posterior urethral valves, bilateral dysplastic kidneys, severe bilateral hydronephrosis

PREVENTION

5. Avoid potassium in all infusions in the first day of life, except for babies on TPN! Potassium can be given only if hypokalaemia confirmed and adequate renal function with good urine output present.

6. If serum potassium level is > 6 mmol/l without ECG changes, monitor serum potassium 2 hourly using blood gas analyser. Babies in whom regular blood samples are being taken should have an arterial line.

MONITORING

4. Blood glucose level for hyperglycaemia and hypoglycaemia.
5. Blood sugar estimation initially ½ -1 hourly until stable and when weaning.
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

INSULIN HYPERKALAEMIA ≥35 WEEKS GESTATION INFANT cont

TREATMENT

1. **ABNORMAL ECG SHOULD BE TREATED IMMEDIATELY** with
   10% calcium gluconate 0.5ml/kg IV infusion

2. **12.5%dextrose IV infusion + Insulin continuous infusion**
   12.5%dextrose 4ml/kg/hr (0.4g/kg/hr) **plus**
   Start Insulin >12 mmol/l serum glucose level at 0.1 unit/kg/hr
   
   *Insulin + Dextrose infusion can be ordered at higher strength by consultants only as the insulin effect is dose related.*

3. Remove potassium from IV infusion.

4. Consider exchange transfusion or peritoneal dialysis as a last resort.

5. **Polystyrene Sulphonate Resins (Calcium Resonium, Sodium Resonium A)**
   0.5g/kg 6hourly as a retention enema.
   Refer to Polystyrene Sulphonate Resins protocol!

6. **Sodium Bicarbonate**
   NOT recommended - underlying causes of acidosis should be treated.

7. **Salbutamol**
   NOT recommended as there is a lack of data on safety and efficacy.

REFERENCES

**DESCRIPTION**

Human immunoglobulin prepared from pooled venous plasma from healthy human donors. It contains all the humoral IgG antibodies normally occurring in the donor pool. Over 90% of immunoglobulin is of IgG type (predominantly IgG monomers), although there are traces of IgA and IgM.

**ACTION**

It contains a broad spectrum of antibodies against bacterial and viral antigens. It provides IgG antibodies for replacement therapy in immunodeficient cases.

**PHARMACOKINETICS**

The plasma half-life is about 15 days. It is evenly distributed between the intravascular and the extravascular compartments and is catabolised at a rate proportional to the serum IgG concentration.

**USE**

1. Adjuvant therapy for severe neonatal sepsis
2. Immunodeficiency syndromes
3. Immune thrombocytopenia
4. Severe Rhesus incompatibility

**PRESENTATION**

Intragram 3g/50ml

**DOSE**

NEONATAL SEPSIS  500mg/kg/dose x 2 at 48 hour intervals
RHESUS ISOIMMUNISATION 500mg/kg single dose after delivery

**ROUTE**

IV infusion

**WRITTEN INFORMED CONSENT**

SHOULD BE OBTAINED FROM PARENTS BEFORE BLOOD PRODUCT ADMINISTRATION.

**ADMINISTRATION**

1ml/hr for the first hour then the remainder is administered over 2-3 hours via the distal IV bung.
Use separate IV line or cease IV fluids during the infusion.

**STORAGE**

Discard unused portion

**MONITORING**

Hourly temperature, apex beat and blood pressure for the duration of the infusion. Dextrostix required only if usual fluid regime is altered.

**ADVERSE EFFECT**

Pyrexia, tachycardia, hypotension, facial flushing and feed intolerance, but these reactions are infrequent. Hypertension has also been reported. The infusion should be halted until any of these symptoms have subsided.

**INCOMPATABILITY**

Do not mix with any other drugs!

**REFERENCE**

# INTUBATION AND EMERGENCY DRUGS

## INTUBATION DRUGS

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
<th>Dilution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphine 10mg / 1 ml</td>
<td>100 mcg / kg</td>
<td>9 ml WFI + 1 ml Morphine = 1mg/1ml</td>
</tr>
<tr>
<td>Atropine 600mcg / 1 ml</td>
<td>10 mcg / kg</td>
<td>5 ml WFI + 1 ml Atropine =100mcg/1ml</td>
</tr>
<tr>
<td>Suxamethonium 100mg / 2 ml</td>
<td>1 – 2 mg / kg</td>
<td>8 ml WFI + 2 ml Sux. = 10mg/1ml</td>
</tr>
</tbody>
</table>

## EMERGENCY DRUGS

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
<th>Dilution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adrenaline 1:10 000</td>
<td>0.1 ml / kg</td>
<td>None</td>
</tr>
<tr>
<td>Atropine 600 mcg / 1 ml</td>
<td>10 mcg / kg</td>
<td>5 ml WFI + 1 ml Atropine =100mcg/1ml</td>
</tr>
<tr>
<td>Calcium Gluconate 10% 2.2 mmol in 10 ml</td>
<td>1 ml / kg</td>
<td>5ml 5%dex + 5ml Cal. Gluc. =0.11mmol /1ml</td>
</tr>
<tr>
<td>Sodium Bicarbonate 8.4% 10 mmol in 10 ml</td>
<td>1 – 3 mmol / kg</td>
<td>5 ml WFI + 5 ml Sodi. Bic. 2 ml = 1 mmol</td>
</tr>
<tr>
<td>Naloxone 400 mcg / 1 ml</td>
<td>100 mcg / kg</td>
<td>None</td>
</tr>
</tbody>
</table>
LIPID EMULSION

USE
To maximise caloric intake of preterm and sick infants.

PRESENTATION
1. 50ml Lipid Syringe contains 20% Clinoleic 36mls
   Vitalipid 11.2mls
   Soluvit 2.8 mls

2. 150ml Lipid bag contains 20% Clinoleic 108mls
   Vitalipid 33.6mls
   Soluvit 8.4mls

DOSE
Lipid needs to be graded up over the first 3 days of TPN administration.
Start the lipids at 1 g/kg/day and increase by 1 g each day to 3 g/kg/day
Prescription should therefore be as follows.
Include lipids in the total fluids once the lipids are run at 3 g/kg/day.

<table>
<thead>
<tr>
<th>Day</th>
<th>Dose</th>
<th>Volume to be prescribed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>1gm/kg/day</td>
<td>6mls/kg/day</td>
</tr>
<tr>
<td>Day 2</td>
<td>2gm/kg/day</td>
<td>12mls/kg/day</td>
</tr>
<tr>
<td>Day 3 and onwards</td>
<td>3gm/kg/day</td>
<td>18mls/kg/day included in total fluids</td>
</tr>
</tbody>
</table>

ROUTE
IV infusion

ADMINISTRATION
Via central and peripheral IV access
Lipids and delivery tubing should be changed every 48 hours.

STORAGE
Refrigerate before use. Discard unused portion.

MONITORING
Triglyceride Before each increase and 24 hrs after 3 g/kg/d.
Mondays and when ill thereafter.

COMPATIBLE DRUGS
Check compatibility carefully under each individual drugs in protocol book.

REFERENCE
Parenteral Nutrition Guidline, Royal Hospital for Women, Newborn Care Centre, 2011-07-17

REVISED
1 July 2011
MAGNESIUM SULPHATE

DESCRIPTION
An essential body electrolyte. It is a co-factor in numerous enzyme systems and is involved in phosphate transfer, muscle contractility and neuronal transmission. Half of all hypocalcaemic infants also have hypomagnesaemia. Failure to treat hypomagnasaemia may cause a lack of response to administration of calcium.

USE
1. Hypomagnesaemia
2. Refractory hypocalcemia

PRESENTATION
2.47g/5ml ampoules of 49.3% magnesium sulphate. (1ml contains 500mg = 2mmol = 4mEq of magnesium.)

DOSE
ACUTE 25-50mg/kg/dose (0.2–0.4mEq/kg/dose) 6hrly if required. May go up to 100mg/kg/dose in acute cases such as neonatal seizures.

MAINTENANCE 30-60mg/kg/day (add to maintenance IV infusion)

RUTE
IV infusion, IV bolus, IM injection

ADMINISTRATION
IM INJECTION Painful and sometimes cause haematomas. Dilute the dose 1.5 times using water for injection.

IV BOLUS Dilute the dose 1.5 times using water for injection. Give at a rate not exceeding 150mg/minute. Monitor patient for adverse effect.

IV INFUSION Dilute 1ml of injection with 0.9%sodium chloride or 5%dextrose to make a total of 50ml solution.

STORAGE Discard unused portion

MONITORING Continuous cardio-respiratory monitoring. Monitor blood pressure and renal function. Serum Mg and Ca levels should be measured at least once daily.

ADVERSE EFFECT
ANTIDOTE FOR IV MAGNESIUM IS 10% CALCIUM GLUCONATE.
1. Hypotension, respiratory depression, and hypermagnesemia.
2. Mg intoxication can cause circulatory collapse, CNS depression, and respiratory paralysis.
3. Caution when used with digoxin.
4. Necrosis can occur with extravasation.

COMPATIBLE FLUIDS 5%dextrose, 0.9%sodium chloride

COMPATIBLE DRUGS calcium gluconate, cephalothin, hydrocortisone, potassium phosphate, verapamil.
MAGNESIUM SULPHATE  cont

COMPATIBLE VIA Y-SITE  acyclovir, amikacin, amphotericin, ampicillin, cefazolin, cefotaxime, cephalothin, cyclosporin, erythromycin lactobionate, famotidine, gentamicin, heparin, insulin, metronidazole, morphine, ondanesetron, pethidine, pieracillin, potassium chloride, ticarcillin, tobramycin, trimethoprim-sulphamethoxazole, vancomycin.

INCOMPATIBLE DRUGS  amphotericin, calcium chloride, ciprofloxacin, dobutamine, folic acid, phytomenadione, sodium bicarbonate.

REFERENCE
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

MCT Oil

DESCRIPTION
Lipid fraction of coconut oil consisting of medium chain triglycerides with carbon chain lengths of 6-10 carbons.

USE
Oral or tube feed supplementation to provide extra calories to newborn babies.

PREPARATION
Approximately 1g (0.94 g)/ml fat giving 7.7cal/ml

DOSE
1–4g/kg/day (1–4ml/kg/day) in 3-4 divided doses. Start with 1ml/kg/day then gradually increase to 4ml/kg/day as needed.

ROUTE
Oral or via intra gastric tube. DO NOT GIVE IV!

STORAGE
Do not store in plastic container as MCT may break or soften plastics.

REFERENCE
MEROPENEM

DESCRIPTION
Broad spectrum carbapenem antibiotic that penetrates well into CSF and most body tissues. Its spectrum of activity includes most aerobic and anaerobic gram positive and gram negative bacteria similar to imipenem. In addition, meropenem has greater activity against intracellular target sites in organisms such as Pseudomonas aeruginosa.

USE
Serious infections caused by susceptible gram-negative organisms resistant to other antibiotics.

PHARMACOKINETICS
Unlike imipenem, meropenem is relatively stable to inactivation by human renal dehydropeptidase. Clearance is directly related to renal function.

PRESENTATION
500mg/vial powder

ROUTE
IV infusion

DOSE

<table>
<thead>
<tr>
<th>Condition</th>
<th>Dose</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sepsis</td>
<td>20mg/kg/dose</td>
<td>12hrly</td>
</tr>
<tr>
<td>Meningitis, Pseudomonas infection</td>
<td>40mg/kg/dose</td>
<td>8hrly</td>
</tr>
</tbody>
</table>

RECONSTITUTION
Add 20ml of water for injection to 500mg vial to make a 25mg/ml solution.

FURTHER DILUTE 1ml of reconstituted solution with 4ml of water for injection to make a 5mg/ml solution.

ADMINISTRATION
IV infusion over 30 minutes

ADVERSE EFFECTS
Diarrhea, nausea, vomiting, rash, inflammation at injection site.

MONITORING
Periodic FBC (for thrombocytosis and eosinophilia) and hepatic transaminases.

SOLUTION COMPATIBILITY
5%dextrose, 10%dextrose, 0.9%sodium chloride

TERMINAL INJECTION SITE COMPATIBILITY
fat emulsion, acyclovir, aminophylline, atropine, cimetidine, calcium gluconate, dexamethasone, doxoin, dobutamine, dopamine, enalapril, fluconazole, furosemide, gentamicin, heparin, insulin, linezolid, metclopramide, morphine, norepinephrine, phenobarbital, ranitidine, vancomycin, zidovudine.

INCOMPATIBILITY
amphotericin B, metronidazole.

REFERENCE
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY
METHYLENE BLUE 1%
KEPT IN OPERATING THEATRE

DESCRIPTION
It reduces methaemoglobin to haemoglobin in red blood cells.

USE
Idiopathic or drug induced methaemoglobinemia.

PHARMACOLOGY
Mainly excreted in urine, therefore expect blue colour of urine and faeces.

PRESENTATION
50mg/5ml

DOSE
1mg/kg/dose

ROUTE
IV, oral

RECONSTITUTION
Dilute the required dose (1mg/kg) with 3-5ml of 0.9% sodium chloride.

ADMINISTRATION
IV administration over 15 minutes is preferable for rapid action. Doses can be repeated if necessary.

ADVERSE EFFECTS
1. G6PD DEFICIENCY Methylene blue may not be effective as these patients have diminished capacity to reduce methylene blue to leucomethylene blue. Large doses of methylene blue in this condition can itself lead to hemolytic anemia.
2. SEVERE RENAL FAILURE Long term administration may lead to marked anemia due to accelerated destruction of red blood cells.

