**The Formulary is designed to contain the most commonly used drugs on the NICU. There may be occasions when other drugs are recommended for use by specialists from other hospitals e.g. Birmingham Children’s Hospital. On these occasions the indication for use and dose MUST be clearly documented in the case notes. Discuss with the pharmacist if necessary.**

NICU FORMULARY

**Updated March 2024**

A close-up of a syringe and pills

Description automatically generated

RESUSCITATION DRUGS

**Adrenaline**

**(1:10 000 solution)**

20 micrograms/kg (0.2ml/kg) IV

**Sodium Bicarbonate**

1 to 2 mmol/kg slow IV

(2 to 4 ml/kg of 4.2% sodium bicarbonate solution)

**10 % Glucose**

2.5ml/kg bolus IV

**0.9% Sodium Chloride**

**(Only if known Hypovolaemia)**

10ml/kg IV

|  |  |
| --- | --- |
| **Reference:** | UK Resuscitation Council, Resuscitation Guidelines 2021 |

Click on the letter below to jump to the relevant page

|  |  |
| --- | --- |
| [A](#A) | [N](#N) |
| [B](#B) | [O](#O) |
| [C](#C) | [P](#P) |
| [D](#D) | Q |
| [E](#E) | [R](#R) |
| [F](#F) | [S](#S) |
| [G](#G) | [T](#T) |
| [H](#H) | [U](#U) |
| [I](#I) | [V](#V) |
| [J](#J) | W |
| K | X |
| [L](#L) | Y |
| [M](#M) | [Z](#Z) |

|  |  |  |
| --- | --- | --- |
| Version Date | Author | Description of Amendment |
| November 2010 | Gemma Holder |  |
| May 2011 | Melanie Sutcliffe  Diana Young  Erika Setzu  Amrat Mahal |  |
| March 2013 | Gemma Holder  Louise Whitticase  Diana Young  Zahra Irshad |  |
| September 2014 | Gemma Holder  Louise Whitticase  Diana Young |  |
| August 2015 | Louise Whitticase  Gemma Holder |  |
| March 2016 | Louise Whitticase  Amar Iqbal  Gemma Holder |  |
| July 2017 | Louise Whitticase  Gemma Holder  Sara Clarke |  |
| October 2017 | Alex Coles  Gemma Holder |  |
| December 2017 | Louise Whitticase  Gemma Holder |  |
| January 2018 | Louise Whitticase  Gemma Holder |  |
| February 2018 | Louise Whitticase  Gemma Holder |  |
| April 2018 | Louise Whitticase  Gemma Holder |  |
| May 2018  August 2018 | Louise Whitticase  Gemma Holder  Louise Whitticase  Gemma Holder |  |
| October 2018 | Louise Whitticase  Gemma Holder |  |
| June 2019 | Louise Whitticase  Gemma Holder |  |
| July 2021 | Louise Whitticase  Gemma Holder |  |
| January 2022 | Louise Whitticase  Gemma Holder |  |
| September 2022 | Louise Whitticase  Gemma Holder  Rhian Hughes |  |
| May 2022 | Louise Whitticase |  |
| March 2024 | Louise Whitticase  Gemma Holder  Rhian Hughes |  |

|  |  |  |
| --- | --- | --- |
| **Added September 2014** | Glycerol suppositories |  |
| Glyceryl Trinitrate Ointment |  |
| Insulin (hyperkalaemia) |  |
| License status of medications |  |
| **Amended September 2014** | Abidec® | Updated dosing for babies on Breast Milk Fortifier |
| Adrenaline | Monitoring advice updated  Compatibility data revised |
| Ametop® | Maximum dose added |
| Amoxicillin | Administration guidance updated  Dosing in renal impairment added  Incompatibility data added |
| Benzylpenicillin | Dosing revised  Administration guidance updated  Caution regarding false positive urinary glucose if testing for reducing substances added |
| Breast Milk Fortifier | Administration guidance updated  Dose added for breast feeding |
| Caffeine citrate | Incompatibility data added  Information on prolonged therapy and CAP trial removed |
| Calcium gluconate | Packaging advice updated: Should be packaged in a plastic amp. Repeated or prolonged administration using glass containers is contraindicated in children under 18 years owing to the risk of aluminium accumulation  Dilution instructions revised  Incompatibility data added  Administration guidance updated  Monitoring advice updated |
| Calcium Sandoz® | Indication revised  Reference to Alkaline Phosphatase removed |
| Carobel | Not to be used in pre-terms  Dosing revised  Administration guidance updated |
| Cefotaxime | Preparation revised to 500mg vials  Dosing advise made clearer  Interactions revised |
| Ceftazidime | Incompatibility data added |
| Ceftriaxone | Dilution instructions revised  Contraindications updated  Compatibility data revised  Dosing in renal/hepatic impairment added |
| Cefuroxime | Dilution instructions revised  Incompatibility data added |
| Chloral hydrate | Dosing in renal/hepatic impairment added  Advice on use in pre-terms added |
| Clonazepam | Product availability updated-Roche product discontinued in UK  Dosing revised  Dilution instructions revised  Administration guidance updated  Monitoring advice updated |
| Curosurf® | Storage requirements added |
| Dalivit® | Updated dosing for babies on Breast Milk Fortifier |
| Dexamethasone | Dilution instructions revised  Monitoring advice updated  Interactions revised |
| Digoxin | Incompatibility data added  Therapeutic levels revised  Dosing information on IV-> oral switch added |
| Dobutamine | Compatibility data revised  incompatibility data revised |
| Domperidone | Dosing revised  Contraindications added |
| Dopamine | Compatibility data revised  incompatibility data revised |
| Erythromycin | Caution neonate under 2 weeks (risk of hypertrophic pyloric stenosis) added |
| Eye drops | Single use minims advised |
| Flucloxacillin | Dosing in hepatic impairment added  Risk of kernicterus in jaundiced neonates when high doses given parenterally added |
| Fluconazole | Dosing revised  incompatibility data added |
| Flumazenil | Maximum dose removed |
| Furosemide | Indications revised  Furosemide liquid (Frusol®) contains 10% v/v alcohol added |
| Gentamicin | Dosing revised  Therapeutic monitoring levels revised  Increase dose interval on ibuprofen removed  incompatibility data revised  Interactions revised |
| Glucose concentrated | 20% preparation added |
| Heparin | Dosing revised  Dilution instructions revised  Administration guidance updated  Preparations updated |
| Hyaluronidase | Phentolamine removed  Use not advisable in extreme preterm infants added |
| Hydrocortisone | incompatibility data added |
| Ibuprofen (Pedea®) | Contraindications revised  Compatibility data revised  Reference to reducing fluid intake removed  Increase dose interval if on gentamicin/ vancomycin removed |
| Ibuprofen (Neoprofen®) | Contraindications revised  Compatibility data revised |
| Insulin (hyperglycaemia) | Indications revised  Dilution instructions revised  incompatibility data revised  compatibility data revised |
| Joulies phosphate | Indications revised  Reference to Alkaline Phosphatase removed  Dosing revised |
| Lactulose | Monitoring advice updated |
| Magnesium sulphate | Dosing revised  incompatibility data revised  Monitoring advice updated  Preparations updated |
| Meropenem | Dilution instructions revised  incompatibility data added |
| Metronidazole | Dosing revised  incompatibility data added |
| Morphine sulfate | Dosing revised  Compatibility data revised  incompatibility data added |
| Naloxone | IV dosing reference revised |
| Noradrenaline | incompatibility data revised |
| Omeprazole | Preparations updated  Administration guidance updated  Compatibility data revised  Dosing in hepatic impairment added |
| Oramorph® | Indication revised |
| Palivizumab® | Preparation instructions revised |
| Paracetamol | Dosing updated  ‘There is some evidence that paracetamol may reduce the effectiveness of childhood vaccinations, therefore routine administration of paracetamol before and repeatedly after immunisation in the absence of symptoms is not indicated’ added |
| Parenteral nutrition | Statement on how to manage bigger babies requiring more than one lipid syringe/ day to meet their requirements added |
| Phenobarbital | Dosing revised  Administration guidance updated  Compatibility data revised |
| Phenytoin | Compatibility data revised  incompatibility data revised  therapeutic level revised |
| Potassium Chloride | Worked calculation added  incompatibility data added |
| Prostin® | Compatibility data revised |
| Ranitidine | Compatibility data revised  incompatibility data added  note Rosemont brand contains 8% w/v alcohol added |
| Retinopathy of prematurity Screen | Updated page included |
| Sodium bicarbonate | Dilution instructions revised  incompatibility data revised |
| Sodium chloride | Sodium content breast milk removed |
| Sodium feredetate (Sytron®)) | Dosing revised |
| Special Feeds | Information on what stock items in Pharmacy and what needs to be ordered for individual babies added |
| THAM | Concentration of preparation revised  Dose calculation revised  incompatibility data revised |
| Ursodeoxycholic acid | Doses of vitamin D and E revised  Concentration of preparations added |
| Vancomycin | Dilution instructions revised  Cautions updated  incompatibility data revised |
| Vitamin K (Phytomenadione) | Dosing updated  Oral dose restriction added |
| Zidovudine | Administration guidance updated |
| Addendum 1- Summary Vitamin Requirements | Updated in line with individual pages  Sytron® should be continued until 6-12 months of age (until tolerating balanced weaning diet)  Abidec® should be continued until 1 year of age (N.B. DOH advice that all children <5 years old should receive multi vitamins containing vitamins A, D + E) added |
| Addendum 2- Hyperkalaemia | Protocol completely revised |
| **Deleted September 2014** | Vitamin D |  |
| **Amended November 2014** | Addendum 1- Summary of Vitamin requirements | Updated to reflect individual monographs |
|  | Morphine sulphate | Label amended to reflect revised loading dose |
| **Added November 2014** | Lidocaine |  |
| **Amended January 2015** | Benzylpenicillin | Dilution instructions revised |
|  | Amoxicillin | Dilution instructions revised |
| **Added July 2015** | Baby Oscar study solution (Addendum 4) |  |
| **Amended Jan 2016** | Abidec | Amended Healthy Start availability onsite Boots |
|  | Adenosine | Infusion instructions amended |
| Adrenaline | Comment regarding caution with dopamine added |
| Ambisome | Preparation instructions altered |
| Amoxicillin | MHRA alert added  Preparation instructions altered |
| Benzylpenicillin | Preparation instructions altered  Dosing and frequency instructions clarifying when to administer higher dose clarified  Specific prescribing times given |
| Caffeine Citrate | New ‘high dose’ added |
| Calcium Sandoz | Sandoz preparation no longer available |
| Carobel | Indications for use clarified |
| Cefotaxime | Now first line for gonococcal infection  Specific prescribing times given |
| Clonazepam | Dose frequency changed to 24 hrs rather than 40 – 60 hours |
| Dalivit | Amended Healthy Start availability onsite Boots |
| Dexamethasone | Organon brand details removed |
| Dobutamine | Comment re caution with adrenaline added |
| Domperidone | Change in license status noted  Comment regarding performing ECG if cardiac concerns added |
| Dopamine | Comment re caution with adrenaline added  Incompatibility with lipid added |
| Fluconazole | Delete use for prophylaxis |
| Gaviscon | Administration instructions amended |
| Gentamicin | Administration times added |
| Heparin Sodium | Concentration for maintaining broviac line patency changed |
| Insulin | Comment re using term units and not abbreviations added  Timing of checking of blood sugar added |
| Meropenem | Prescription times added |
| Metronidazole | Prescription times added |
| Nystatin | Added for fungal prophylaxis |
| Palivizumab | Preparation instructions amended |
| Paracetamol | Comment re administering before men B vaccine added |
| Parenteral Nutrition | Indications for use added  Amended starting lipid day 1 |
| Phenobarbital | Comment re using water for injection as diluent added |
| Sodium Chloride | Comment re administering concentrated solution via central line added |
| Special Feeds | Table updated |
| Urso and fat soluble vits | Comment re starting in babies on lipid added |
| Vaccinations | Updated |
| Vancomycin | Instructions for changing bolus to infusion added |
| Addendum 5-Coagulation Problems | Added |
| Addendum 6 – Privigen Liquid | Added |
| Addendum 7 - Short synacthen test | Added |
| Addendum 8 – Intubation policy | Added |
|  | Addendum 9-Palliative Care Medication | Added |
| **Deleted Jan 2016** | Ceftriaxone |  |
| **Added July 2017** | Addendum 11: ENFit syringes |  |
| Addendum 12**:** Meticillin-Resistant Staphylococcus Aureus (MRSA) Decolonisation treatment |  |
| Drug allergy guidance |  |
| Drug administration and preparation | Changing IV infusions every 24 hours and guidance re multi-dose |
| Human Milk Fortifier | Changed name from Breast Milk Fortifier  Advice re part quantities and storage  Use at >2kg revised  Indications revised |
| Furosemide | Continuous infusion added |
| Isoprenaline hydrochloride |  |
| Morphine Sulfate Oral Solution | Changed name from Oramorph®  100microgram/ml preparation added |
| Bevacizumab |  |
| Milrinone |  |
| Oral Glucose gel |  |
| Paracetamol | IV added |
| **Deleted July 2017** | Clonazepam |  |
| Breast Milk Fortifier | Renamed Human Milk Fortifier |
| Domperidone |  |
| Oramorph | Changed name to Morphine Sulfate Oral Solution |
| Dalivit |  |
| **Amended July 2017** | How to dilute drugs for intravenous administration safely |  |
| Abidec | Amended inclusion of babies born at >34/40 who remain an inpatient at 4 weeks of age for duration of inpatient stay and healthy start vitamin advice on discharge  Dose for combination feeding, high calorie formula and special feeds and those on liver vitamin regime  Dose with HMF at >2kg revised |
| Aciclovir | Changes added to preparation  Advice and approval notes for VZIG amended |
| Adenosine | Notes added to routes and monitoring |
| Benzylpenicillin | Administration instructions revised |
| Carobel | Gaviscon Infant warning added  Note re concentrating further added |
| Fentanyl | Order in CD requisition book  Record administration and destruction in CD record book |
| Fluconazole | Incompatibility updated |
| Furosemide | Administration, route and monitoring revised |
| Gaviscon Infant | Carobel warning added |
| Gentamicin | Notes added re times levels processed |
| Glucose solutions (concentrated) | Notes added about stickers for hypoglycaemia screen |
| Glyceryl Trinitrate (GTN) | Patches added to preparation, administration, dosage |
| Insulin | Instruction added to dosage re monitoring checks, incompatibility revised |
| Joulies phosphate | Notes added re using with HMF/ preterm formula and PN |
| Lactulose | Dose revised |
| Meropenem | Criteria for use added |