SIDE EFFECT
1. Nausea, vomiting, abdominal and chest pain
2. Headache, dizziness, mental confusion, profuse sweating
3. Hypertension
3. Very high doses can lead to methaemoglobinemia and hemolysis

IV INCOMPATIBILITY
No data available.

REFERENCE
1. MIMS Annual 1999, 2-226
**NEWBORN USE ONLY**
**GIVEN ON DOCTORS ORDER ONLY**

**METRONIDAZOLE**

**DESCRIPTION**
Potentially useful but poorly evaluated drug in neonates. Active against gram negative anaerobes such as Bacteroides fragilis and gram positive anaerobes such as Clostridium species and anaerobic protozoa including Trichomonas vaginalis, Giardia lamblia and Entamoeba histolytica.

**USE**
1. Anaerobic infections, such as meningitis by Bactroides and other anaerobes resistant to penicillin.
2. Suspected or proven necrotizing enterocolitis
3. Serious intraabdominal infections
4. Infections caused by Trichomonas vaginalis
5. Infections by C. difficile colitis

**PHARMACOKINETICS**
Excellent absorption orally. Well distributed in the body tissues. Elimination half-life was inversely related to gestational age, ranging from 22.5 to 109 hours. It is not protein bound and is excreted in the urine as metronidazole and its metabolites.

**PRESENTATION**
500mg/100ml bag

**DOSE**

<table>
<thead>
<tr>
<th>Age</th>
<th>Interval</th>
<th>1st Maintenance dose AFTER loading dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-28 days</td>
<td>12hrly</td>
<td>12hrs</td>
</tr>
<tr>
<td>≥28 days</td>
<td>8hrly</td>
<td>8hrs</td>
</tr>
</tbody>
</table>

**ROUTE**
IV infusion only

**RECONSTITUTION**
Add 5ml (25mg) of Metronidazole to 5ml of 5%dextrose or 0.9%sodium chloride to make a 2.5mg/ml solution.
NOTE metronidazole solution already has a significant amount of sodium: 13.5mmol per 100ml.

**ADMINISTRATION**
IV infusion over 1 hour. HALT MAINTENANCE FLUIDS WHILE INFUSING VIA SAME CANNULA.

**STORAGE**
Discard unused portion.

**MONITORING**
Not necessary

**ADVERSE EFFECT**
1. Seizures and paraesthesias rarely reported following high dose.
2. Carcinogenic in mice and rats?
4. Neutropenia very rarely.
NEWBORN USE ONLY  
GIVEN ON DOCTORS ORDER ONLY

METERONIDAZOL cont

COMPATIBLE DRUGS amikacin, aminophylline, benzylpenicillin, cefotaxime, cephalothin, chloramphenicol, cimetidine, ciprofloxacin, flucloxacillin, fluconazole, gentamicin, heparin, hydrocortisone, tobramycin.

MANUFACTURER RECOMMENDS NOT TO MIX ANY OTHER DRUG WITH METRONIDAZOLE.

COMPATIBLE VIA Y SITE acyclovir, amiodarone, cyclosporin, fentanyl, fluconazole, foscarnet, magnesium sulphate, morphine, pethidine.

INCOMPATIBLE FLUIDS 10%dextrose, Hartmans solution.

INCOMPATIBLE DRUGS aztreonam, dopamine, filgrastim.

REFERENCE
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY
MICEL A PLUS E

See under VITAMIN A PLUS E
**MIDAZOLAM**  
Schedule 4 Medicine

**DESCRIPTION**  
Short acting benzodiazepine with rapid onset of action. Sedative and anticonvulsant properties are related to GABA accumulation and occupation of benzodiazepine receptor.

**USE**  
1. Sedation  
2. Anticonvulsant for refractory seizures

**PHARMACOLOGY**  
Duration of action is 2-6 hours. Half life is 4-6 hours in term and up to 22 hours in preterm babies. Bioavailability is 33% with oral and up to 50% with sublingual and intranasal preparation. Metabolised by liver.

**PRESENTATION**  
5mg/5ml ampoule

**DOSE**  
- IV BOLUS: 0.05-0.15 mg/kg  
- INTRANASAL: 0.2-0.3 mg/kg/dose  
- IV INFUSION: 10–60 mcg/kg/hr

<table>
<thead>
<tr>
<th>Infusion strength</th>
<th>Prescribed amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1ml/hr=20mcg/kg/hr</td>
<td>1mg/kg Midazolam to make a 50ml solution</td>
</tr>
</tbody>
</table>

**ROUTE**  
IV bolus, IV infusion, intranasal

**ADMINISTRATION**  
- IV BOLUS: Slow IV bolus injection over at least 5 minutes using the proximal IV bung. Repeat dose as required 2-4 hourly.

  - IV INFUSION: **DILUTE** 1ml/kg (1mg/kg) of Midazolam with 5% or 10%dextrose or 0.9%sodium chloride to make a total of 50ml solution that makes 1ml/hr=20mcg/kg/hr. Commence IV infusion at 1ml/hr and titrate to the neonate’s response.

**MONITORING**  
Closely monitor respiratory status, blood pressure and liver functions. Observe for signs of withdrawal after discontinuation of prolonged therapy.

**ADVERSE EFFECT**  
Respiratory depression and hypotension. Seizure, like myoclonus can occur with infusions and rapid IV bolus administration. Intranasal administration can cause a burning sensation.

**SOLUTION COMPATIBILITY**  
5%dextrose, 10%dextrose, 0.9%sodium chloride, water for injection.

**TERMINAL INJECTION SITE COMPATIBILITY**  
amiodarone, amikacin, atropine, calcium gluconate, cefazoline, cefotaxime, cimetidine, clindamycin, digoxin, dobutamine, dopamine, epinephrine, erythromycin, esmolol, fampotamide, fentanyl, fluconazole, gentamicin, heparin, imipenem, insulin, lorazepam, methadone, metoclopramide, metronidazole, morphine, nitroglycerine, nitroprusside, pancuronium, piperacillin, potassium chloride, propofol, prostaglandin E1, ranitidine, sodium nitroprusside, theophylline, tobramycin, vancomycin, vecuronium
MIDAZOLAM cont

INCOMPATIBILITY  lipid, ampicillin, ceftazidime, dexamethasone, furosemide, hydrocortisone, nafcillin, omeprazole, pentobarbital, Phenobarbital, sodium bicarbonate

REFERENCE
MILRINONE

DESCRIPTION
Selective phosphodiesterase inhibitor, inotrope and vasodilator. Mode of action seems to involve an increase in cyclic AMP raising intracellular calcium levels, leading to an increase in cardiac contractility. Unlike catecholamines, myocardial oxygen consumption is not increased.

USE
1. To reduce systemic vascular resistance and increase cardiac output.
2. Use in short term (< 72hrs) treatment of acute low cardiac output after cardiac surgery or due to septic shock.
3. Use as an adjunct to Nitric Oxide (NO) treatment in Persistent Pulmonary Hypertension of the Newborn (PPHN)

PRESENTATION
1 mg/ml ampoule

PHARMACOKINETICS
Half-life is variable, usually 3 hours but can be up to 10 hrs in extremely preterm infants. Because of the large volume of distribution in the newborn a loading dose needs to be given if an early response to treatment is required.

DOSE

<table>
<thead>
<tr>
<th>Dose</th>
<th>Infants &gt; 30 wks gestation</th>
<th>Preterm &lt; 30 wks gestation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loading</td>
<td>75mcg/kg over 60 mins</td>
<td>0.75mcg/kg/min for 3 hours</td>
</tr>
<tr>
<td>Maintenance infusion</td>
<td>0.5-0.75 mcg/kg/min</td>
<td>0.2 mcg/kg/min</td>
</tr>
</tbody>
</table>

Loading dose followed immediately by maintenance infusion

Special consideration Milrinone can be given as an IV infusion 0.25-0.5mcg/kg/min in preterm infants < 30 weeks without a loading dose

PRESCRIPTION

<table>
<thead>
<tr>
<th>Infusion strength</th>
<th>Prescribed amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1ml/hr=0.5mcg/kg/min</td>
<td>1.5mg/kg Milrinone to make a 50ml solution</td>
</tr>
</tbody>
</table>

RECONSTITUTION
Add prescribed amount to 0.45%, 0.9% sodium chloride or 5% dextrose to make a total of 50ml solution.

ROUTE
IV infusion

ADMINISTRATION
Deliver via a central line through a dedicated lumen.

DO NOT ADMINISTER WITH ANY OTHER DRUGS OR FLUIDS TO AVOID BOLUS!

DO NOT FLUSH LINE OR SUDDENLY STOP INFUSION!

MONITORING
1. Continuous blood pressure, heart rate and rhythm.
2. Assess signs of cardiac output.
3. Electrolytes and urine output.
4. Platelet counts
Ensure adequate vascular volume prior to commencing. Blood pressure is likely to fall 5-9% but should return to baseline after 24hrs. In the event of hypotension refractory to standard management cease infusion
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

MILRINONE cont.

ADVERSE EFFECTS
Safety and efficacy in the neonate has not been fully established

1. Hypokalaemia
2. Thrombocytopenia
3. Rash
4. Ventricular arrhythmias

CONTRAINDICATIONS
1. Previous cardiac arrhythmia
2. Hyperkalaemia > 6.5mmol/l
3. Serum bilirubin > 200µmol/l

DRUG INTERACTIONS
Caution advised as limited knowledge of interactions with other drugs

SOLUTION COMPATIBILITY
TPN compatibility with IV lipid has not been assessed

TERMINAL INJECTION SITE COMPATIBILITY
Adrenaline, dopamine, dobutamine, fentanyl, gentamicin, heparin, insulin, morphine, noradrenaline, midazolam, heparin, ranitidine, vancomycin

TERMINAL INJECTION SITE INCOMPATIBILITY
Furosemide, sodium bicarbonate

REFERENCES
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

MORPHINE
Schedule 8 Medicine

DESCRIPTION
Narcotic analgesic. Stimulates CNS opioid receptors resulting in analgesia, drowsiness and an alteration in mood and pain perception. Vasodilation occurs, especially of the coronary vessels. Gastrointestinal secretions and motility are decreased. Smooth muscle tone is increased.

USE
1. Premedication for intubation
2. Analgesia and sedation
3. Treatment of neonatal abstinence syndrome

PRESENTATION
- 10mg/ml ampule
- 0.5mg/ml oral solution

DOSE

<table>
<thead>
<tr>
<th>Infusion strength</th>
<th>Prescribed amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1ml/hr=20mcg/kg/hr</td>
<td>1mg/kg Morphine to make a 50ml solution</td>
</tr>
</tbody>
</table>

ROUTE
IV infusion, IV injection, IM injection, oral

RECONSTITUTION
IV Add 9ml of water for injection to 1ml of morphine to give 1mg/ml (1000mcg) solution.

ADMINISTRATION
IV BOLUS Slow IV bolus injection using the proximal IV bung
IV INFUSION FURTHER DILUTE 1ml/kg (1mg/kg) of the above prepared solution to 5% or 10%dextrose to make a total of 50ml solution that makes 1ml/hr=20mcg/kg/hr. Commence IV infusion at 1ml/hr and titrate to the neonate’s response.
Change IV infusion solution 48 hourly!

ORAL
VOMITING Seek medical advice prior re-dosing if infant vomits 20 minutes or less after giving oral Morphine.

ORAL MORPHINE SCRIPT FOR CUPS BABIES AS OUTPATIENTS
We need to write strength of the solution (i.e. 0.5mg/ml) and the dose in numbers and words and then the total amount of solution in mls and the number of days prescribing for.

Example
For a baby on 0.5ml morphine 6hourly, script should be written as
MORPHINE HCL (0.5MG/ML)
0.5ML (POINT FIVE MILLILITRES) PO QID FOR 7 DAYS
TOTAL 20 (TWENTY) MILLI LITRES
(EXTRA 6 MLS GIVEN FOR SPILLAGE)

MONITORING
IV Continuous cardio-respiratory monitoring. Observe for abdominal distension and loss of bowel sounds.

ORAL Commence monitoring if daily oral morphine is ≥0.8mg/kg/day or if ambiguous maternal history.
ROYAL HOSPITAL FOR WOMEN
CLINICAL POLICIES AND PROCEDURES

NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

MORPHINE cont

ADVERSE EFFECT Marked respiratory depression (decreases the responsiveness of the respiratory centre to CO₂ tension) Hypotension, delayed gastric emptying, ileus, and urinary retention. Addiction; wean slowly after prolonged use.

NALOXONE SHOULD BE AVAILABLE TO REVERSE THE ADVERSE EFFECT!

TERMINAL INJECTION SITE COMPATIBILITY acyclovir, amikacin, aminophylline, amphotericin B, ampicillin, atropine, aztreonam, calcium chloride, cefotaxime, ceftazidime, ceftriaxone, chloramphenicol, cefazolin, cimetidine, clindamycin, dexamethasone, digoxin, dobutamine, dopamine, epinephrine, erythromycin, famotidine, fentanyl, fluconazole, frusemide, gentamicin, heparin, hydrocortisone, insulin, lidocaine, lorazepam, meropenem, metoclopramide, metronidazole, mezlocillin, midazolam, nafcillin, oxacillin, pancuronium, penicillin G, piperacillin, potassium chloride, propranol, PG E 1, ranitidine, sodium bicarbonate, sodium nitroprusside, ticarcillin, tobramycin, vancomycin, vecuronium, and zidovudine.