| Midazolam | Order in CD requisition book  Record administration and destruction in CD record book |
| Morphine sulfate | Record administration and destruction in CD record book |
| Nystatin | License status updated, use after feeds |
| Omeprazole | MHRA/CHM advice added |
| Palivizumab | Preparation amended, note to prescriber and Bluetec note added |
| Paracetamol | Note added to noting preparation strength when choosing dose |
| Parenteral Nutrition | Formulations updated, guidelines amended in-line with network PN |
| Phenobarbital Sodium | Notes re taking levels revised  Record administration and destruction in CD record book |
| Phenytoin | Notes added re using an in-line filter, signs of toxicity and antidote |
| Potassium Chloride | Incompatibility updated  Order in CD requisition book |
| Rocuronium Bromide | Incompatibility notes added |
| Sodium Bicarbonate | Changes made to indication for use, recommendations for infusion over 6-12 hours rather than bolus, cautions updated |
| Sodium Feredetate | Dose for special formula added |
| Special feeds | Supply route updated  Indications revised  Hydrolysed nutriprem added |
| Ursodeoxycholic Acid and fat soluble vitamins | Doses revised, practical dosing guide for alfacalcidol added, Vitamin A preparation updated, guidance re abidec and PN added  Monitoring information updated |
| Vaccinations | Schedule updated and guidance re immunosuppression added. |
| Vancomycin continuous | Notes added re times levels processed and times to take |
| Vancomycin intermittent Regime | Notes added re times levels processed and times to take  Guidance added re switching from continuous regime |
| Addendum 1 | Updated in line with changes to abidec/ ursodeoxycholic acid pages |
| Addendum 4 | Baby Oscar study solution amended |
| Addendum 8 | Intubation prescription chart added |
| Addendum 9 | Palliative care medication doses amended  Example Controlled Drug Discharge TTO added |
| **Added October 2017** | Addendum 13 | MiniDEX Trial |
| **Amended October 2017** | Morphine sulfate oral solution | Clarity around not further diluting 100microgram/ml preparation added. |
|  | Midazolam | Preparation for IV infusion updated |
| **Added December 2017** | Paraldehyde |  |
| **Amended December 2017** | Vaccinations | Updated in line with Public Health England’s Green Book chapter on live attenuated vaccines |
| **Amended February 2018** | Dinoprostone | Withdraw 50mL from the bag into a syringe to run through a syringe pump  The 500ml bag containing Dinoprostone should NEVER be infused directly into the patient. Discard the bag immediately. |
| **Amended April 2018** | Caffeine citrate | Change in oral preparation to licensed product |
| **Amended May 2018** | Insulin for hyperkalaemia (page and addendum) | Monitoring instructions clarified |
| **Amended May 2018** | Nystatin | Clarification to be used even if baby NBM added |
| **Amended May 2018** | Potassium chloride replacement fluids | Withdraw 50mL from the bag into a syringe to run through a syringe pump  The 500ml bag containing 10mmol/500ml should not be infused directly into the patient. Discard the bag immediately. |
| **Amended May 2018** | Milrinone | Do not give a bolus in babies with CDH |
| **Added August 2018** | LaBiNIC (Probiotic) |  |
| **Amended August 2018** | Ceftazidime | Displacement value changed with new brand |
| **Amended October 2018** | Flucloxacillin | Displacement value changed with new brand |
| **Amended October 2018** | Bevacizumab | Preparation changed |
| **Amended October 2018** | Gaviscon Infant | Max 6 times in 24 hours removed |
| **Amended June 2019** | Fluconazole | Treatment dose changed from 6 – 12mg/kg to 12mg/kg |
| **Amended June 2019** | Human Milk Fortifier | Wording altered to make adding to smaller volumes clearer |
| **Amended June 2019** | Sodium Chloride | Administration changed to bolus rather than to feeds |
| **Amended March 2020** | Vaccine schedule  Sodium Feredetate | Amended in line with new vaccination schedule  Additional formulation of SodiFer added as Sytron is currently MCS |
| **Amended July 2020** | Glycerol Trinitrate | Added ‘Monitor Methaemoglobin’ |
| **Amended Jan 2021** | Adrenaline and noradrenaline | Dosing changed from nanograms to micrograms |
| **Amended Jul 2021** | Caffeine Citrate | Standard maintenance dose changed from 12mg/kg to 10mg/kg and method of administration changed from infuse over 30 mins to slow IV injection over 10 mins |
|  | Resuscitation guideline | Adrenaline dose updated in line with national guideline update |
|  | Hydrocortisone | Dose for prevention of CLD in all babies <28 weeks gestation (From Premiloc study) added, monitoring and cautions updated  Administration amended to include option of giving via slow IV over 3-5 minutes |
|  | Isoprenaline | Statement added that different preparations exist to take care with strengths |
|  | Digoxin | New preparation added  Dilution instructions amended  Dosing instructions clarified |
| **Added Jul 2021** | Paracetamol for PDA |  |
| **Amended Jan 2022** | Hydrocortisone | Wording changed on days of age from 0-6 and 7-9 to 1-7 and 8-10  Admin instructions changed |
|  | Zidovudine | Duration of PEP updated to include potential for 2 weeks if strict criteria met in line with QEHB birth plans |
| **Amended May 2022** | Omeprazole | Omeprazole preparation changed to suspension. |
| **Added/amended March 2024** | Abidec | Revised in line with ODN guidelines |
|  | Ambisome® | Administration through 1.2 micron in-line filter clarified with how to obtain and must not be infused through standard 0.2micron in-line filter |
|  | Calcium (Calvive) | Preparation updated to Calvive and instructions altered accordingly |
|  | Caffeine citrate | Discontinuation changed from 34 weeks to 32 weeks  Loading dose changed from 25mg/kg to 20mg/kg |
|  | Cefotaxime | IM dose and administration added in cases of inability to obtain IV access |
|  | Fluconazole | Indications altered in line with NICE guidelines |
|  | Folic acid | Supplementation for babies <34 weeks and 1800g added in line with ODN guidelines |
|  | Glucagon | Page added |
|  | Glyceryl trinitrate | Dose and administration instructions updated for patch  Added elevating and warming limb |
|  | Human Milk Fortifier | Page altered in line with new Network Feeding Guidelines |
|  | Hyperkalaemia Appendix | Appendix altered to use standardized Salbutamol infusion |
|  | Isoprenaline | Preparation altered. Administration amended to match. Simplified calculation removal of sulfate- hydrochloride conversion |
|  | Joulies Phosphate | Indication, dosing removed- referenced to appendix 11 MBD |
|  | Levetiracetam | Page added |
|  | Methylprednisolone | Page added |
|  | Milrinone | Dose units changed from micrograms/kg/hour to micrograms/kg/min |
|  | Nitric Oxide | Example prescribing sticker added  Reference to medical physics being required to set up-removed |
|  | Nystatin | Indications altered in line with NICE guidelines  Dose added for treatment in event of shortage of miconazole oral gel |
|  | Paracetamol | IV doses altered in line with Paediatric Formulary, Evelina London Children’s Hospital,  15mg suppositories added, comment to prescribe sensible doses and full suppositories |
|  | Parenteral nutrition | Vamin bags updated to match WMODN standard bags |
|  | Potassium | Inclusion of ready made bag 100mmol in 500ml bag 10% glucose 0.18% sodium chloride  Stipulation to use ready made where possible added  Example calculation of side arm infusion added |
|  | Prostaglandin | Moved from Brand name to Dinoprostone |
|  | Retinopathy of Prematurity Screening | Prescription chart example updated |
|  | Rocuronium | Reminder to prescribe Carmellose 0.5% Eye Drops concurrently  Route- added to prescription sticker example |
|  | Sodium feredetate (Sytron®) | Dosing and indication revised in line with NDIG/ODN guidelines  Sodifer® brand added due to Sytron® shortage |
|  | Sore bottoms | Orabase® removed as product discontinued and Flaminal hydro added |
|  | Ursodeoxycholic acid | Vitamin D preparation changed from alfacalcidol to colecalciferol  Dosing guide for >37 CGA weeks removed. Single dose for all gestational age for ease with cap of max dose. |
|  | Vaccinations | Hepatitis B immunoglobulin- dose clarification depending on vial size |
|  | Vitamin Supplements reviewed | Abidec page updated and doses consolidated in to appendix Colecalciferol 600 units alternate days required for those babies <34 weeks and/or < 1.8kg on Nutriprem Preterm Formula  Weight threshold for vits changed from 1.5kg to 1.8kg  Joulies phosphate removed from routine supplementation |
|  | Addendum review | 1. Summary of vitamin requirements- updated with ODN guideline 2. -Albumin 20%- dose calculation removed   4- Baby Oscar study solution removed  5- Privigen- infusion rates updated  8- Palliative Care drugs removed  10- Elfin study solution removed  11- Additional CHO (Maxijul) to feeds added-became appendix 10  13-Minidex trial removed |
|  | Nutritional Management of Metabolic Bone Disease | Appendix 11 added |
|  | Addition of Extravasation RAG rating triangles | Appendix 12 added |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **A** |  | Gentamicin | 63 | Parenteral Nutrition | 111 |
| Abidec® | 21 | Glucagon | 65 | Phenobarbital (Phenobarbitone) | 113 |
| Aciclovir | 23 | (Oral) Glucose gel | 67 | Phenytoin | 114 |
| Glucose solutions (concentrated) | 68 | Potassium Chloride | 115 |
| Adenosine | 24 | Glycerol (Glycerin) Suppositories | 69 |  |  |
| Adrenaline (Epinephrine) | 25 | Glyceryl Trinitrate (GTN) | 70 |  |  |
| Ambisome® | 27 | **H** |  |  |  |
| Ametop® | 28 | Heparin Sodium | 71 | **R** |  |
| Amiloride | 29 | Human Milk Fortifier | 72 | Ranitidine | 117 |
| Amoxicillin | 30 | Hyaluronidase | 74 | Retinopathy of Prematurity | 118 |
| Atropine | 31 | Hydrocortisone | 75 | Rocuronium Bromide | 119 |
| **B** |  | Hyoscine hydrobromide patches | 76 | **S** |  |
| Benzylpenicillin | 32 | **I** |  | Sodium Bicarbonate | 120 |
| Bevacizumab | 33 | Ibuprofen (Pedea®) | 77 | Sodium Chloride | 121 |
| **C** |  | Insulin (soluble) | 78 | Sodium Feredetate (Sytron® or Sodifer®) | 122 |
| Isoprenaline hydrochloride | 81 |
| Caffeine Citrate | 34 | **J** |  | Sore Bottoms | 123 |
| Calcium Gluconate | 35 | Joulies Phosphate | 83 | Special Feeds | 124 |
| Calcium (oral)- Calvive | 36 | **L** |  | Spironolactone | 125 |
| Carobel | 37 | LaBiNIC® Probiotic | 84 | Stoma Care | 126 |
| Cefotaxime | 38 | Lactulose | 85 | Sucrose | 127 |
| Ceftazidime | 40 | Levetiracetam | 86 | Suxamethonium chloride | 128 |
| Cefuroxime | 41 | Lidocaine Hydrochloride | 87 | T |  |
| Chloral Hydrate | 42 | **M** |  | (THAM) Trometamol | 129 |
| Chlorothiazide | 43 | Magnesium Sulfate | 88 | Trimethoprim | 130 |
| Curosurf® Poractant alfa | 44 | Meropenem | 90 | **U** |  |
| **D** |  | Methylprednisolone | 92 | Ursodeoxycholic Acid and Fat Soluble Vitamins | 131 |
| Dexamethasone | 45 | Metronidazole | 93 | **V** |  |
| Digoxin | 47 | Miconazole (Daktarin®) | 94 | Vaccinations | 132 |
| Dinoprostone Prostaglandin E2 | 49 | Midazolam | 95 | Vancomycin continuous infusion | 134 |
| Dobutamine hydrochloride | 50 | Milrinone | 96 | Vancomycin intermittent | 136 |
| Dopamine hydrochloride | 51 | Morphine sulfate (intravenous) | 97 | Vitamin K (Phytomenadione) | 137 |
| **E** |  | Morphine sulfate oral solution | 99 | **Z** |  |
| Erythromycin | 52 | **N** |  | Zidovudine | 138 |
| Eye treatment | 53 | Naloxone | 100 |  |  |
| **F** |  | Nitric Oxide | 101 |  |  |
| Fentanyl | 54 | Noradrenaline | 102 |  |  |
| Nystatin | 103 |
| Flucloxacillin | 55 | **O** |  |  |  |
| Fluconazole | 56 | Omeprazole | 104 |  |  |
| Flumazenil | 58 | **P** |  |  |  |
| Folic Acid | 59 | Palivizumab (Synagis®) | 105 |  |  |
| Furosemide | 60 | Paracetamol | 106 |  |  |
| **G** |  | Paracetamol for PDA | 109 |  |  |
| Gaviscon® Infant | 62 | Paraldehyde | 110 |  |  |

ADDENDUM

Addendum 1: Summary of Vitamin Requirements

Addendum 2: Hyperkalaemia

Addendum 3: 20% Human Albumin Solution Dose Calculation

Addendum 4: Coagulation Problems

Addendum 5: Privigen® liquid

Addendum 6: ACTH Short Synacthen Test

Addendum 7: Elective Intubation Policy

Addendum 8: Safe use of ENFit Syringes

Addendum 9**:** Meticillin-Resistant Staphylococcus Aureus (MRSA) Decolonisation treatment

Addendum10: Additional CHO (Maxijul) to feeds

Appendix 11: Extravasation RAG rating triangles

**Abbreviations used in this manual:**

|  |  |
| --- | --- |
| mg | Milligrams |
| kg | Kilograms |
| ml | Millilitres |
| L | Litres |
| IV | Intravenous |
| IM | Intramuscular |
| SC | Subcutaneous |
| ET | Endotracheal |
| PO | By mouth |
| NG | Nasogastric tube |

**Units:**

|  |  |  |
| --- | --- | --- |
| 1 Kilogram (kg) | = | 1000 grams |
| 1 gram (g) | = | 1000 milligrams |
| 1 milligram (mg) | = | 1000 micrograms |
| 1 microgram | = | 1000 nanograms |

A 1% weight by volume (w/v) solution contains 1 gram of substance in 100mL of solution. A 10% weight by volume (w/v) solution contains 10g of substance in 100mL of solution.

It therefore follows that:

1mL of a 1% solution (1:100) will contain 10 milligrams of substance

1mL of a 0.1% solution (1:1000) will contain 1 milligram of substance

1mL of a 0.01% solution (1:10000) will contain 100 micrograms of substance

**Definitions:**

**Renal Impairment**: Increase in base line creatinine of 20% and decreased urine output to less than 1mls/kg/hr

**Hepatic Impairment**: Conjugated bilirubin > 50 associated with increased liver enzymes of 20% above baseline

**Drug allergy (suspected or confirmed)**

Suspected drug allergy is any reaction caused by a drug with clinical features compatible with an immunological mechanism. All drugs have the potential to cause adverse drug reactions, but not all of these are allergic in nature. A reaction is more likely to be caused by drug allergy if:

* The reaction occurred while the child was being treated with the drug, or
* The drug is known to cause this pattern of reaction, or
* The child has had a similar reaction to the same drug or drug-class previously.

A suspected reaction is less likely to be caused by a drug allergy if there is a possible non-drug cause or if there are only gastro-intestinal symptoms present.

The following signs, allergic patterns and timing of onset can be used to help decide whether to suspect drug allergy:

Immediate, rapidly-evolving reactions (onset usually less than 1 hour after drug exposure)

* Anaphylaxis, with erythema, urticaria or angioedema, and hypotension and/or bronchospasm. See also [Antihistamines, allergen immunotherapy and allergic emergencies](https://www.medicinescomplete.com/mc/bnfc/current/PHP78111-antihistamines-allergen-immunotherapy-and-allergic-emergencies.htm)
* Urticaria or angioedema without systemic features
* Exacerbation of asthma e.g. with non-steroidal anti-inflammatory drugs (NSAIDs)

Non-immediate reactions, ***without*** systemic involvement (onset usually 6–10 days after first drug exposure or 3 days after second exposure)

* Cutaneous reactions, e.g. widespread red macules and/or papules, or, fixed drug eruption (localised inflamed skin)

Non-immediate reactions, ***with*** systemic involvement (onset may be variable, usually 3 days to 6 weeks after first drug exposure, depending on features, or 3 days after second exposure)

* Cutaneous reactions with systemic features, e.g. drug reaction with eosinophilia and systemic signs (DRESS) or drug hypersensitivity syndrome (DHS), characterised by widespread red macules, papules or erythroderma, fever, lymphadenopathy, liver dysfunction or eosinophilia
* Toxic epidermal necrolysis or Stevens–Johnson syndrome
* Acute generalised exanthematous pustulosis (AGEP)

Suspected drug allergy information should be clearly and accurately documented in clinical notes and p0rescriptions, and shared among all healthcare professionals. Children and parents or carers should be given information about which drugs and drug-classes to avoid and encouraged to share the drug allergy status.

If a drug allergy is suspected, consider stopping the suspected drug and advising the child and parent or carer to avoid this drug in future. Symptoms of the acute reaction should be treated, in hospital if severe. Children presenting with a suspected anaphylactic reaction, or a severe or non-immediate cutaneous reaction, should be referred to a specialist drug allergy service. Children presenting with a suspected drug allergic reaction or anaphylaxis to NSAIDs, and local and general anaesthetics may also need to be referred to a specialist drug allergy service, e.g. in cases of anaphylactoid reactions or to determine future treatment options. Children presenting with a suspected drug allergic reaction or anaphylaxis associated with beta-lactam antibiotics should be referred to a specialist drug allergy service if their disease or condition can only be treated by a beta-lactam antibiotic or they are likely to need beta-lactam antibiotics frequently in the future (e.g. immunodeficient children).

For further information see Drug allergy: diagnosis and management. NICE Clinical Guideline 183 (September 2014) [www.nice.org.uk/guidance/cg183](https://www.nice.org.uk/guidance/cg183)

Reference: Paediatric Formulary Committee. BNF for Children (online) London: BMJ Group, Pharmaceutical Press, and RCPCH Publications <http://www.medicinescomplete.com> [Accessed on 06.03.17]

**How to dilute drugs for intravenous administration safely (see addendum 8 ENFit for oral administration)**

Many drugs have to be diluted before they can be used in babies because they were formulated for use in adults. In addition dilution is almost always required when a drug is given as a continuous infusion. Serious errors can occur at this stage if the dead space in the hub of the syringe is overlooked. Thus if a drug is drawn into a 1ml syringe up to the 0.05ml mark the *syringe* will then contain between 0.14 and 0.18ml of drug. If the syringe is then filled to 1ml with diluent the syringe will contain **three** times as much drug as was intended.

To dilute any drug safely, therefore follow the steps below (you will require a *large* syringe-suitable for holding the total final volume and a *small* syringe-small enough to accurately measure the volume of drug to be diluted for each dilution):

1. Draw up the intended volume of diluent into the *large* syringe (total volume – drug volume to be added)
2. Draw up the drug into the *small* syringe through a filter straw/ needle (at this point ensure you have drawn up at least 0.1ml more than the required dose)
3. Attach a green needle if using a filter straw to the *small* syringe and expel any excess drug via the green needle to obtain the intended drug volume in the *small* syringe (this primes the needle to account for dead space)
4. Transfer the drug drawn up in the *small* syringe to the *large* syringe containing the diluent via the same green needle you have just primed, using a single depression of the plunger
5. Carefully expel any air. Cap and mix thoroughly by inverting the *large* syringe several times.
6. Clearly label the syringe

Reference: Neonatal Formulary: Drug Use in Pregnancy and the First Year of Life (6th Edn) London: Wiley-Blackwell;2011

**Compatibility information**

Refers to Y-site compatibility ONLY and not admixtures. All drugs and solutions should be assumed to be incompatible unless stated otherwise. Ideally only two drugs should run together at a Y-site as most available compatibility data is only for two-drug combinations. The information given is not definitive as varying drug concentration and/or diluent may result in incompatibility. Hence, when two drugs are infused via a Y-site, it is good practice to observe the distal portion for signs of incompatibility and monitor the patient closely for adverse clinical effects.