INCOMPATIBILITY phenobarbital, and phenytoin

REFERENCE
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY
MUCOMYST

See under ACETYLCESTEINE
NALOXONE

DESCRIPTION
Potent narcotic antagonist with a plasma half-life of 1-3 hours. Reverses respiratory depression by competing for CNS narcotic receptor sites. Onset of action within 1-2 minutes after IV administration. Metabolized by the liver and excreted in the urine. Increases circulatory catecholamines.

USE
Reversing narcotic induced respiratory CNS depression.

Use at delivery ONLY after the baby has been first resuscitated and is pink with a good heart rate but remains apnoeic!

DO NOT USE IF MATERNAL OPIATE-DEPENDENCE IS KNOWN OR SUSPECTED AS IT MAY PRECIPITATE ACUTE WITHDRAWAL SYMPTOMS AND SEIZURES!

PRESENTATION
400mcg/ml ampoules

DOSE
100mcg/kg /dose
Treatment may be repeated if necessary 3-5mins after first dose.

An initial 200mcg dose irrespective of weight provides a pragmatic delivery room approach suitable for most babies.

ROUTE
IV or IM

ADMINISTRATION
IV transient benefit because of the short half-life of naloxone.
IM effect that is sustained for 24 hrs.

MONITORING
Assess respiratory effort and neurologic status

ADVERSE EFFECTS
Increased blood pressure, tremulousness, seizures, vomiting, tachycardia, hypotension, hypertension, ventricular tachycardia and fibrillation.

CONTRAINDICATIONS
DO NOT USE IF MATERNAL OPIATE-DEPENDENCE IS KNOWN OR SUSPECTED AS IT MAY PRECIPITATE ACUTE WITHDRAWAL SYMPTOMS AND SEIZURES!

DRUG INTERACTIONS
none reported

SOLUTION COMPATIBILITY
0.9%sodium chloride, 10%dextrose, 5%dextrose

REFERENCES
Neonatal Formulary 5, Drug use in Pregnancy and First Year of Life, 2007, Blackwell Publishing
# NEOSTIGMINE

## DESCRIPTION
Acetylcholinesterase inhibitor at neuromuscular junction, allowing accumulation of acetylcholine and restoration muscle activity.

## USES
1. Reversal of drug induced muscle paralysis
2. Myasthenia gravis
   - About 10-15% of the babies born to myasthenic mothers are affected by transient neonatal myasthenia due to transfer from the maternal circulation of antibodies directed against the acetylcholine receptors of the nerve-muscle junction. Symptoms present within 1-3 days and persist for 3-6 weeks. Symptoms persist for months in the other congenital recessively inherited forms of myasthenia, although they usually become less severe with time.

## PREPARATION
2.5mg/ml ampoule

## DOSE
1. **Reversal of drug induced muscle paralysis**
   - IV 50mcg/kg Neostigmine and 10mcg/kg Glycopyrronium with Atropine 15 mcg/kg.
2. **Myasthenia gravis**
   - 150 mcg IM test dose 30min before feeding.
     - **Short-term management**
       - 150mcg/kg 6-8 hourly is usually used for maintenance, but twice this dose may be necessary every 4 hours. (Oral treatment with puridostigmine can be used once control is achieved.)
     - **Long-term management**
       - 1mg/kg 4 hourly oral pyridostigmine is preferable in the long term management as it has a longer duration of action.

## ROUTE
IV infusion, IM injection

## RECONSTITUTION
Add 1ml of Neostigmine to 19ml of water for injection to make a 125mcg/ml solution.

## ADMINISTRATION
Slow IV bolus injection using the proximal IV bung.

## MONITORING
Respiratory and cardiovascular status.

## ADVERSE EFFECTS
Muscle weakness, tremors, bradycardia, hypotension, respiratory depression, bronchospasm, diarrhoea, and excessive salivation.

## CONTRAINDICATION
1. Intestinal or urinary obstruction
2. Bradycardia or hypotension
3. Use cautiously in patients with bronchospasm or cardiac arrhythmia.
4. Aminoglycoside antibiotics are hazardous in patients with any of the myasthenic disorders because they interfere with neuromuscular transmission causing respiratory depression.

## COMPATIBLE DRUGS
- Glycopyrronium, heparin, hydrocortisone, netilmicin, pentobarbital, potassium chloride.

## REFERENCES
NORADRENALINE

DESCRIPTION
Key postganglionic neurotransmitter in the sympathetic nervous system. The main effects of noradrenaline are to raise peripheral vascular resistance and therefore blood pressure, increase cardiac contractility, heart rate and myocardial oxygen consumption. High dose infusions can cause intense peripheral vasoconstriction. Such peripheral vasoconstriction can sometimes by increasing the afterload on the heart, counteract the drugs inotropic effect and cause a decrease in cardiac output. Similarly the increase in myocardial oxygen consumption can exacerbate any existing cardiac failure and compromise ventricular function. For these reasons the drug should only be used when the need to increase arterial pressure outweighs the risk of lowering cardiac output. There is virtually no published data on the haemodynamic effects in the neonatal age group. There is no evidence of a beneficial effect on the ratio of pulmonary vascular resistance/systemic vascular resistance in persistent pulmonary hypertension of the newborn. It is rapidly metabolised and has a half-life of less than 5 minutes.

Infants with sepsis who are hypotensive but have good cardiac function and adequate vascular volume are the most likely to benefit, though even here the optimal dose calls for careful judgement.

USE
Severe refractory hypotension
MUST DISCUSS WITH CONSULTANT BEFORE COMMENCING!

PREPARATION
2mg/2ml ampoule of noradrenaline acid tartrate
1mg of noradrenalin acide tartrate = 500mcg of noradrenaline base.

DOSE
Prescribe as noradrenaline base!

100 nanogram/kg/min - maximum of 1.5mcg/kg/min

Dose is a guideline only and must be considered in light of clinical response. Dosages should be increased or decreased in small increments only.

<table>
<thead>
<tr>
<th>Infusion strength</th>
<th>Prescribed amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1ml/hr=1mcg/kg/min</td>
<td>3mg/kg Noradrenaline base = 6mg/kg</td>
</tr>
<tr>
<td></td>
<td>Noradrenaline acide tartrate to make a 50ml solution</td>
</tr>
</tbody>
</table>

RECONSTITUTION
Add prescribed amount to 10% dextrose or 0.9% sodium chloride to make a total of 50ml solution.

ADMINISTRATION
Continuous IV infusion via a central line only!

Ensure patient is not hypovolaemic.
Correct if necessary before commencing therapy.

STORAGE
Drug is stable but best prepared every 24hrs unless protected from light

MONITORING
Blood pressure, limb perfusion, urine output.
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

NORADRENALINE cont.

ADVERSE EFFECTS

1. Severe vasoconstriction can be associated with peripheral infusion similar to that with dopamine.
2. May cause large increases in blood pressure.
3. Possible risk of plasma volume depletion
4. May cause arrhythmias, bradycardia. Severe arrhythmias warrant discontinuation of the drug
5. Peripheral ischaemia including gangrene of the extremities

PRECAUTIONS
Hypoxia or hypercapnia may cause noradrenaline-induced cardiac arrhythmias!

CONTRAINDICATIONS
1. Uncorrected hypovolaemia is an absolute contraindication
2. Hypertension.
3. Mesenteric or peripheral vascular thrombosis

DRUG INTERACTIONS
1. Halogenated anaesthetic agents – severe arrhythmias
2. Digoxin- increased risk of arrhythmias
3. Beta blockers - risk of hypertension
4. Doxapram - risk of hypertension

SOLUTION COMPATIBILITY  5% and 10% dextrose, 0.45% and 0.9% sodium chloride

SOLUTION INCOMPATIBILITY not reported

TERMINAL INJECTION SITE COMPATIBILITY TPN, lipid, dobutamine, heparin, hydrocortisone, milrinone

TERMINAL INJECTION SITE INCOMPATIBILITY aminophylline, phenobarbitone, phenytoin, sodium bicarbonate

REFERENCES
Neonatal Formulary 5, Drug use in Pregnancy and First Year of Life, 2007, Blackwell Publishing
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

NYSTATIN

DESCRIPTION  Antifungal. Not absorbed well from the GI tract, skin and mucous membranes.

USE  Oral and gastrointestinal candidiasis.

PREPARATION  Oral suspension 100,000 U/ml

DOSE  0.5ml/dose

ADMINISTRATION  0.1ml oral AND 0.4ml via nasogastric tube 6 hourly

SIDE EFFECTS  No known side effects. Well tolerated.


REVISED  14.August 2012
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

OMEPRAZOLE

DESCRIPTION
Proton-pump inhibitor. Inhibits gastric acid secretion by inhibition of hydrogen-potassium ATPase, the enzyme responsible for the final step in the secretion of HCL by the gastric parietal cell.

USE
Treatment of reflux oesophagitis or duodenal ulcer refractory to conventional treatment.

PHARMACOLOGY
Onset of action is within one hour of administration and the duration of action is about 72 hours.

DOSE
1-3mg/kg/day daily or in 2 divided doses. Neonates may need 3mg/kg than 1mg/kg in view of variable absorption. Even higher doses may be needed at the discretion of gastroenterologist and paediatrician.

PRESENTATION
20mg/capsule
2mg/ml suspension

RHW Pharmacy prepares omeprazole suspension by dispersing 100mg omeprazole (5 capsules) in 50ml of 8.4%sodium bicarbonate solution.
1ml of Omeprazole suspension contains
2mg Omeprazole
1mmol Sodium
1mmol Bicarbonate

STORAGE
Stable for 30 days. Refrigerate. Protect from light. Shake the bottle well before administration.

ADVERSE EFFECTS
Limited data. Hypergastrinemia and mild transaminase elevations with prolonged usage.

MONITORING
1. Consider checking gastric pH (aim >5.0) if there is no symptomatic improvement.
2. Measure LFTs if duration of therapy is >8 weeks.

DISCHARGE ADVICE
RHW Pharmacy supplies a 50 ml bottle of suspension as well as an instruction sheet to be given to the community pharmacist, if subsequent bottles should be required.
(A copy of this instruction sheet can be found on the next page.)

REFERENCE
OMEPIRAZOLE cont

PREPARATION OF OMEPIRAZOLE SUSPENSION (2mg/ml)

Instruction Sheet for Community Pharmacist

METHOD

Take 5 capsules of Omeprazole (Probitor 20mg)

Carefully open the capsules and empty pellets into a 100ml bottle, containing 50 ml of sodium bicarbonate 8.4% solution. (Use Injection Sodium Bicarbonate 8.4% 100ml (Pharmacia Upjohn) or any other brand available).

Shake vigorously from time to time to disperse the pellets. This could take over 60 minutes. (As there is a certain amount of froth, dispense the suspension in the 100ml bottle)

LABEL

1. Omeprazole 2mg/1ml
2. Directions
3. Shake the bottle
4. Refrigerate
5. Discard after 30 days

Department of Pharmacy
Royal Hospital for Women
Barker Street
Randwick NSW 2031
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

PANCURONIUM

DESCRIPTION
A nondepolarizing neuromuscular blocking agent that produces skeletal muscle paralysis mainly by causing a decreased response to acetylcholine at the myoneural junction. The onset of action is generally 30-60 seconds with a duration varying with dose and age. Neuromuscular blockade may be enhanced by acidosis, hypothermia, neuromuscular disease, hepatic disease and renal failure. Neuromuscular blockade may be minimized by alkalosis, adrenaline, and hyperkalaemia.

USE
Skeletal muscle paralysis in infants requiring mechanical ventilation

PRESENTATION
4mg/2ml ampoule

DOSE
100mcg/kg/dose prn to maintain paralysis

ROUTE
IV injection

RECONSTITUTION
Add 2ml of pancuronium (4mg) to 8ml of 0.9%sodium chloride to make a 400mcg/ml solution.
KEEP MADE UP SOLUTION MARKED WITH ADDITIVE LABEL AT THE BEDSIDE. DISCARD UNUSED PORTION AT THE END OF EACH NURSING SHIFT.

ADMINISTRATION
IV bolus injection using the proximal IV bung

STORAGE
REFRIGERATE! Discard unused portion.

MONITORING
Continuous cardio-respiratory and arterial blood pressure monitoring. Infant must be on mechanical ventilation.

ADVERSE EFFECT
1. Hypoxaemia may result from inadequate mechanical ventilation and altered pulmonary mechanics
2. Tachycardia and blood pressure changes (both hypotension and hypertension) occur frequently
3. Increased salivation may be seen
4. May be reversed by neostigmine 0.025mg/kg/dose and atropine 0.02mg/kg/dose

SOLUTION COMPATIBILITY
5%dextrose, 0.9%sodium chloride

COMPATIBILITY VIA Y SITE
amino acide solution, aminophylline, cefazolin, dobutamine, dopamine, epinephrine, esmolol, fentanyl, fluconazole, gentamicin, heparin, hydrocortisone, isoproterenol, lorazepam, midazolam, morphine, netilmicin, nitroglycerine, nitroprusside, propofol, prostaglandin E1, ranitidine, vancomycin.

INCOMPATABILITY
phenobarbital, pentobarbital

REFERENCE
**NEWBORN USE ONLY**  
**GIVEN ON DOCTORS ORDER ONLY**

**PANTOPRAZOLE (SOMAC)**

**DESCRIPTION**  
Proton-pump inhibitor. Inhibits gastric acid secretion by inhibition of hydrogen-potassium ATPase, the enzyme responsible for the final step in the secretion of HCL by the gastric parietal cell.

**USE**  
Treatment of reflux oesophagitis or duodenal ulcer refractory to conventional treatment.

**PHARMACOLOGY**  
Terminal half-life is approximately one hour. Plasma kinetics are linear.

**PRESENTATION**  
40mg/vial of pantoprazole in dry powder form.

**DOSE**  
1 mg/kg/day in **2 divided doses**

**ROUTE**  
IV infusion over 15 min

**RECONSTITUTION**  
Add 10ml of 0.9% sodium chloride to 40mg vial to make 4mg/ml solution. **FURTHER DILUTE** 1ml of the above solution with 9ml of 0.9% sodium chloride to make a 0.4mg/ml solution.

**ADVERSE EFFECTS**  
Limited data available, though appears well tolerated and to have few side effects. Uncommon reports of nausea, vomiting and skin rash.

**MONITORING**  
Consider checking gastric pH (aim > 5.0) if there is no symptomatic improvement.

**SOLUTION COMPATIBILITY**  
5% dextrose, 10% dextrose, 0.9% sodium chloride

**CONTRAINDICATIONS**  
Liver disease.

**REFERENCE**  
Do not use in combination with atazanavir (antiviral medication).

www.nlm.nih.gov/medlineplus/
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

PARACETAMOL

DESCRIPTION
Non-narcotic analgesic and antipyretic. Paracetamol is rapidly absorbed by mouth and widely distributed in the body. Extensively metabolized in the liver, primarily by sulfation with a small amount by glucuronidation.

PHARMACOKINETICS
Metabolites and unchanged drug are excreted by the kidney. Elimination half-life is approximately 3 hours in term neonates, 5 hours up to 11 hours in preterm neonates. Elimination is prolonged in patients with liver dysfunction. Optimum pain relief occurs over an hour after the blood level peaks.
IV paracetamol is a more effective analgesic compared to oral paracetamol, offering faster onset of action, higher peak plasma concentration and longer duration of action.

USE
Analgesia

PRESENTATION
ORAL  100mg/ml syrup
IV    500mg/50ml (10mg/ml) vial

DOSE
7.5 mg/kg/dose  6 hourly

MAXIMUM OF FOUR DOSES DAILY WITH A MAXIMUM OF 30 MG/KG/DAY!

Warning! review dose and indications if IV paracetamol is needed for more then 3 days!

ROUTE
IV  used for post-operative analgesia where oral route is contraindicated or unavailable
• NBM> 24 hrs
• High nasogastric output
• Vomiting due to prolonged ileus
• Short gut

ORAL
RECTAL NOT recommended as rectal absorption is unreliable

ADMINISTRATION
IV  Administer undiluted over 15minutes via syringe driver.

ORAL
RECTAL

MONITORING
Hepatic and renal function

ADVERSE EFFECT
1. Pain at the injection site
2. Vomiting
3. Rash, neutropenia, leucopenia, thrombocytopenia
4. Neurological disorders, hypersensitivity, anaphylaxis
5. Hepatotoxicity as higher peak plasma levels achieved
6. Rare occurrence of elevated liver transaminases
PARACETAMOL cont

PRECAUTIONS
1. Hepatic or renal impairment
2. Dehydration
3. Chronic malnutrition
4. Hypotension

CONTRAINDICATIONS
1. Hypersensitivity to paracetamol.
2. Active liver disease.

SOLUTION COMPATIBILITY 0.9% sodium chloride, 5% dextrose

INCOMPATABILITY IV Paracetamol should not be mixed with any other intravenous fluids or medications!

REFERENCE
2. Personal communication with The Royal Children’s hospital, Neonatal Department and Pharmacy, Parkville, Melbourne, Vic.
3. MIMS (No dosing schedule for preterm).
4. Bristol-Myers Squibb Australia Pty Ltd Information 23.05.2012
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

PENTA-VITE

DESCRIPTION
Vitamin supplement containing vitamin B group except Dexpanthenol, C and D.

Each 0.45 mL contains:

- Thiamine (B1) 540 µg
- Riboflavine (B2) 800 µg
- Nicotinamide (B3) 7.1 mg
- Pyridoxine (B6) 135 µg
- Ascorbic Acid (C) 42.8 mg
- Cholecalciferol(D3) 10.1 µg

USE
Vitamin supplement for infants.

PRESENTATION
Oral solution

DOSE
0.45ml Daily

ADMINISTRATION
Give orally or via IGT with feed

STORAGE
Store below 25°C and in fridge after opening. Protect from light.

REFERENCE
Penta-vite Multivitamins for Infants by Bayer.

REVISED
22.July 2011
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

PHENOBARBITONE
Schedule 4 Medicine

DESCRIPTION
An anticonvulsant that limits the spread of seizure activity and increases the threshold for electrical stimulation of the motor cortex. Reduction of serum bilirubin levels is attributed to the increased levels of glucuronyl transferase and intracellular \( y \)-binding protein. Phenobarbitone is effective in controlling symptoms of neonatal withdrawal syndrome with the exception of vomiting and diarrhoea.

PHARMACOKINETICS
Primarily metabolised by liver and excreted in urine. Half-life is prolonged in neonates (up to 120 hrs).

USE
1. Neonatal seizures – first line of drug
2. Neonatal abstinence syndrome
3. Cholestatic jaundice

PRESENTATION
200mg/ml ampoule
10mg/ml Phenobarbiton Sodium oral elixir

DOSE
1. **NEONATAL SEIZURES**
   
   **LOADING** 20mg/kg/dose. Can be repeated after every 60 minutes at 10mg/kg/dose to a maximum of 40mg/kg/dose when seizures are not controlled. This is followed 12 hours later by
   
   **MAINTENANCE** 2.5 mg/kg/dose 12 hrly

2. **NEONATAL ABSTINENCE SYNDROME**
   
   **LOADING** 5mg/kg/dose orally followed 24 hours later by
   
   **MAINTENANCE** 2.5mg/kg/dose orally 12 hrly

3. **NEONATAL JAUNDICE** 5mg/kg/day orally

ROUTE
IV injection, IM injection, oral

ADMINISTRATION
IV  Add 9ml of normal saline to 1ml of Phenobarbitone to make a 20mg/ml solution. Slow IV bolus injection over 10 minutes, using the proximal IV bung.

ORAL

VOMITING  Seek medical advice prior re-dosing if infant vomits 20 minutes or less after giving oral Phenobarbiton.

STORAGE
Discard unused portion

MONITORING
Continuous cardio-respiratory monitoring. When loading is given for an anticonvulsant effect, monitor serum levels every 24 hours for first 3 days. Once seizures are controlled, dose may need to be adjusted to maintain serum levels between 65-170micromol/l for anticonvulsant activity. Serum concentrations may increase when patient is also receiving phenytoin or valproate.
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

PHENOBARBITONE cont

ADVERSE EFFECT Irritating to veins due to high pH. Respiratory depression with levels >60 mcg/ml, sedation >40 mcg/ml, and lethargy. Tolerance and dependence can occur with continued use.

SOLUTION COMPATIBILITY 5%dextrose, 10%dextrose, 0.9%sodium chloride

TERMINAL INJECTION SITE COMPATIBILITY acyclovir, amikacin, aminophylline, calcium gluconate, enalaprilat, fosphenytoin, heparin, meropenem, propofol, PG E1, sodium bicarbonate.

INCOMPATABILITY cimetidine, clindamycin, hydralazine, hydrocortisone, insulin, methadone, midazolam, morphine, ranitidine, sodium bicarbonate, vancomycin. No data on potassium chloride.

REFERENCE
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

PHENYLEPHRINE EYE DROPS

DESCRIPTION
Alpha-adrenergic. Produces pupillary dilation (mydriasis) and cyclopegia (paralysis of accommodation).

USE
In fundoscopy and other diagnostic and therapeutic ophthalmic procedures.

PREPARATION
Phenylephrine 2.5%

DOSE
1-2 drops in the eye 10-30 minutes prior to fundoscopy. Apply pressure to lacrimal sac during and for 2 minutes after instillation to minimize systemic absorption. Without lacrimal sac occlusion, approximately 80% of each drop may pass through the nasolacrimal system and be available for rapid systemic absorption by the nasal mucosa.

SIDE EFFECTS
May cause decreased pulmonary compliance, tidal volume, and peak airflow in babies with chronic lung disease. Do not use in babies receiving beta-blockers, such as propranolol.

REFERENCES
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

PHENYTOIN

DESCRIPTION
Breaks the seizure threshold of the motor cortex to electrical or chemical stimuli.

PHARMACOKINETICS
85-90% protein-bound. Bilirubin displaces phenytoin from albumin-binding sites increasing the percentage of unbound drug. This may complicate the interpretation of serum levels. Half-life is 18-60 hours. Oral absorption is erratic.

USE
1. Seizures unresponsive to phenobarbitone
2. Cardiac arrhythmia

PRESENTATION
100mg/2ml ampoule
30mg/5ml oral mixture

DOSE
LOADING  15-20 mg/kg/dose
MAINTENANCE  4-8 mg/kg/day

ROUTE
IV injection
Oral

ADMINISTRATION
1. Add 100mg (2ml) phenytoin to 2ml of 0.9%sodium chloride to make a 25mg/ml solution. Administer the required dose through proximal IV bung over 1 hour (maximum rate of infusion 0.5mg/kg/min).
2. Flush IV with normal saline before and after injection.
3. If same line is used, halt the maintenance infusion.
4. Avoid using in central lines because of risk of precipitation.

STORAGE
Discard unused portion.

MONITORING
Continuous cardio-respiratory monitoring. If loading dose is given, monitor serum levels every 24 hours for 3 days. Once on maintenance dose may be adjusted to maintain the serum levels at 6-15mcg/ml.

ADVERSE EFFECT
1. Irritating to veins due to high pH, hypotension or circulatory collapse with rapid IV administration.
2. CNS depression.
3. Reduces action of calcium, clonazepam, dexamethasone, digoxin, frusemide and theophylline (by 40-50%). Increases action of chloramphenicol, diazepam and cimetidine.

COMPATIBLE SOLUTIONS  0.9%sodium chloride only! (Not even 0.45%sodium chloride.)

INCOMPATIBLE SOLUTIONS  dextrose containing solutions, Hartmanns

COMPATIBILITY VIA Y SITE  esmolol, famotidine, fluconazole, sodium bicarbonate.

INCOMPATIBILITY  All other drugs
REFERENCES

Sicca F, Contaldo A, Rey E, Dulac O. Phenytoin administration in the newborn and infant. Brain Dev. 2000 Jan;22(1):35-
40.
Painter MJ, Scher MS, Stein AD et al. Phenobarbital compared with phenytoin for the treatment of neonatal seizures. N
PIPERACILLIN

DESCRIPTION
Broad spectrum semi-synthetic penicillin, useful for gram-negative, gram-positive and anaerobic organisms. A second line drug. Effective against Pseudomonas aeruginosa and many strains of Klebsiella, Serratia, E coli, Enterobacter, Citrobacter, and Proteus. Also effective against group B Streptococcus. No activity against Staph aureus.

PHARMACOLOGY

PRESENTATION
1g/vial

DOSE
50-100 mg/kg/dose

<table>
<thead>
<tr>
<th>Postnatal age (days)</th>
<th>Interval (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–28 days</td>
<td>12 hrly</td>
</tr>
<tr>
<td>≥28 days</td>
<td>8 hrly</td>
</tr>
</tbody>
</table>

ROUTE
IV infusion

RECONSTITUTION
Add 4.3ml water for injection to vial to make a 200mg/ml solution. FURTHER DILUTE the whole amount with 5ml of 0.9% sodium chloride to make a 100mg/ml solution.

ADMINISTRATION
Slow IV infusion over 30 minutes using the proximal IV bung

STORAGE
Discard unused portion.

MONITORING
Monitor renal function.

ADVERSE EFFECT
Hyperbilirubinaemia, renal impairment, eosinophilia, elevations in ALT, AST, BUN and creatinine.

SOLUTION COMPATIBILITY
5%dextrose, 10%dextrose, 0.9%sodium chloride

TERMINAL INJECTION SITE COMPATIBILITY
acyclovir, aztreonam, clindamycin, enalaprilat, esmolol, famotidine, heparin, hydrocortisone, lorazepam, midazolam, morphone, potassium chloride, propofol, ranitidine and zidovudine.

INCOMPATIBILITY
aminoglycosides, fluconazole, vancomycin.

REFERENCE
POLYJOULE

DESCRIPTION
Maltodextrin glucose polymer.

USE
To increase the energy and carbohydrate content of enteral food.

PRESENTATION
8gm/scoop powder. Scoop supplied by the manufacturer.

ENERGY
3.8Kcal/gm

PREPARATION
Dissolve Polyjoule in Expressed Human Milk or standard cow’s milk formula. 
1gm of polyjoule displaces 0.65ml of water.