**Drug administration and preparation**

Intravenous fluids with additives and drug infusions prepared at ward level must be changed every 24 hours unless otherwise specified in the drug monograph.

Unless described in the monograph as “Multidose”, ALL injectable products, including bags of sodium chloride and glucose must be treated as single-use-only and discarded immediately after use.

**Medusa- NHS Injectable Medicines Guide**

As a Trust we have access to Medusa-The NHS Injectable Medicines Guide which provides guidance on the preparation and administration of injectable medicines in adult and paediatric clinical areas.

Monographs comprise a number of different sections detailing how the medicine is presented, how it should be reconstituted and/or diluted if appropriate, how it should be administered, information on adverse effects that may occur during administration, compatibility, any monitoring required, plus technical details such as pH, osmolarity, sodium content and latex status. Risk assessments using the NPSA tool are also included. Each monograph links to the British National Formulary (BNF), BNF for Children (BNFC), the Summary of Product Characteristics (SmPCs) and Package insert/Patient Information Leaflet (PL).

Accessed at: <https://medusaimg.nhs.uk/>

Username: bwhward

Password: injection14

This may be particularly useful out of hours if a drug is prescribed outside of this guidance. Any queries must be escalated to the on-call Pharmacist for further advice.

**Converting from one unit to another**

To convert from a *larger* unit to a *smaller* unit – multiply by 1000

To convert from a *smaller* unit to a *larger* unit – divide by 1000

*Large*  Multiply x *small*

Kg g mg microgram nanogram

Divide ÷

**Calculating dose as volume**

Used when calculating how much volume of a particular strength preparation you need to give the patient to give the prescribed dose.

What you WANT (prescribed dose)

X What it is IN (Volume)

What you have GOT (what it is available in)

*Ensure units are the same*

**DRUG CALCULATIONS TO WORK OUT WHAT BABY IS RECEIVING**

**Mg/kg/hour=**

Stock dose (mg) = *concentration (mg/ml)*

Stock volume (ml)

concentration (mg/ml) x rate (ml/hr) = *dose delivered (mg/hr)*

dose delivered (mg/hr) = *dose delivered (mg/kg/hour)*

weight (kg)

**Micrograms /kg/hour=**

Stock dose (mg) = *concentration (mg/ml)*

Stock volume (ml)

concentration (mg/ml)x 1000 = *concentration (microgram/ml)*

concentration (microgram/ml) x rate (ml/hr) = *dose delivered (microgram/hr)*

dose delivered (microgram/hr) = *dose delivered (microgram/kg/hour)*

weight (kg)

**Micrograms/kg/min=**

Stock dose (mg) = *concentration (mg/ml)*

Stock volume (ml)

concentration (mg/ml)x 1000 = *concentration (microgram/ml)*

concentration (microgram/ml) x rate (ml/hr) = *dose delivered (microgram/hr)*

dose delivered (microgram/hr) = *dose delivered (microgram/kg/hour)*

weight (kg)

dose delivered (microgram/kg/hour) = *dose delivered (microgram/kg/min)*

60

**Units/kg/hour=**

Stock dose (units) = *concentration (units/ml)*

Stock volume (ml)

concentration (units/ml) x rate (ml/hr) = *dose delivered (units/hr)*

dose delivered (units/hr) = *dose delivered (units/kg/hour)*

weight (kg)

**Nanogram/kg/min=**

Stock dose (mg) = *concentration (mg/ml)*

Stock volume (ml)

concentration (mg/ml)x 1000 = *concentration (microgram/ml)*

concentration (microgram/ml)x 1000 = *concentration (nanogram/ml)*

concentration (nanogram/ml) x rate (ml/hr) = *dose delivered (nanogram/hr)*

dose delivered (nanogram/hr) = *dose delivered (nanogram/kg/hour)*

weight (kg)

dose delivered (nanogram/kg/hour) = *dose delivered (nanogram/kg/min)*

60

**Mmols/hour=**

Stock dose (mmol) = *concentration (mmol/ml)*

Stock volume (ml)

concentration (mmol/ml) x rate (ml/hr) = *dose delivered (mmol/hr)*

**Mmols/kg/day=**

Stock dose (mmol) = *concentration (mmol/ml)*

Stock volume (ml)

concentration (mmol/ml) x rate (ml/hr) = *dose delivered (mmol/hr)*

dose delivered (mmol/hr) = *dose delivered (mmol/kg/hour)*

weight (kg)

dose delivered (mmol/kg/hour) x 24 = *dose delivered (mmol/kg/day)*

|  |  |
| --- | --- |
|  | ABIDEC® |
| **Indications for use:** | Vitamin supplementation  Start when baby receiving at least 100ml/kg/day enteral feeds for:   * + All babies with birth weight < 1800g   + All babies born at gestation ≤ 33+6 weeks gestation   Babies receiving parenteral nutrition: start when receiving <10mls/kg/day intralipid / SMOFlipid® syringe  Babies born at ≥ 34 weeks gestation who are still an inpatient at 4 weeks of age should commence vitamins for the remainder of their inpatient stay provided they are receiving at least 100ml/kg/day enteral feeds  Babies ≥ 34 weeks should not be given Abidec® as TTO  All parents (of babies born ≥ 34 weeks gestation) should be instructed to obtain free healthy start vitamins from the onsite pharmacy at discharge and informed that multivitamins are recommended until 5 years of age    Use in preference to Dalivit® unless advised otherwise by a consultant |
| **Preparation:**  **License status:** | Contains vitamin A, B group, C and D  Note: excipients include arachis oil |

|  |  |
| --- | --- |
|  | **Babies born ≤ 33+6 weeks gestation and/or <1800g** |
| **Administration:**  **Dosage:** | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  |  | **Choose ONLY 1 multivitamin preparation** | | | **Folic acid** | | **Current weight** | **ABIDEC** | **Healthy start vitamins** | **DALIVIT** | | **Babies born <34 weeks and /or <1.8 kg** | | | | | | | **Fortified MEBM/DEBM**  **Preterm Formula (Nutriprem 1 or SMA Gold**  **Prem 1)** | ≤1 kg | 0.3 mL once daily | 3 drops once daily | X  Vitamin D **only** Colecalciferol  200 units daily | X | | >1 kg | 0.6 mL once daily | 5 drops once daily | X  Vitamin D **only** Colecalciferol  400 units daily | X | | **\*Unfortified MBM/DBM** | ≤1 kg | 0.6 mL once daily | 5 drops once daily | 0.3 mL once daily and Vitamin D Colecalciferol 200 units daily | 50 microgram once  daily | | >1 kg | 0.6 mL once daily and vitamin D Colecalciferol 600 units **alternate days** | 5 drops once daily and vitamin D Colecalciferol 600 units **alternate days** | 0.3 mL once daily and vitamin D Colecalciferol 600 units daily | 50 microgram once  daily | |  |  | **Choose ONLY 1 multivitamin preparation** | | | **Folic acid** | |  | **ABIDEC** | **Healthy start vitamins** | **DALIVIT** | | **Babies born <34 weeks’ gestation when reaching ≥1.8 kg** | | | | | | | **Post discharge formula**  **(Nutriprem 2/SMA Gold 2)**  **MBM and post-discharge fortifier**  **High energy infant formula (Infatrini/SMA high energy)** | | 0.3 mL once daily | 3 drops once daily | X  Vitamin D **only** Colecalciferol  200 units daily | X | | **Unfortified MBM**  **Term formula** | | 0.6 mL once daily | 5 drops once daily | 0.3 mL once daily and vitamin D Colecalciferol 200 units daily | X | |
|  | \*Preterm babies fed exclusively on unfortified breast milk will not meet recommended  intakes for calcium/phosphate and other essential micronutrients. Care needs to be taken to ensure risk of deficiency of micronutrients is minimised, especially the impact on metabolic bone disease see **Metabolic bone disease** guideline for advice on screening and supplementation  † **NOTE** doses of Abidec® and Dalivit ® are not equivalent due to differing levels of vitamin  content, especially vitamin A. In the absence of ABIDEC consider using Healthy Start Vitamins as next best alternative or seek advice of neonatal dietitian/pharmacist  **Babies born at >34 weeks gestation who are still an inpatient at 4 weeks of age:**  Breast milk or term formula: 0.3ml OD (not as a TTO see indications above)  If on specialist formula discuss with a dietician |
| **Routes:** | Oral/ NG |
| **Other:** | Prescribe at 18:00 |
| **Reference:** | Reference: West Midlands Perinatal Network guideline, Nutrition and enteral feeding ESPGHAN update Revised Dec23 |