<table>
<thead>
<tr>
<th>Polyjoule</th>
<th>EHM or standard cow’s milk formula (term S26)</th>
<th>Total volume</th>
<th>Total Kcalorie</th>
</tr>
</thead>
<tbody>
<tr>
<td>4gm=1/2scoop</td>
<td>97ml</td>
<td>≈100ml</td>
<td>24Kcal/30ml</td>
</tr>
<tr>
<td>8gm=1scoop</td>
<td>95ml</td>
<td>100ml</td>
<td>28Kcal/30ml</td>
</tr>
</tbody>
</table>

REFERENCE
**NEWBORN USE ONLY**  
**GIVEN ON DOCTOR’S ORDER ONLY**

**POLYSTYRENE SULPHONATE RESINS**  
**(SODIUM RESONIUM A, CALCIUM RESONIUM)**

**DESCRIPTION**  
A cation exchange resin. Mainly acts in the large intestine. May take hours to see the effect. Two preparations are available.  
1. **Sodium Resonium A** is a sodium polysterene sulfonate (sodium exchange resin)  
2. **Calcium Resonium** is a calcium polysterene sulfonate (calcium exchange resin)

**USE**  
Hyperkalemia when plasma potassium > 7.5mmol/l  
1. Use Resonium A if plasma sodium within normal limits.  
2. Use Calcium Resonium if plasma sodium high.

Insulin + 25% dextrose is more reliable to reduce and sustain lower serum potassium level!

**PRESENTATION**  
Powder of Resonium A and Calcium Resonium

**DOSE**  
0.5gm/kg 12 hourly

**ROUTE**  
RECTAL

**RECONSTITUTION**  
Dissolve each gramm of powdered medication in 1ml of water for injection.

**ADMINISTRATION**  
Retention enema  
*Ensure evacuation of accumulated resonium by colonic irrigation after 8-12hours.*

**STORAGE**  
Room temperature

**MONITORING**  
Serum electrolytes

**ADVERSES EFFECT**  
Hypokalemia, hypernatremia, hypocalcemia. Nausea, vomiting, constipation, diarrhea. Perforation of the rectum.  
Watch for waterload in tiny babies if resonium is frequently used.

**CONTRAINDICATION**  
NEC, strictures, fistula

**REFERENCE**  
Neonatal Formulary 5, Drug use in Pregnancy and First Year of Life, 2007, Blackwell Publishing
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY
POTASSIUM CHLORIDE

USE
1. Maintenance potassium therapy
2. Correct hypokalemia

PRESENTATION
IV 10mmol/10mls ampoule (750mg/10ml)
ORAL 20mmol/15mls solution (1.33mmol/ml)

ROUTE
IV infusion  Never give it as an IV bolus!
Oral

DOSE
1. ASYMPTOMATIC HYPOKALEMIA 2-4mmol/kg/day diluted in 24-hr maintenance IV infusion or divided into oral feeds.

Maximum concentration in the infusion should not exceed 4mmol/100ml for peripheral and 8mmol/100ml for central venous infusions.
MAXIMUM INFUSION RATE IS 0.4MMOL/KG/HR

2. ACUTE SYMPTOMATIC HYPOKALEMIA 0.5-1mmol/kg IV over 1 hour, then reassess. The suggested regime is to dilute 0.5–1mmol/kg of potassium in a 6-8hour volume of maintenance infusion and administer over 1 hour.
Only under consultant’s guidance!

MONITORING
Continuous ECG monitoring is mandatory during acute treatment of hypokalemia with concentrated IV potassium (infants receiving ≥0.4mmol/kg/hr). Observe serum electrolytes.

ADVERSE EFFECT
1. Rapid IV infusions may cause arrhythmias including cardiac arrest.
2. Concentrated solutions through peripheral IV can cause thrombophlebitis and pain at injection site.
3. GI irritation, diarrhoea, vomiting and bleeding may occur with oral supplements.
4. CAUTION when patient is on potassium sparing diuretics.

INCOMPATIBILITY
amphotericin B, diazepam, phenytoin.

REFERENCE
SAFE HANDLING OF POTASSIUM CHLORIDE

Critical incidents have been associated with the preparation and administration of intravenous potassium chloride.

This policy should be read in conjunction with the Newborn Care Centre Drug Administration Policy on Potassium Chloride.

**STORAGE**

Potassium Chloride ampoules (10mls containing 10mmol) should be stored in an aspecific container, including lid, in alphabetical order of drug name in a locked medication cupboard. Ampoules of similar appearance, such as Sodium Chloride 0.9% (5mls) should be stored within the manufacturer's box, on a separate shelf.

**PRESCRIPTION**

1. Prescribing of all IV Potassium Chloride should be in millimoles. "Milligrams per Litre" or "percent" will not be acceptable.
2. **Potassium Chloride should be written in full.** Abbreviations such as “KCL” should not be accepted.
3. Orders for IV Potassium Chloride should have rate, route, dilution and administration instructions fully specified.
4. Prescriptions without these instructions should not be accepted.

**PREPARATION**

1. Potassium Chloride should not be added to an IV bag. It must be added to a burette of 100mls and administered through an infusion pump or made up in a syringe and administered through a syringe driver.
2. A maximum of 4mmol can be added to a burette of 100mls.
3. A completed orange “Baxter Additive Label” should be attached to the burette or syringe administration tubing.
4. At commencement of infusion, two nursing staff should check the correct drug (Potassium Chloride), dose, dilution, labeling, route and rate prior to administration. Both signatures must appear on the fluid prescription sheet.
5. Infusion orders and solution must be checked at the commencement of each nursing shift and signed on fluid prescription chart.

**USE PRE-MADE POTASSIUM CHLORIDE IV SOLUTION WHEN POSSIBLE.**

**PRE-MADE SOLUTIONS KEPT IN LEVEL 3 STORE ROOM.**

**REFERENCE**

Policy for the Safe Handling of Intravenous Potassium Chloride in Health Care Facilities, February 2004, NSW Health Department, Circular No 2004/5.

Intravenous Potassium Chloride can be fatal if given inappropriately, October 2003, Safety and Quality Council Medication Alert.
**PROPOFOL**

**DESCRIPTION**
Soy-based rapid acting intravenous anaesthetic agent.

**USE**
Induction agent for endotracheal intubation ONLY.  
*Do not use as an infusion!*

**PRESENTATION**
200mg/20ml ampoule

**PHARMACOKINETICS**
Onset of action is approximately 30 seconds with the duration of 1-10 minutes. It is metabolised mainly in the liver to form inactive sulphate and glucuronide conjugates that are excreted in the urine. 95% of the drug is bound to plasma proteins.

**DOSE**
1.5mg/kg/dose (0.15ml/kg/dose)
May need to be repeated with further doses of 0.5mg/kg (0.05ml/kg/dose) at 2 minutes interval up to a total of 5mg/kg (0.5ml/kg).  
*See protocol for Propofol Dosing Research Study!*

**STORAGE**
REFRIGERATE ampoule.  
Discard unused portion.

**ROUTE**
IV BOLUS

**ADMINISTRATION**
Slow IV bolus injection over 20secs using the proximal IV bung followed by 1ml of 0.9% sodium chloride flush.

For infants < 4kg doses MUST be drawn up in a 1ml syringe.

Shake vial well and warm to 37°C prior use.  
*Do not use if the emulsion is separated or discoloured!*

**MONITORING**
Continuous cardio-respiratory and arterial blood pressure monitoring.

**ADVERSE EFFECTS**
- **CARDIOVASCULAR**: Hypotension, myocardial depression, bradycardia
- **RESPIRATORY**: Apnoea, pulmonary oedema, anaphylaxis
- **SKIN**: Rash, pruritis, pain on injection site
- **PROPOFOL INFUSION SYNDROME** when used as a prolonged infusion
  - Arrhythmia plus 1 or more of the following
    1. lipaemic plasma
    2. hepatomegaly or hepatic stenosis
    3. metabolic acidosis with or without increased serum lactate
    4. rhabdomyolysis with myoglobinuria

**CONTRAINDICATIONS**
1. Cyanotic congenital heart disease
2. Hypotension
3. Impaired cerebral circulation
4. Raised intracranial pressure
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

PROPOFOL cont

DRUG INTERACTIONS
1. CNS depressants Possibility of severe respiratory and cardiovascular depression should be considered.
2. Suxamethonium (without atropine) Serious bradycardias.

SOLUTION COMPATIBILITY
5%dextrose

COMPATIBLE DRUGS
Acyclovir, amiadrone, esmolol, filgrastim, fluconazole, insulin, magnesium, morphine, ondanesetron, pethidine.

INCOMPATIBLE DRUGS
Adrenaline, amphotericin, ampicillin, atropine, benzylpenicillin, calcium chloride, ceftazidime, dexamethasone, digoxin, dobutamine, dopamine, fentanyl, fluconazole, frusemide, gentamicin, heparin, hydrocortisone, lignocaine, midazolam, morphine, naloxone, pancuronium, phenobarbitone, phentoyin, potassium chloride, ranitidine, sodium bicarbonate, sodium nitroprusside, suxamethonium, vancomycin

REFERENCES
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

PROTAMINE SULPHATE

DESCRIPTION
Combines with Heparin forming a stable salt complex. The effect on heparin is almost immediate and persists for approximately 2 hours.

USE
Reversal of heparin overdose.

PRESENTATION
50mg/5ml ampoule.

DOSE
1mg of protamine sulphate for every 100U of heparin given in the last 4 hours.

ROUTE
IV bolus
IM

ADMINISTRATION
Dilute protamine sulphate with equal part of 0.9%sodium chloride then slow IV bolus injection using the proximal IV bung.

STORAGE
Refrigerate! Discard unused portion.

MONITORING
Continuous cardio-respiratory and continuous invasive blood pressure monitoring or 15 minute non-invasive blood pressure monitoring for 2 hours. Monitor clotting functions. Observe for bleeding.

ADVERSE EFFECT
Excessive administration to reverse heparin overdose may have an anticoagulant effect. May cause fall in blood pressure and bradycardia.

SOLUTION COMPATIBILITY
5%dextrose, 0.9%sodium chloride

TERMINAL INJECTION SITE COMPATIBILITY
cimetidine, ranitidine.

INCOMPATIBILITY
cephalosporins, penicillin

REFERENCE
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

PYRIDOXINE (VITAMIN B6)

USE
1. Diagnosis and treatment of pyridoxine-dependent seizures
2. Prophylaxis during Isoniazid therapy

PRESENTATION
50mg/ml vial May use injectable form orally.
25mg/tablet

DOSE

DIAGNOSTIC DOSE (for seizures) 100mg IV bolus or IM as a single test-dose followed by a 30 minute observation period

MAINTENANCE (for pyridoxine-dependent seizures) 50-100mg/day orally

PROPHYLAXIS (during isoniazid therapy) 2mg/kg/day orally

ROUTE
IV injection
IM injection
Oral

ADMINISTRATION
IV Slow IV bolus injection using the proximal IV bung
ORAL Dissolve one 25mg tablet in 5ml of water for injection to make a 5mg/ml solution
Note Lactose in tablet may make dissolved solution thick!

STORAGE
Discard unused portion.

MONITORING
Continuous cardiorespiratory monitoring. EEG may be required at some stage.
Initial IV dose is to be administered in level 3 nursery only!

ADVERSE EFFECT
1. Risk of profound sedation, ventilator support may be necessary.
2. Overdose is rare unless >100-250 times RDA–reversible nerve damage. Excess also can cause increased oxalate in urine leading to stone formation.

INCOMPATIBILITY
No data available

REFERENCE
MIMS Annual 1999; p 12-1918.
NEWBORN USE ONLY 
GIVEN ON DOCTORS ORDER ONLY

RANITIDINE

DESCRIPTION
A selective competitive antagonist of histamine (H2) receptors. It inhibits gastric acid secretions.

USE
Stress ulcers and GI haemorrhage aggravated by gastric acid secretion.

PRESENTATION
IV 50mg/5ml ampoule
Oral 150mg/10mls syrup

DOSE

IV BOLUS

Term 1mg/kg/dose 8 hourly
<37 weeks 0.5mg/kg/dose 8 hourly

IV INFUSION 60mcg/kg/hr
ORAL 2mg/kg/dose 8 hourly

ROUTE
IV injection
Oral

RECONSTITUTION

IV BOLUS Add 1ml of ranitidine to 1ml of 0.9%sodium chloride to make a 5mg/ml solution.

IV INFUSION Add 5mg/kg of ranitidine to 5%dextrose or 0.9%sodium chloride to make a total of 50ml solution that makes 1ml/hr=100mcg/kg/hr.

ADMINISTRATION
Slow IV bolus injection using the proximal IV bung
IV infusion

STORAGE
Discard unused portion.

MONITORING
Gastric pH may be measured to assess efficacy.

ADVERSE EFFECT
Very rare. Only one case report of thrombocytopenia. Hepatic dysfunction, leukopenia and bradycardia reported in adults. Too rapid infusion can cause hypotension.

COMPATIBLE FLUIDS
5%dextrose,10%dextrose, 0.9%sodium chloride

COMPATIBILITY VIA Y SITE
acyclovir, acetazolamide, amikacin, aminophylline, atropine, aztreonam, cefazolin, cefepime, cefotaxime, chloramphenicol, clindamycin, dexamethasone, digoxin, dobutamine, dopamine, enalapril, epinephrine, erythromycin, fentanyl, fluconazole, frusemide, genamycin, heparin, insulin, isoproterenol, lidocaine, lorazepam, meropenem, metoclopramide, midazolam, morphine, nitroprusside, pancuronium, penicillin G, piperacillin, potassium chloride, propofol, PGE1, protamine, tobramycin, vancomycin, vecuronium, vitamin K1, zidovudine.

INCOMPATIBILITY
amphotericin B, pentobarbital, phenobarbital, phentoin.

REFERENCE
RESONIUM

See under POLYSTYRENE SULPHONATE RESINS

1. SODIUM RESONIUM A
2. CALCIUM RESONIUM
**NEWBORN USE ONLY**
**GIVEN ON DOCTORS ORDER ONLY**

**ROCURONIUM**

**DESCRIPTION**
A non-depolarizing neuromuscular blocking agent that produces skeletal muscle paralysis mainly by competitively attaching itself to the cholinergic receptors on the ‘end-plates’ responsible for transmitting signals to the body’s voluntary muscles.

**USE**
Skeletal muscle paralysis in infants requiring mechanical ventilation
**PARALYSED INFANTS SHOULD ALWAYS BE SEDATED!**

**PRESENTATION**
50mg/5ml ampoule

**PHARMACOKINETICS**
Onset of action is 1-10 min and recovery may take up to an hour. The mean half life is 1.3 hours in infancy and is not greatly affected by renal dysfunction. Mostly eliminated by the liver and biliary system, but up to a quarter is eliminated unchanged in the urine.

**DOSE**

<table>
<thead>
<tr>
<th>Infusion strength</th>
<th>Prescribed amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1ml/hr=10mcg/kg/min</td>
<td>30mg/kg Rocuronium to make a 50ml solution</td>
</tr>
</tbody>
</table>

**ROUTE**
IV infusion, IV injection, IM injection

**RECONSTITUTION**
Add 1ml of Rocuronium (10mg) to 4ml of 0.9%sodium chloride or 5%dextrose to make 2mg/ml solution.

**STORAGE**
REFRIGERATE vial! Discard unused portion.

**ADMINISTRATION**

<table>
<thead>
<tr>
<th>IV BOLUS</th>
<th>Slow IV bolus injection using the proximal IV bung.</th>
</tr>
</thead>
</table>

**KEEP MADE UP SOLUTION MARKED WITH ADDITIVE LABEL AT THE BEDSIDE. DISCARD UNUSED PORTION AT THE END OF EACH NURSING SHIFT.**

<table>
<thead>
<tr>
<th>IV INFUSION</th>
<th>Add prescribed amount of Rocuronium to 0.9%sodium chloride or 5%dextrose to make a total of 50ml solution when 1ml/hr=10mcg/kg/min.</th>
</tr>
</thead>
</table>

**MONITORING**
Continuous cardio-respiratory and arterial blood pressure monitoring. **Infant must be on mechanical ventilation!**

**ADVERSE EFFECTS**
1. Hypoxemia from inadequate mechanical ventilation and altered pulmonary mechanics.
2. Tachycardia and blood pressure changes both hypotension and hypertension.
3. Increased salivation and nausea.
4. Arrhythmias.
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

ROCURONIUM cont

PRECAUTIONS
There is very limited data on the use of Rocuronium in the newborn. Neuromuscular blockade may be enhanced by acidosis, hypothermia, neuromuscular disease, hepatic disease and renal failure. Neuromuscular blockade may be minimized by alkalosis, adrenaline, and hyperkalemia. In patients with myasthenia gravis or myasthenic (Eaton-Lambert) syndrome, small doses of nondepolarizing neuromuscular blocking agents may have profound effects.

CONTRAINDICATIONS
Hypersensitivity to rocuronium bromide.

DRUG INTERACTIONS
1. Isoflurane and enflurane may prolong the duration of action of initial and maintenance doses of rocuronium and decrease the average infusion requirement of rocuronium by 40%.
2. Gentamicin and vancomycin may enhance the neuromuscular blocking action of Rocuronium.
3. Chronic administration of phenytoin may shorten durations of neuromuscular block

ANTIDOTE
Neostigmine 50 mcg/kg/dose and Atropine 20 mcg/kg/dose

ANTAGONISTS SHOULD NOT BE ADMINISTERED PRIOR TO THE DEMONSTRATION OF SOME SPONTANEOUS RECOVERY FROM NEUROMUSCULAR BLOCKADE!

SOLUTION COMPATIBILITY
5%dextrose, 0.9%sodium chloride

TERMINAL INJECTION SITE COMPATIBILITY
midazolam

TERMINAL INJECTION SITE INCOMPATIBILITY
Lipid, amoxycillin, amphotericin, cephalozin, dexamethasone, diazepam, erythromycin, frusemide, hydrocortisone, insulin, phenobarbitalone, prednisolone, propofol, vancomycin.

REFERENCES
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

ROTARIX VACCINE
POISON SCHEDULE S4

DESCRIPTION
Live attenuated human rotavirus vaccine.

USE

PRESENTATION
Clear colourless liquid suspension; ready to use with no reconstitution or dilution required.

DOSE
1. The vaccine course consists of 2 doses.
2. Each dose is 1.5ml.
3. The first dose is to be given on or after discharge from the Newborn Care Centre, between 6 weeks and 14 weeks 6 days of chronological age.
4. The second dose should be given by the infant’s general practitioner a minimum of 4 weeks after first dose. Not to be given after 24 weeks of age as its safety has not been assessed in older children.

ADMINISTRATION
Oral administration only!

1. NOT TO BE INJECTED UNDER ANY CIRCUMSTANCES.
2. Administration orally via applicator to inside of cheek with infant in reclined position.
3. Rotarix should be administered only at discharge, or after discharge from the Newborn Care Centre, as viral antigen particles are found in 50% of stools after the first dose, and there is a potential risk of transmission to unvaccinated contacts.

STORAGE
1. Refrigerate at 2 to 8 °C. Do not freeze.
2. Store in original packaging to protect from light.
3. Discard unused portion.

ADVERSE EFFECTS
1. Diarrhoea, appetite loss, irritability and fever have been reported but these symptoms were not increased in treatment versus control groups in large placebo controlled trials.

CONTRAINDICATIONS
1. Chronic gastrointestinal disease including uncorrected congenital gastrointestinal malformations.
2. Acute severe febrile illness.
ROTARIX VACCINE cont

PRECAUTIONS
1. Rotarix administration should be postponed in infants suffering from diarrhoea or vomiting.
2. Rotarix should be administered with caution to infants with close contacts who are immunodeficient.
3. Contacts of vaccines should be advised to wash hands after changing nappies.

COMPATIBILITY
Rotarix may be co-administered with DTPa, Hib, IPV, HBV, pneumococcal conjugate vaccine and meningococcal serogroup C.

INCOMPATIBILITY
An interval of 2 weeks between Rotarix and oral polio vaccine is advised.

REFERENCE
1. MIMS Full Prescribing Information 2009-08-04
3. Advisory Committee on Immunisation Practices to the Centres for Disease Control and Prevention.

REVISED 06.2011
SILDENAFIL
VIAGRA

DESCRIPTION
Selective phosphodiesterase inhibitor leading to accumulation of cyclic AMP in pulmonary smooth muscle cells causing pulmonary vascular relaxation and reducing pulmonary vascular resistance. It promotes the accumulation of intracellular cGMP and enhances nitric oxide–mediated vasodilatation.

USE
Persistent Pulmonary Hypertension refractory to inhaled nitric oxide and other conventional therapies and in situations where inhaled nitric oxide is not available. Sildenafil can also be used in addition to nitric oxide in severe PPHN. **Do not use before discussing with consultant!**

PREPARATION
2mg/ml suspension

PHARMACOKINETICS
Both sildenafil and the metabolite have terminal half lives of about 4 hrs. It is rapidly absorbed after oral administration, with absolute bioavailability of about 40%. It is eliminated predominantly by the liver.

DOSE
0.3-1mg/kg/dose 6-12hourly

ADMINISTRATION
Via IG tube

ROUTE
Oral

STORAGE
Stable for 1 month if refrigerated.

MONITORING
1. Continuous blood pressure monitoring
2. Oxygen saturation

ADVERSE EFFECTS
Limited data is available for neonates.
1. Systemic hypotension – no blood pressure changes were seen in a small pilot randomised controlled trial in neonates. ²
2. Worsening oxygenation.
3. No evidence of rebound hypoxemia when sildenafil was ceased in a small randomised pilot study of oral sildenafil 1mg/kg/dose 6hrly in 7 infants ≥ 35wks gestation.²
4. Bleeding following circumcision has been reported in 1 patient.
5. Significant increase in sildenafil concentrations when used concomitantly with erythromycin and cimetidine in patients with hepatic or renal dysfunction
6. Severe retinopathy of prematurity in premature infant.
7. Suspect central nervous system disturbances.
8. Intracerebral hemorrhage.

CONTRAINDICATIONS
1. Concomitant use of Erythromycin, Cimetidine
2. Hepatic or renal impairment.
SILDENAFIL cont

DRUG INTERACTIONS  1. Ketoconazole, erythromycin and cimetidine reduce sildenafil clearance
                     2. HIV protease inhibitor ritonavir increases blood levels of sildenafil by up to 300%.
                     3. The endothelin receptor antagonist bosentan and rifampicin reduces sildenafil levels.

REFERENCES

**SODIUM BICARBONATE**

**DESCRIPTION**
An alkalinizing agent that dissociates to provide bicarbonate ion. It increases the alkali reserve of the plasma.

**USE**
1. Documented metabolic acidosis during prolonged resuscitation after establishment of effective ventilation
2. Bicarbonate deficit due to renal or gastro-intestinal losses.

**PRESENTATION**
0.84g/10ml ampoule
(1ml of solution gives 1mmol(mEq) of sodium and 1mmol(mEq) of bicarbonate. It has an osmolality of 1800 mOsm/l.)

**DOSE**
**RESUSCITATION** 1–2mmol/kg/dose (1-2ml/kg/dose)

**CORRECTION OF ACIDOSIS**
- **Bolus**
  \[0.3 \times \text{weight(kg)} \times \text{base deficit} = \text{mmol/dose} \text{ HCO}_3 \text{ needed}\]
- **Infusion**
  2-10mmol/kg/day

**ROUTE**
IV injection, IV infusion

**ADMINISTRATION**
Dilute the dose with an equal volume of water for injection and administer it through proximal IV bung.

**RESUSCITATION**
Slow IV bolus over at least 2 minutes

**IV BOLUS**
Administer half of calculated dose over 10 minutes, then assess need for remainder.

**IV INFUSION**
12–24hours maintenance infusion

**STORAGE**
Discard unused portion.

**MONITORING**
Follow acid-base status through serial arterial blood gases. Serum electrolytes.

**ADVERSE EFFECT**
1. Rapid infusion can lead to intraventricular haemorrhage
2. Local tissue necrosis, hypocalcemia and hypernatremia.
3. Make sure effective ventilation is established before prescribing HCO\(_3\) otherwise, PCO\(^2\) increases, thereby dropping pH.

**SOLUTION COMPATIBILITY**
5%dextrose, 10%dextrose, 0.9%sodium chloride

**COMPATIBILITY VIA Y SITE**
fat emulsion, acyclovir, amikacin, aminophylline, amphotericin B, ampicillin, atropine, aztreonam, cefepime, ceftriaxone, chloramphenicol, cimetidine, clindamycin, dexamethasone, erythromycin, esmolol, famotidine, fentanyl, frusemide, heparin, hyaluronidase, hydrocortisone, indomethacin, insulin, lidocaine, morphine, netilmicin, oxacillin, penicillin G, pentobarbital, phenobarbital, phenytoin, potassium chloride, propofol, tolazoline, vancomycin, vitamin K\(_1\).
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

SODIUM BICARBONATE  cont

INCOMPATABILITY  amino acid solution, amiodarone, calcium chloride, calcium gluconate, cefotaxime, dobutamine, dopamine, epinephrine, imipenem, isoproterenol, magnesium sulphate, methadone, methicillin, metoclopramide, midazolam, norepinephrine, ticarcillin, vecuronium.

REFERENCE
SODIUM CHLORIDE

DESCRIPTION
Replacing sodium loss.

USE
When sodium level is <130mmol/l
1. Renal sodium loss due to immaturity
2. Sodium depleting chronic diuretic therapy

PRESENTATION
IV  3% sodium chloride infusion
ORAL  3% sodium chloride oral solution

DOSE
AS DIRECTED BY THE LEVEL OF HYponATREMIA

SODIUM REQUIREMENT IS 2-4mmol/kg/day.
SMALL PRETERMS MAY NEED 5-10mmol/kg/day.

1g sodium chloride = 17mmol sodium
3% sodium chloride = 0.5mmol/ml sodium

ADMINISTRATION
ORAL  In 4 or more divided doses over the day with fedds.

IV  Continuous IV infusion over 24 hours.

MONITORING
Serum electrolytes

ADVERSE EFFECT
Gastric irritation, food intolerance, extravasation.

REFERENCE
Shann F, Drug doses, ed8. Collective Pty Ltd, p 49
SOTALOL

DESCRIPTION  Beta-blocker.

USE  Treatment of refractory ventricular and supraventricular tachycardia.

PHARMACOKINETICS  Oral bioavailability is decreased by food, particularly milk.

PRESENTATION  80mg/8ml ampoule

DOSE

ORAL  1 mg/kg/dose 8 hourly. Dose can increase up to 2 mg/kg/dose 8 hourly. If no response with the increased dose, add digoxin.

IV  1 mg/kg/dose 8 hourly.
   In acute SVT not responding to Adenosine – 1mg/kg/dose.
   (Refer to Dr Steve Cooper and Dr David Murphy cardiologists at the SCH, Randwick.)

ROUTE  IV bolus, oral

RECONSTITUTION  Add 1ml (10mg) of Sotalol to 4ml of 9% sodium chloride to make 2mg/ml solution.

ADMINISTRATION

ORAL  Sotalol to be given 15-30 minutes prior to feeds as bioavailability is reduced with food.

IV  Slow IV bolus injection over 5-10 minutes.

MONITORING  Frequent ECG monitoring during initiation of therapy.