Written by: Gemma Holder (Neonatal Consultant), Sara Clarke (Neonatal Network Dietitian)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **ACICLOVIR** |
| **Indications for use:** | Treatment of disseminated herpes simplex infection, chicken pox and herpes-zoster infection |
| **Preparation:**  **License status:** | Injection (one of two preparations supplied):   1. Powder for reconstitution 250mg vial   Reconstitute 250mg vial of aciclovir powder with 9.8 mls water for injection or 0.9% sodium chloride to give 25mg in 1mL (250mg in 10mL). Dilute to 50mls with 5% glucose to give solution of **5mg/ml.** Shake the prepared infusion well to ensure adequate mixing occurs. Take required dose and infuse over 1 hour  Since no antimicrobial preservative is included, reconstitution and dilution must be carried out under full aseptic conditions, immediately before use, and any unused solution discarded   1. Aciclovir solution for infusion 25 mg in 1 ml   Take 1 ml and make up to 5 mls with 5% glucose to give solution of **5mg/ml.** Take required dose and infuse over 1 hour  IV infusion not licensed for herpes zoster in children under 18 years |
| **Administration:** | See below under dosage  Into as large a vein as possible |
| **Dosage:** | **Treatment of herpes simplex infection:**  20 mg/kg IV infusion over 1 hour.  Give 8 hourly for 14 days (21 days if CNS involvement. Confirm cerebrospinal fluid negative for herpes simplex virus before stopping treatment or discuss with micro if result not available)  Conversion to oral treatment is not suitable for children under 1 month of age  **Chicken pox and herpes zoster infection:**  10 – 20 mg/kg infused over 1 hour 8 hourly for at least 7 days. Longer course may be required |
| **Routes:** | IV infusion  Preferably via a central venous access device to avoid potential venous irritation as the preparation has a high pH. If given peripherally, the insertion site must be monitored closely for phlebitis |
| **Other:** | Incompatible with caffeine citrate, dopamine, dobutamine, meropenem, and morphine sulfate  Dose should be altered in renal failure; Refer to BNF-C and consult product literature  **Information regarding whether Varicella Zoster immunoglobulin is required for prophylaxis can be found on**  <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/616119/VZIG_gudiance.pdf>  **Varicella Zoster immunoglobulin dose is 250mg IM. APPROVAL/ ADVICE FROM MICROBIOLOGY, ORDER FROM BCH PHARMACY VIA SWITCHBOARD** |
| **Reference:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  Trissel, L.A. Handbook of Injectable drugs. Available at <http://www.medicinescomplete.com/mc/hid/current/> [Accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusa.wales.nhs.uk/> [Accessed 16.01.2017] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | ADENOSINE |
| **Indications for use:** | Supraventricular tachycardia  May be used in babies with diaphragmatic hernia if remains poorly oxygenated – see Congenital Diaphragmatic Hernia guideline on intranet and discuss with PICU Consultant before use |
| **Preparation:**  **License status:** | Adenosine 3mg/ml  For supraventricular tachycardia:  Take 3mg (1ml) of adenosine and dilute to 3ml with 0.9% sodium chloride to give 1mg/ml i.e. 1000 micrograms/ml  For infusion to treat babies with diaphragmatic hernia: (unlicensed indication)  Take 150mg of adenosine (50mls of 3mg/ml solution) This is a concentration of 3mg/ml. No further dilution is required. Run infusion at rate calculated by weight x 1 ml/hr to give 50 micrograms/kg/min (3mg/kg/hr)  Adenocor® licensed in children, Adenoscan® not |
| **Administration:** | Babies with supraventricular tachycardia (SVT): |
| **Dosage:** | Draw up the following 3 doses:  Dose 1: 150 micrograms/kg  Dose 2: 200 micrograms/kg  Dose 3: 300 micrograms/kg  Administer Dose 1 by rapid intravenous injection over 2 seconds followed by rapid flush of 0.9% sodium chloride (1 to 2ml)  If tachycardia is not terminated give Dose 2 (2 minutes later), followed by Dose 3 if still tachycardic after another 2 minutes. Max single dose 300 microgram/kg  Cardiologist must be contacted if SVT is not terminated after Dose 3 i.e. 300 micrograms/kg  For babies with Diaphragmatic Hernia:  Continuous infusion at rate of 50microgram/kg/min (3mg/kg/hr) |
| **Routes:**    **Monitoring:** | IV/UVC – large peripheral or central vein  Preferably give centrally as adenosine is painful on administration and is rapidly metabolised in the peripheral circulation  Administer adenosine via a dedicated line using a 3 way tap to facilitate rapid intravenous injection over 2 seconds followed by rapid flush of 0.9% sodium chloride  Do not give this medicine by IV injection via a line being used for an infusion containing a medicine additive without first stopping the running infusion. Flush the line both before and after giving the injection  Monitor and record ECG continuously. Resuscitation facilities must be available immediately. |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  Adenosine infusion for the management of persistent pulmonary hypertension of the newborn. Ng C Franklin O, Vaidya M et al. Pediatr Crit Care Med 2004 Jan;5(1) 10 – 3  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusa.wales.nhs.uk/> [Accessed 06.03.17] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **ADRENALINE (EPINEPHRINE)** |
| **Indications for use:** | FOR CARDIAC ARREST SEE EMERGENCY DRUG FLOW CHART AT START OF FORMULARY  Anaphylaxis: IM  Post extubation stridor: Nebulised (unlicensed indication)  Hypotension: see following page |
| **Preparation:** | 1 mg in 1 ml (1 in 1000) |
| **Administration:** | FOR CARDIAC ARREST SEE EMERGENCY DRUG FLOW CHART AT START OF FORMULARY |
| **Dosage:** | Anaphylaxis\*:  0.15ml (150micrograms) 1:1000  Can be repeated after 5 mins if required (According to blood pressure, pulse and respiratory function)  Nebulised\*\*:  Take 1ml of 1:1000 and make up to 4mls with 0.9% sodium chloride. Effect rapidly wears off, can be repeated if required |
| **Routes:** | Anaphylaxis : IM  Post extubation stridor: Nebulised |
| **Reference:** | \* BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  **\*\*** Guy’s and St Thomas’, Kings College and University Lewisham Hospitals Paediatric Formulary (9th Edn) London: Guy’s and St Thomas’ NHS Foundation Trust ; 2012. Available online at <http://www.guysandstthomas.nhs.uk/resources/publications/formulary/paediatric-formulary-9th-edition.pdf> [accessed 19.08.15] |



Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **ADRENALINE (EPINEPHRINE)** |
| **Indications for use:** | Hypotension |
| **Preparation:**  **License status:** | Use 1:1000 (1mg/ml) preparation (NOT 1:10 000 [100micrograms/ml])  (1:1000 not licensed for IV administration)  Prepare as per prescription label |
|  | **Adrenaline**  Take…………micrograms Adrenaline (wt in Kgs x3000) and make up to 50 mls with ………………………... i.e. 0.1 ml/hr provides 0.1microgram/kg/min  Run at ……… ml/hour (i.e.……………… microgram/kg/min)  Route………………………  Signed…………………………Date……………… |
| **Administration:** |  |
| **Dosage:** | Starting dose 0.1 microgram/kg/min and adjust according to response  Usual dose 0.1 - 1 microgram/kg/min  Doses up to 1.5micrograms/kg/min have been used in acute hypotension  **NOTE: If commencing adrenaline because baby is unresponsive to first line medications (dopamine, dobutamine and hydrocortisone) the dopamine should be weaned and stopped (as should dobutamine if possible)**  **A combination of all of the above may result in tachycardia, decreased filling in diastole and subsequent decreased cardiac output** |
| **Routes:** | Must be infused centrally  UVC / CVL |
| **Compatibility:** | Sodium Chloride 0.9%  Glucose 10%  Glucose 5%  Glucose 4% + Sodium chloride 0.18% |
| **Incompatibility:** | Sodium Bicarbonate and alkaline solutions  Adrenaline is sensitive to light and air. Do not remove ampoules from carton until ready to use |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusa.wales.nhs.uk/> [Accessed 19.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **AMBISOME® -AMPHOTERICIN (LIPOSOMAL)** |
| **Indications for use:** | Treatment of fungal infections following discussion with  Microbiologist |
| **Preparation:**  **License status:** | NB. The following is for ‘AMBISOME®’ only. There are other products with different trade names. Different preparations vary in their pharmacodynamics, pharmacokinetics, dose and administration; **these preparations should not be considered interchangeable.** To avoid confusion prescribers should specify the brand.  Do not use this data for other brands.  Always follow package insert  50 mg vial of Ambisome®  Add 12 ml water for injection to vial and shake vigorously to produce solution containing 4 mg/ml.  Withdraw 20mg (5ml) from the reconstituted vial into a syringe. Remove the needle and attach the 5 micron filter provided (in the Ambisome box) to the syringe along with a new needle. Add the AmBisome® via the filter to 15ml glucose 5% to produce a final concentration of 1mg/ml. Infuse prescribed amount over 60 minutes  Infuse over 60 mins using a 1.2 micron in-line filter (lipid line, obtained via NHS supplies). This must not be infused through a standard 0.2 micron in-line filter.  Not licensed for children under 1 month |
| **Administration:** | IV infusion over 60 minutes. Do not administer with any other infusion  After infusion complete, infuse 2ml of glucose 5% at the same rate as used to administer the Ambisome® |
| **Dosage:** | Test dose:  Initial dose of 100 micrograms/ kg infused over 10 mins as part of first day’s dose. Stop infusion then flush with 5% glucose at the same rate, observe over 30 mins and give rest of treatment dose if no reaction over 60 mins  1 mg/kg daily, increased as necessary in steps of 1 mg/kg/day; Max 3 mg/kg daily(empirical) or 5 mg/kg (proven infection) |
| **Routes:** | IV |
| **Incompatibility:** | Sodium Chloride. Existing line must be flushed with 5% glucose prior to administration or use a separate line  Must not come into contact with any product other than glucose 5% |
| **Further information:** | Liposomal amphotericin (Ambisome®) contains 900mg sucrose in each vial |
| **Reference:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.wales.nhs.uk/> [Accessed 06.02.24] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **AMETOP® Tetracaine (AMETHOCAINE)** |
| **Indications for use:** | Topical local anaesthetic. Only licensed for a child greater than 1 month of age. |
| **Preparation:** | 4% topical gel. 1.5g tube |
| **Administration:** | Apply over potential venepuncture sites and cover with occlusive dressing for 30 mins prior to procedure. Remove dressing and gel. |
| **Dosage:** | See above.  Max 1 tube applied at separate sites at a single time |
| **Routes:** | Topical only |
| **Other:** | Never apply to mucous membranes or damaged or broken skin.  Only used in OPD |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **AMILORIDE HYDROCHLORIDE** |
| **Indications for use:** | Prevent potassium loss in babies receiving regular loop diuretics |
| **Preparation:** | 1 mg in 1 ml solution |
| **Licence status:** | Not licensed for use in children |
| **Administration:** |  |
| **Dosage:** | * 1. – 0.2 mg/kg   Give 24 hourly and monitor electrolytes and effect (  If required can be increased to 12 hourly |
| **Routes :** | Oral / NG |
| **Reference:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15] |
|  |  |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **AMOXICILLIN** |
| **Indications for use:** | Infection – please refer to Antibiotic Policy |
| **Preparation:** | 500mg vial  **9th July 2014 – MHRA Class 4 Drug Alert: do NOT administer amoxicillin injection manufactured by Wockhardt UK Ltd to neonates and infants below one year old. Amoxil (GlaxoSmithKline) and Bowmed Ibisqus Ltd amoxicillin can continue to be administered to neonates and infants below one year old.**  Reconstitute 500 mg vial with 9.6 ml water for injection to give **50mg/ml solution**  Take required dose and infuse over 30 mins |
| **Administration:** | By infusion over 30 minutes  To reduce the risk of CNS toxicity and convulsions administration of doses greater than 30mg/kg by IV infusion is recommended |
| **Dosage :** | Listerial meningitis (in combination with another antibacterial), group B streptococcal infection, enterococcal endocarditis (in combination with another antibacterial):  50mg/kg (dose may be doubled to 100mg/kg in neonates up to 28 days old- n.b. higher frequency in those >28 days old) |
| **Frequency:** | Less than 7 days old 12 hourly  7-28 days old 8 hourly  >28 days old 6 hourly  **Indication for use should ALWAYS be documented**  **Prescribe in dedicated antibiotic section on new prescription chart**  **Review culture results after 36 hours (where possible) and at most 48 hrs and ensure regular review is undertaken and the outcome documented as stipulated on prescription chart.** |
| **Routes:** | IV / UVC |
| **Other:** | Reduce dose in severe renal impairment, risk of crystalluria with high doses-refer to BNF-C and product literature  Discard after use  Give first dose as soon as possible  Prescribe subsequent doses at 06:00/18:00, 10.00/22.00 or 12.00/23.59 for 12 hrly dosing and 02.00, 10.00 and 18.00 for 8 hrly dosing  If baby on Transitional Care or Ward, prescribe at 11.00/23.00 |
| **Incompatibility:** | Aminoglycosides, midazolam, sodium bicarbonate |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusa.wales.nhs.uk/> [Accessed 19.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

**ATROPINE**

|  |  |
| --- | --- |
| **Indications for use :** | 1. Prior to laser therapy treatment of retinopathy of prematurity to prevent bradycardia 2. As premedication for elective intubation |
| **Preparation:** | 600micrograms in 1 ml – solution supplied in 1ml ampoules  Dilute 0.1ml of the ampoule with 0.9ml of 0.9% Sodium Chloride to give a solution containing **60micrograms/ml** |
| **License status:** | Not licensed for children under 12 years for either indication |
| **Administration:** |  |
| **Dosage:** | 1. Prior to laser treatment 10 micrograms/kg by slow  bolus  NB this is not required if baby has received atropine  as part of pre-intubation drug regimen within 6 hours of  laser treatment  2. As premedication 20micrograms/kg over 1 minute |
| **Routes:** | IV / UVC |
| **Compatibility:** | Sodium Chloride 0.9% |
| **Other:** | Administration produces effect within 30 seconds that lasts at least 6 hours |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  Guy’s and St Thomas’, Kings College and University Lewisham Hospitals Paediatric Formulary (9th Edn) London: Guy’s and St Thomas’ NHS Foundation Trust ; 2012. Available online at <http://www.guysandstthomas.nhs.uk/resources/publications/formulary/paediatric-formulary-9th-edition.pdf> [accessed 19.08.15]  Neonatal Formulary: Drug Use in Pregnancy and the First Year of Life (7th Edn) London: Wiley-Blackwell;2014 |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **BENZYLPENICILLIN SODIUM** |
| **Indications for use:** | Infection – please refer to Antibiotic Policy |
| **Preparation:** | 600mg vial  Reconstitute 600 mg vial with 5.6ml of water for injection to give 100mg/ml solution |
| **Administration:** | Take required dose and further dilute with equal volume of glucose 5% or sodium chloride 0.9% to give 50mg/ml solution  25mg/kg dose- By slow IV injection  50mg/kg dose- by infusion over 15- 30 minutes (longer administration time important to avoid CNS toxicity) |
| **Dosage:** | see below |
| **Frequency:** | Less than 7 days old 25 mg/kg 12 hourly  Increased to 25mg/kg 8 hourly if baby severely  unwell or blood culture is positive    50mg/kg 12 hourly if CSF positive for Gp B Strep  (in line with NICE guidance)  7 - 28 days old 25 mg/kg 8 hourly  (increased to 50mg/kg in severe infection)  Greater than 28 days old 25 mg/kg 6 hourly  (increased to 50mg/kg in severe infection)  Indication for use should ALWAYS be documented  Prescribe in dedicated antibiotic section on new prescription chart  Review culture results after 36 hours (where possible) and at most 48 hrs and ensure regular review is undertaken and the outcome documented as stipulated on prescription chart. |
| **Routes:** | IV/UVC |
| **Other:** | Discard after use  Give first dose as soon as possible  Prescribe 12 hrly doses at 02:00/14:00, 06:00/18:00 or 12.00/23.59 and  8 hrly dosing at 02.00/10.00/18.00  Caution-false positive urinary glucose if tested for reducing substances  If baby on Transitional Care or Ward, prescribe at 11.00/23.00 (babies should not be in TC or on the ward if they are unwell enough to require tds dosing)  In renal impairment Refer to BNF-C and consult product literature |
| **References:** | NICE Guidelines 2012: Antibiotic use in early-onset neonatal infections  BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 16.01.2017] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **BEVACIZUMAB (Avastin®)**  **\*ONLY FOR USE BY OPTHALMOLOGIST\*** |
| **Indications for use:** | * Aggressive posterior retinopathy of prematurity (ROP) * Zone I ROP * Any ‘sight threatening’ ROP which is not amenable to laser therapy because   + No view of retina   + Child too sick to withstand procedure after discussion with anaesthetist/intensivist * ROP which has failed to respond to conventional laser therapy |
| **Preparation:** | 5mg in 0.2ml pre-filled syringe (unlicensed special to be obtained by Boots from BCH Pharmacy) |
| **Administration:** |  |
| **Dosage:** | 0.625mg – 1.25mg (0.025 – 0.05ml of 25mg/ml solution)  Eye(s) should be dilated as per ROP screening protocol prior to use |
| **Routes:**  **Other:** | Intravitreal injection  Detailed assessment and documentation of patient’s retinal status, past medical history and relevant features. Ideally over more than one time point (though disease severity may not allow this).  If anti-VEGF decided upon detailed, documented discussion with parents including the unknown long term risks to development of the brain.  Where there is uncertainty of the appropriateness of the treatment choice a second consultant’s opinion should be taken.  Review within a week for early response and follow up mandated including retinal examinations until complete vascularization or stable for over 12/12 |
| **Reference:** | BCH Protocol for use of Avastin® Updated March 2017 |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