ADVERSE EFFECT  Proarhythmic effects, sinoatrial block, A-V block, torsades de pointes, ventricular ectopic activity, prolonged QT interval.

INCOMATIBILITY  No information is available.

REFERENCE
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

SPIRONOLACTONE

DESCRIPTION
A mild diuretic with potassium-sparing effects. The clinical effects may not be seen before 2-3 days following initiation of therapy. Half-life with chronic use is 13-24 hrs. Recent study suggests that addition of spironolactone to thiazide diuretics in patients with chronic lung disease may yield little, if any, additional benefit.

USE
Treatment of BPD or congestive heart failure in combination with other diuretics.

PHARMACOKINETICS
Competitive antagonist of mineralocorticoids (e.g. aldosterone). Decreases excretion of potassium. Slightly increases excretion of calcium, magnesium, sodium and chloride.

PRESENTATION
5mg/ml oral mixture.

DOSE
1-2mg/kg/dose daily

ROUTE
Oral, preferably with feeds.

STORAGE
Refrigerated below 8°C. Do not freeze.

MONITORING
Follow serum potassium closely during chronic therapy.

ADVERSE EFFECT
1. Rashes, vomiting, diarrhea, parasthesias
2. Gynecomastia in males
3. Dose-dependent androgenic effects in females
4. Headache, nausea and drowsiness
5. May cause false positive ELISA screening tests for congenital adrenal hyperplasia
6. CAUTION in patients with impaired renal function

REFERENCE
SUCROSE 25%

DESCRIPTION
Sucrose 25% provides analgesia and comforting for painful procedures. The analgesic effects are mediated by endogenous opioids triggered by sweet taste. The long term safety and benefits are not known in extremely preterm infants.

USE
Prior painful procedures such as heel prick, venipuncture, arterial puncture etc.

PRESENTATION
25% sucrose/ml solution

DOSE
- <1Kg: 0.5ml/KG/dose up to a maximum of 4 times the prescribed dose
- ≥1Kg: 0.5ml/dose up to a maximum of 2ml

ROUTE
Oral. Not to be given via intra gastric tube!

PRESCRIPTION
To prescribe on the medication chart PRN section as “Up to Xml of sucrose 25% PO PRN” Sucrose can be a Nurse Initiated medication charted on the front page of the medication chart and marked as NI (Nurse Initiated) if it is needed.

ADMINISTRATION
Using a syringe or pacifier dipped in the sucrose 25% solution 2 minutes prior painful procedure. Sucrose can be given to surgical infants and infants with Nil By Mouth order as long as there is no absolute contraindication.

STORAGE
Keep refrigerated. Expires 28 days after opening.

ADVERSE EFFECT
None reported. Sucrose 25% has an osmolality of 1000mOsm/l.

INCOMPATIBILITY
No data available.

REFERENCE
Stevens et al. Sucrose for analgesia in newborn infants undergoing painful procedures (Cochrane Review). The Cochrane Library, Issue 1, 2003
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

SURFACTANT (SURVANTA or BERACTANT)

DESCRIPTION
A natural bovine lung extract or pulmonary surfactant (contains protein). It lowers surface tension on alveolar surfaces during respiration and stabilizes the alveoli against collapse at resting transpulmonary pressures. It significantly reduces the mortality due to RDS and air leak complications.

PHARMACOLOGY
Survanta contains phospholipids, neutral lipids, fatty acids and surfactant associated proteins B and C, to which colfosceril palmitate (DPPC), palmitic acid and tripalmitin are added. Most of the drug becomes lung-associated within hours of administration, and lipids enter endogenous surfactant pathways of reuse and recycling.

USE
1. Respiratory distress syndrome
2. Meconium aspiration syndrome

PRESENTATION
8ml/vial suspension

DOSE
4ml/kg (100mg of phospholipid/kg) 6-12 hourly up to a maximum of 4 dose. Initiate therapy as soon after the diagnosis of RDS is established.

ROUTE
Intratracheal instillation

ADMINISTRATION
Before administration, allow to stand in room temperature for 20 minutes or warm in the hand for at least 8 minutes. ARTIFICIAL WARMING METHODS SHOULD NOT BE USED. DO NOT FILTER OR SHAKE.

Before administering survanta, assure proper placement of ETT and assess need to suction ETT. Shorten a 5F end-hole catheter (feeding tube) so tip of catheter protrudes just beyond the tip of ET tube above infant’s carina. Slowly withdraw the contents of vial into a plastic syringe through a large (>20 gauge) needle. Attach shortened catheter to syringe. Fill catheter so only dose to be given remains in syringe.

Divide the dose into 4 quarter. Administer each quarter over 2-3 seconds. Wait for 30 seconds or so or until the baby is stable and repeat the next quarter. During instillation of each quarter, baby may need to be disconnected from the ventilator. Alternatively, it can be given via neonatal suction valve without disconnecting from ventilator. Endotracheal tube reflux of the drug is common with second method. The administration of total dose may take 2-3 minutes.

During dosing procedure, ventilator settings may be adjusted at the discretion of the clinician to maintain appropriate oxygenation and ventilation. Do not suction for at least eight hours after administration unless signs of significant airway obstruction occur.

STORAGE
24 HOURS IN REFRIGERATOR (2-8°C). DO NOT FREEZE.

MONITORING
Continuous cardio-respiratory monitoring and SaO₂ in place. Intra-arterial monitoring desirable.
SURFACTANT (SURVANTA OR BERACTANT) cont

ADVERSE EFFECT
During administration transient episodes of bradycardias and decreased oxygen saturation can occur. If this occurs, stop dosing procedure and initiate appropriate measures to alleviate condition. Resume dosing once stabilized.
Other transient side effects, although rare, include endotracheal tube reflux or blockage, pallor, vasoconstriction, hypotension, hypertension, hypocarbia, hypercarbia, and apnoea.

INCOMPATABILITY
Not applicable.

REFERENCE
SUXAMETONIUM

DESCRIPTION
Suxamethonium is a short acting depolarising neuromuscular blocking agent. It has a rapid onset and a short duration of action with complete muscle relaxation within 30-60 secs persisting for 2-4 min. Gradual spontaneous recovery occurs within 10 mins.

USE
Skeletal muscle paralysis in infants requiring mechanical ventilation.

NB: Paralysed babies should always be sedated

PRESENTATION
100mg/2ml ampoules

DOSE
2mg/kg/dose

ROUTE
IV injection

RECONSTITUTION
Add 2ml suxamethonium to 8ml water for injection to make a 10mg/ml solution.

ADMINISTRATION
IV bolus injection using the proximal IV bung.

STORAGE
REFRIGERATE! Discard unused portion.

MONITORING
Continuous cardio-respiratory and arterial blood pressure monitoring. Unlike non-depolarising muscle relaxants such as pancuronium the action of suxamethonium cannot be reversed. NEVER paralyse a baby unless you are confident the airway can be maintained and that ventilation can be provided.

ADVERSE EFFECTS
- slight rise in BP and bradycardia via vagal stimulation
- flushing of the skin,
- bronchospasm
- acute transient rise in serum potassium (0.5mmol) caution in hyperkalaemia
- increase in intragastric pressure
- increased intraocular pressure
- prolonged paralysis in patients who have inherited one of the abnormal genes associated with deficient cholinesterase production (0.04% popn)
- Neonates are more sensitive to neuromuscular blocking agents than adults. If repeated doses of suxamethonium are given action may change from a depolarising to a non-depolarising block requiring both atropine and neostigmine for reversal. This will not occur following a single dose.
- recovery may be delayed in patients on magnesium sulphate

SOLUTION COMPATIBILITY
5% dextrose, 0.9% sodium chloride

REFERENCES
DESCRIPTION
Levothyroxine (T₄) / Thyroid hormone

USE
Congenital Hypothyroidism

PHARMACOKINETICS
Absorption of L-Thyroxine is approximately 70-80% following oral administration. It is absorbed rapidly in the distal small bowel reaching maximum plasma levels in 2-4 hours and has a bioavailability of 40–80%. It’s onset of action is within 1 day and the maximal response occurs in 2 days with evident metabolic effects for 7-8 days and a duration of action for about 15 days. The slow onset of action is at least in part the result of binding of T₄ to TBG, the degree of saturation of TBG with T₄ being 10 times higher than T₃. The half-life of T₄ is 7 days in a euthyroid person and may be as long as 14 days in situations of hypothyroidism.

PRESENTATION
INDIVIDUAL POWDER SACHETS made up in RHW pharmacy to the dose prescribed with added Polyjoule using 50-100 mcg/tablet.

DOSE
10-15 mcg/kg/day as a once daily dose as per recommendation of Paediatric Endocrine Team at SCH.

ROUTE
Oral

RECONSTITUTION
Add 0.5ml of water for injection to sachet to dissolve powder.

ADMINISTRATION
ORAL 30 mins to 1 hr prior to feeds
Treatment needs to be started within 2 weeks of birth if outcome is to be optimised.

STORAGE
Cool, dry place on 8-15ºC. Dispensed powder may be kept in room temperature.

DRUG INTERACTIONS
Antacids, iron salts, calcium carbonate, milk and soy-based formulas reduce the absorption of thyroxine.

MONITORING
Blood levels of TSH (Thyroid stimulating hormone). Early levels after starting thyroxine vary, but levels above 10mU/l are rare after the first 3 days and the free T₄ level by immunoassay in the term baby more than a month old should be 10-25 pmol/l

REFERENCES
Thyroid Diseases. F Monaco, M.A. Satta, B Shapiro, L Troncone 1993
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

TICARCELLIN SODIUM CLAVULANATE

DESCRIPTION
Extended spectrum antibiotic with the beta-lactamase inhibitor clavulanic acid in a 30:1 ratio. Used for treatment of NON-CNS infections caused by susceptible β-lactamase-producing bacteria, including many strains of E.coli, Enterobacter, Klebsiella, Haemophilus influenzae, Proteus mirabilis, Pseudomonas spp. and Staph aureus.

PHARMACOKINETICS
Ticarcellin is primarily eliminated unchanged by renal mechanisms, whereas clavulanate undergoes significant hepatic metabolism. Mean half-life of ticarcellin is 4.2 hours compared to a mean half-life of 2 hours of clavulanate. CNS penetration is modest! Each dose of drug may contain sodium of up to 0.48 mEq/kg body weight.

PRESENTATION
Ticarcellin Sodium 3gm + Potassium Clavulanic Acid 100mg/vial

ROUTE
IV infusion only

DOSE
75-100mg/kg/dose

<table>
<thead>
<tr>
<th>Postnatal age (days)</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–28</td>
<td>12hrly</td>
</tr>
<tr>
<td>≥28</td>
<td>8 hrly</td>
</tr>
</tbody>
</table>

RECONSTITUTION
Add 13ml of water for injection to the vial to make a 200 mg/ml solution.

ADMINISTRATION
IV infusion over 30 minutes

MONITORING
1. Assess renal function prior to therapy.
2. Periodic check on serum Na and hepatic transaminases.
3. Observe IV site for extravasation.

ADVERSE EFFECT
1. Eosinophilia
2. Hyperbilirubinemia
3. Elevations in liver enzymes
4. Hypernatremia

SOLUTION COMPATIBILITY
5%dextrose, 0.9%sodium chloride

TERMINAL INJECTION SITE COMPATIBILITY
amino acid and fat emulsion, acyclovir, aztreonam, cefepime, famotidine, fluconazole, heparin, insulin, morphine, propofol, theophylline.

INCOMPATIBILITY
aminoglycosides, sodium bicarbonate, vancomycin.

REFERENCE
TISSUE PLASMINOGEN ACTIVATOR
ALTEPLASE

IMPORTANT NOTE
The drug should be not be used without the approval of consultant neonatologist. The benefits of therapy should be weighed against its dangers of intraventricular bleed or with low platelets in sick, preterm babies. While the drug can be effective in the thrombolysis, it is associated with low margin of safety and an unknown risk-benefit ratio.

DESCRIPTION
Recombinant tissue plasminogen activator (rt-PA). It has the property of fibrin enhanced conversion of plasminogen to plasmin. Actilyse is fibrin dependent. When introduced into the systemic circulation Actilyse binds to fibrin in a thrombus and converts entrapped plasminogen to plasmin. This initiates local fibrinolysis and clot dissolution but with minimal systemic effects. Rt-PA is better than streptokinase because its short half-life, non-antigenic properties and local specific action on plasminogen bound fibrin. In studies, it has been shown to have an overall patency (clot dissolution) rate of 94%.

USE
1. Arterial and venous thrombosis
2. Central venous catheter occlusions
3. Renal vein thrombosis
4. Intracardiac thrombus secondary to cvcs
5. Vegetations from infective endocarditis not responding to conventional antibiotic therapy

CONTRAINICATION
Major surgery during the last 10 days, history of severe bleeding such as intracranial, pulmonary or gastrointestinal haemorrhage.
Correct the following before starting r-TPA: platelets<100,000, low fibrinogen<100g/l, severe coagulation factor deficiencies.

PHARMACOKINETICS
Actilyse is cleared rapidly from plasma primarily by the liver. Half-life is about 5 minutes.

PRESENTATION
50mg/vial with 50ml solvent and transfer cannula

DOSE
Before starting therapy get baseline investigations including FBC and Coagualtion studies(PT, APTT, Fibrinogen)

OCCLUDED CENTRAL LINE
Instill 1mg/ml solution of rt-PA into CVC in an amount equal to CVC lumen capacity (0.1-2ml) plus an additional 10%. After 20 minutes check for CVC lumen patency, and if necessary, a second rt-PA instillation can be performed. With this dosing regime, it’s effects are local with little or minimal systemic side effects. If possible, infuse the drug into or close to thrombus.
TISSUE PLASMINOGEN ACTIVATOR (Alteplase) cont

SYSTEMIC THROMBOLYSIS

1. **High dose regime** Loading dose of 0.7mg/kg over 30-60 minutes followed by a continuous infusion of 0.2mg/kg/hr (dose range 0.1-0.3mg/kg/hr) of rt-PA ± heparin 4-10U/kg/hr. **This is the preferred regime.** The infusion dose of rt-PA depends on the success of thrombolytic treatment, complications and coagulation status. Review therapy after every 6-12 hours. Infusion is stopped in case of total or partial clot lysis with only minor clot residue after 5 days of treatment and complications, such as general or significant local bleeding. Total duration of treatment is determined by the response (improvement in circulation and clot dissolution) and the overall assessment of risk.

2. **Low dose regime** Loading dose of 0.7mg/kg over 30-60 minutes, followed by a continuous infusion of 0.02–0.04mg/kg/hr of rt-PA. Choose this dosing regime if the risk of intracerebral haemorrhage is considered very high such as sick ELBW infants with cerebral echodensities and/or low fibrinogen levels and/or low platelets.

3. **Follow-up treatment** After successful systemic thrombolysis with low dose 2-6U/kg/hr heparin should be considered as long as central venous lines are required.

RECONSTITUTION

Add 50ml of solvent aseptically to the 50mg of Actilyse by the use of transfer cannula supplied to make a 1mg/ml solution. **Do not use water for injection available in the unit.**

The transfer cannula must always be introduced vertically into the stopper and through the mark at its centre. As an alternative to transfer cannula, we can use large bore needle directing the stream of solvent into the drug cake. Slight foaming is not unusual. Standing the vial undisturbed for a few minutes will allow dissipation of any large bubbles. Avoid excessive or vigorous shaking.

**FURTHER DILUTE** 10ml(10mg) of reconstituted solution with 40ml of 0.9%sodium chloride to give a 0.2mg/ml solution.

STORAGE

Solution can be stored up to 24 hours in refrigerator (2-8°C).

MONITORING

6-12hourly monitoring of platelets, PT, APTT, Fibrinogen

**Preferred coagulation test values under treatment with systemic rt-PA are:** PT 30-40sec, APTT 50-60sec, Fibrinogen ≥150g/l

PRECAUTION

Avoid frequent venepunctures and arterial punctures while on therapy!

ADVERSE EFFECT

local and systemic bleeding intracranial haemorrhage, allergic reaction
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

TISSUE PLASMINOGEN ACTIVATOR (Alteplase) cont

REFERENCE
TOTAL PARENTERAL NUTRITION

This is a brief summary of the standardised parenteral solutions available in the Newborn Care Centre. Refer to the Parenteral Nutrition in NCC Guideline for detailed description, instruction for prescription and monitoring.

### Solutions

<table>
<thead>
<tr>
<th>Solutions</th>
<th>Starter</th>
<th>Standard Preterm</th>
<th>High Na Preterm</th>
<th>7.5% Dextrose Preterm</th>
<th>Peripheral Preterm</th>
<th>Term</th>
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<tbody>
<tr>
<td>Indications</td>
<td>For preterm and term infants from birth up to 120ml/kg/day</td>
<td>Starts after 24-48 hrs of life</td>
<td>Hyponatreemic preterm infants</td>
<td>Hyperglycaemic VLBW infants</td>
<td>No central line access</td>
<td>For term infants from 24-48 hrs of life</td>
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### Concentration / Litre

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<th>AminoAcids, g</th>
<th>Glucose, g</th>
<th>Na, mmol</th>
<th>K, mmol</th>
<th>Cl, mmol</th>
<th>Ca, mmol</th>
<th>Mg, mmol</th>
<th>Ph, mmol</th>
<th>Acetate, mmol</th>
<th>Zinc, µg</th>
<th>Selenium, µg</th>
<th>Iodine, µg</th>
<th>Heparin, units</th>
<th>Osmol, mosm/L</th>
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### Amount given at 135ml/kg/day total fluid prescribed

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<th>AminoAcids, g/kg/day</th>
<th>Glucose, g/kg/day</th>
<th>Na, mmol/kg/day</th>
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<th>Mg, mmol/kg/day</th>
<th>Ph, mmol/kg/day</th>
<th>Acetate mmol/kg/day</th>
<th>Zinc, µg/kg/d</th>
<th>Selenium, µg/kg/d</th>
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<td>7.5% Dextrose Preterm</td>
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<td>Peripheral Preterm</td>
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<tr>
<td>Term</td>
<td>4</td>
<td>16.2</td>
<td>3.4</td>
<td>3</td>
<td>3.5</td>
<td>0.5</td>
<td>0.3</td>
<td>1.4</td>
<td>1.8</td>
<td>256</td>
<td>2.7</td>
<td>1</td>
</tr>
</tbody>
</table>

### MONITORING

- UEC(Na, K, Cl, HCO₃, urea ) daily first 3-7 days, Mo/Thurs thereafter
- Ca, PO₄, bilirubin, albumin baseline or as needed
- Blood glucose level 4-6hrly, twice a day once stable
- Plasma ammonia once on maximum AA intake

### REFERENCE

Parenteral Nutrition Guideline, Royal Hospital for Women, Newborn Care Centre, 2011

### REVISED

1 July 2011
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

VANCOMYCIN

DESCRIPTION
Bactericidal. Inhibits cell wall synthesis and alters bacterial cell membrane permeability and RNA synthesis. Active against gram positive organisms including Staph aureus, Staph epidermidis, streptococci, pneumococci, Streptococcus agalactiae, the viridans group, Streptococcus bovis, and enterococci; Cl difficile and diphtheroids. Not active against gram-negative organisms.

USE
Drug of choice for serious infections caused by methicillin-resistant staphylococcus aureus (MRSA) and methicillin resistant staph epidermidis (MRSE) and penicillin resistant pneumococci.

PHARMACOLOGY
Widely distributed in most body tissues. Predominantly eliminated in urine through glomerular filtration. Renal dysfunction slows excretion of vancomycin. Small amounts metabolised in liver. It does not readily diffuse across normal meninges but penetration occurs when the meninges are inflamed.

PRESENTATION
500mg/vial
5mg/ml in a 10ml pre-made syringe

DOSE
The following dosing regime is for babies with no significant renal dysfunction. If renal dysfunction is suspected or present, discuss with the consultant on call for any dose modification.

<table>
<thead>
<tr>
<th>Age</th>
<th>Dose</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7 cdays</td>
<td>15mg/kg/dose</td>
<td>24 hours</td>
</tr>
<tr>
<td>&gt;7 days</td>
<td>15mg/kg/dose</td>
<td>12 hours</td>
</tr>
</tbody>
</table>

ROUTE
IV infusion

RECONSTITUTION
Add 9.7ml water for injection to vial to make a 50mg/ml solution.
FURTHER DILUTE 1ml(50mg) of reconstituted Vancomycin to 9ml of 0.9%sodium chloride to make 5mg/ml solution.

ADMINISTRATION
Infusion over 1 hour using proximal IV bung

STORAGE
Discard unused portion

MONITORING
Measure trough levels only
Trough level (10-15mcg/ml) prior to administration of 3rd dose
0.5ml of blood is to be collected in green top heparinised tube for drug levels.
Administer 3rd dose after acceptable result received.
Sub-therapeutic level to be documented and discussed with consultant. Assess renal function.
VANCOMYCIN cont

ADVERSE EFFECT

1. Ototoxicity and nephrotoxicity enhanced by aminoglycoside therapy.
2. Red man syndrome: Rash and hypotension may occur rapidly and resolves within minutes to hours. Lengthening the infusion time usually eliminates risk for subsequent dose.
3. Neutropenia especially after prolonged treatment for >3 weeks.
4. Phlebitis.

SOLUTION COMPATIBILITY
dextrose, 0.9% sodium chloride

COMPATIBLE DRUGS
calcium gluconate, hydrocortisone, KCL, ranitidine, verapamil, vitamin B complex and C.

COMPATIBILITY VIA Y SITE
acyclovir, amiodarone, esmolol, filgrastim, fluconazole, insulin regular, magnesium, morphine, ondanesetron, pethidine.

INCOMPATIBLE DRUGS
adrenaline, albumin, aminophylline, aztreonam, benzylpenicillin, calcium chloride, ceftazidime, cefotaxime, ceftriaxone, chloramphenicol, dexamethasone, erythromycin, foscarнет, heparin, phenobarbitone, phenytoin, phytonemadione, piperacillin, prochlorperazine, sodium bicarbonate.

REFERENCE
**VITAMIN A PLUS E**

**DESCRIPTION**
Liquid vitamin A and E supplement in micellised form for enhanced absorption containing Retinol (vitamin A) 2210 IU/mL and D-alpha Tocopheryl Acetate (vitamin E) 102 IU/mL.

**USE**
Vitamin supplement.
May improve immune activity, blood circulation, epithelial tissue and vision.

**PRESENTATION**
Oral solution

**DOSE**
0.5 ml Daily

**ADMINISTRATION**
Give orally or via IGT with feed

**STORAGE**
Store below 30°C and in fridge after opening. Protect from light.

**REFERENCE**
Micel A plus E (Liquid Supplement). Pretroiusvitamins.com.au

**REVISED**
2 August 2011
NEWBORN USE ONLY
GIVEN ON DOCTORS ORDER ONLY

VITAMIN E

DESCRIPTION
A potent free radical scavenger. An antioxidant to prevent destruction of unsaturated fatty acids and cell membranes by uncontrolled free radicals.

USSE
1. Prophylaxis against vitamin E deficiency
2. At higher dose to reduce oxidant injury such as ROP, BPD, IVH remain controversial.

PRESENTATION
156U/ml oral preparation

DOSE
5-25U/day commenced at 4 weeks of age.

ADMINISTRATION
Oral with feeds.

MONITORING
Assess feeding tolerance. Signs of vitamin E deficiency include hemolytic anemia and thrombocytosis.

REFERENCE

REVISED
2 August 2011
NEWBORN USE ONLY
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VITAMIN K

DESCRIPTION
Promotes formation of the following clotting factors in the liver: Active prothrombin (factor II), proconvertin (factor VII), plasma thromboplastin component (factor IX), and Stuart factor (factor X). It does not counteract the anticoagulant action of heparin.

PHARMACOKINETICS
This preparation is effective through both IM and oral route, but not presented in a user-friendly way. IM administration requires a 1mg/dose in a 0.1ml volume of injection (half that in the ampoule) increasing the dose error. This problem is magnified for very pre-term infants who would receive 0.5mg in 0.05ml. Other disadvantage is that it comes in glass ampoules that are not user friendly for parents. The working party from National Health and Medical Research Council (NHMRC) expressed these concerns to the manufacturer.

USE
1. Prophylaxis and therapy of vitamin K deficiency bleeding known as Haemorrhagic Disease of the Newborn.
2. Hypoprothrombinaemia secondary to factors limiting absorption or synthesis of vitamin K.

PRESENTATION
2mg/0.2ml ampoule

ROUTE
IM, IV, oral
IV is restricted to only emergency use in severe haemorrhagic disease and should be used with a physician in attendance as severe anaphylactic reaction can occur. Read adverse reaction section before IV administration.

DOSE
ENSURE PARENTAL CONSENT PRIOR TO ADMINISTRATION!

1. IM PROPHYLAXIS This is the preferred route. Single IM injection in the anterolateral thigh following delivery for <1.5kg 0.5mg=0.05ml and ≥1.5kg 1mg=0.1ml of dose.
2. ORAL PROPHYLAXIS Three 2mg=0.2ml oral dose given at birth, at 3-5 days and at 4 weeks. The last dose is not required in infants predominantly formula fed. It is imperative that the third dose is given no later than 4 weeks after birth as the effect of earlier dose decreases after this time. Undertaking this form of prophylaxis requires that the parent accept responsibility and those clinicians advise them in the administration of the third dose. If the infant vomits within 1 hour of administration repeat the oral dose. Contraindicated in preterms, infants who are unwell and unable to take oral vitamin K or whose mothers have taken medications that interfere with vitamin K metabolism.
3. SEVERE HAEMORRHAGIC DISEASE 1-10mg IM or slow IV bolus <1mg/min. Read ADVERSE EFFECT section before IV administration.
4. ORAL ANTICOAGULANT OVERDOSE 1-2mg/dose IV <1mg/min 4-hourly PRN. Assess response with serial PT and APTT Read ADVERSE EFFECT section before IV administration.
NEWBORN USE ONLY  
GIVEN ON DOCTORS ORDER ONLY  

VITAMIN K cont  

RECONSTITUTION  
IV  Add 2mg (0.2 ml) of vitamin K to 9.8ml of water for injection to give a 0.2mg/ml solution. Infuse the required amount over 10 minutes via Alaris syringe driver only. Prior to commencing the infusion confirm with second RN on correct rate of infusion and time to be >10 minutes. IV administration should be restricted only to emergency use with a physician in attendance and should not exceed 1mg/min.  

ADVERSE EFFECT  
1. Pain and swelling may occur at IM injection site.  
2. Efficacy of treatment is decreased in liver disease.  
3. Severe anaphylactoid or hypersensitivity reaction including shock, cardio-respiratory arrest and death have been reported with IV administration.  

REFERENCE  