**CAFFEINE CITRATE**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  | | --- | --- | | **Indications for use:** | Respiratory Stimulant  Treatment of central apnoea of prematurity    Should be discontinued at 32 weeks post conceptual age if baby symptom free | | **Preparation:** | Caffeine citrate injection 10mg/ml  Caffeine citrate oral solution 10mg/ml  **NB. Take care 2mg caffeine *citrate* = 1mg caffeine *base***  **Prescriptions should always specify as caffeine citrate** | | **Administration:** | ‘Standard Dose’ | | **Dosage:** | Loading: 20mg/kg caffeine citrate infused over 30 minutes or by mouth/via nasogastric tube (dose as per local practice)  Maintenance: 10mg/kg caffeine citrate daily  Prescribe at 10:00 given by slow IV injection over 10 minutes or by mouth/ via nasogastric tube  Increase dose with weight if symptomatic  ‘High Dose’ (to be used only on Consultant Request)  There is emerging evidence that high dose caffeine facilitates extubation and prevents reintubation in preterm babies and lessens frequency of apnoea of prematurity  Loading: 40mg/kg caffeine citrate infused over 30 minutes or by mouth/via nasogastric tube  Maintenance: 20mg/kg caffeine citrate daily infused over 30 minutes or by mouth/via nasogastric tube  NB: Maintenance dose is commenced approx 24 hrs after loading dose | | **Routes:** | IV / Oral / NG | | **Other:** | Levels (rarely required) taken pre-dose  The therapeutic range for plasma-caffeine concentration is usually 10–20 mg/litre (50–100 micromol/ litre), but a concentration of 25–35 mg/litre (130–180 micromol/litre) may be required.NB: Signs of toxicity only occur with levels greater than 50mg/L (260 micromol/litre)  Dose may need to be reduced in renal/ hepatic impairment | | **Interactions:**  **Incompatibility:** | Caffeine levels are reduced by Phenobarbital and Phenytoin. If caffeine is administered concurrently with phenobarbital/phenytoin, it may be necessary to give doses every 12 hours rather than 24 hourly. Plasma caffeine concentrations may be increased with ciprofloxacin  Aciclovir, furosemide | | **References:** | Schmidt B, Roberts RS, Davis Pet al. Long term effects of caffeine therapy for apnoea of prematurity. N Engl J Med 2007;357:1893 – 902  Schmidt B, Anderson PJ, Doyle LW et al. Survival without disability to age 5 years after neonatal caffeine therapy for apnoea of prematurity. JAMA 2012;307:275-82  Mohammed S, Nour I, Shabaan AE et al High versus low-dose caffeine for apnea of prematurity:a randomised controlled trial Eur J Pediatr (2015)174:949-956  Steer P, Flenady V, Shearman A High dose caffeine citrate for extubation of preterm infants: a randomised control trial Arch Dis Child Fetal neonatal Ed 2004;89:F499-F503  Evelina London Paediatric Formulary London:. Available online at http://cms.ubqo.com/public/d2595446-ce3c-47ff-9dcc-63167d9f4b80 [accessed 22.06.21]  Neonatal Formulary: Drug Use in Pregnancy and the First Year of Life (7th Edn) London: Wiley-Blackwell;2014  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 22.06.21]  BNF for Children London: BMJ Group and Pharmaceutical Press; 2023 - 2024 Available <https://bnfc.nice.org.uk>  [Accessed 06.02.24] | |  |
|  |  |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **CALCIUM GLUCONATE** |
| **Indications for use:** | Stabilising the myocardium to prevent arrhythmias in hyperkalaemia  Calcium deficiency |
| **Preparation:** | IV: Calcium gluconate 10%; 100mg/ml equivalent to 1g/10ml calcium gluconate. (Ca2+ 0.226mmol(226micromol)/ml) 10ml amp  Should be packaged in a plastic amp. Repeated or prolonged administration using glass containers is contraindicated in children under 18 years owing to the risk of aluminium accumulation  Can be used undiluted in emergencies  For continuous infusion:  Dilute to a maximum concentration 0.045mmol (45micromol)/ml with glucose 5% or sodium chloride 0.9% (i.e. MINIMUM dilution is making 10ml amp up to 50mls) |
| **Administration:**  **Dosage:** | Hyperkalaemia (prevention of arrhythmias) and acute hypocalcaemia:  0.11mmol/kg (0.5ml/kg calcium gluconate 10%) as a single dose injected slowly over 5 – 10 mins, diluted to at least 5 times the volume with sodium chloride 0.9% or glucose 5%.  Hypocalcaemia maintenance dose:  0.5mmol(500micromol)/kg/day (2.2ml/kg/day calcium gluconate 10%) by continuous iv infusion, diluted to at least 5 times the volume with sodium chloride 0.9% or glucose 5%, over 24 hours and adjust according to response.  Maximum infusion rate (non emergency) of 0.022mmol (22 micromol)/kg/hour |
| **Frequency:** | Hyperkalaemia: once only  Correction of hypocalcaemia:  As continuous iv infusion |
| **Routes:** | IV/UVC/LL  Infuse centrally wherever possible,  Solution >20mg/ml must be given via central line |
| **Other:** | Calcium salts can form complexes with many drugs, and this may result in a precipitate; do not let any fluid containing calcium come into contact with any other IV administered drug.  Calcium salts are irritant. Extravasation may cause tissue irritation and necrosis. The infusion site must be monitored regularly to ensure extravasation injury has not occurred  Not to be given simultaneously with ceftriaxone even via different infusion lines or at different infusion sites as risk of precipitation in kidneys and lungs. |
| **Reference:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at http://medusaimg..nhs.uk/ [Accessed 19.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **CALCIUM (ORAL)- CALVIVE® 1000** |
| **Indications for use:** | Hypocalcaemia |
| **Preparation:** | There is no licensed oral liquid calcium product available in the UK.  Calvive® 1000 effervescent tablets- containing 25mmol calcium per tablet  1. Dissolve each 25mmol tablet in 20mL water to give a solution containing 1mmol/mL.  2. Once the tablet has fully dispersed and fizzing has stopped, which is usually after about 5 minutes, use the necessary volume of 1mmol/mL solution to administer the required dose.  3. Discard the remaining solution; a new tablet should be used for each dose |
| **Dosage:** | Prescribe as Calvive® 1000  0.25mmol/kg Calcium 6 hrly, adjusting dose to response  Doses should be rounded to enable measurement using the resulting 1mmol/ml solution.   |  |  | | --- | --- | | Calculated Dose | Round to the Nearest | | 0.2-0.49mmol | 0.02mmol | | 0.5-1.9mmol | 0.1mmol | | 2 - 4.9mmol | 0.2mmol | | 5 - 9.9mmol | 0.5mmol | | More than 10mmol | 1mmol | |
| **Routes:** | Oral / NG |
| **Other:** | Give at different times to phosphate supplementation  Close monitoring of patient response and appropriate dose adjustment is required  Each tablet also contains 5.95mmol of sodium  There are unpublished, anecdotal reports of alkalosis when effervescent calcium tablets have been used for supplementation in neonates. This is likely to be due to incomplete consumption of carbonate where the effervescence process has not been allowed to run its full course. Use of an alternative formulation may be justified if the problem persists.  Avoid use via the NJ route as very likely to block tube and will be hyperosmolar. |
| **Reference:** | BNF for Children London: BMJ Group and Pharmaceutical Press; 2013 – 2014 Available at <http://www.bnf.org/bnf/index.htm> [Accessed 09.06.14]  NPPG Position Statement 2023-02: Enteral Calcium and Phosphate Supplementation in Neonates and Children Available at: [Enteral Calcium and Phosphate Supplementation in Neonates and Children – NPPG](https://nppg.org.uk/enteral-calcium-and-phosphate-supplementaton-in-neonates-and-children/) [Accessed 16.05.23] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **CAROBEL** |
| **Indications for use:** | For use:   1. In term/near term babies receiving NG or bottle feeds as first line pharmaceutical treatment for gastro-oesophageal reflux (as per NICE guidelines 2015)   NOT RECOMMENDED FOR USE IN PRETERM OR LOW BIRTH WEIGHT INFANTS   1. On the advice of speech and language therapist for babies with evidence of suck swallow incoordination when suck feeds are initiated   Carobel should not be used in conjunction with Gaviscon Infant® |
| **Preparation:** | In a bottle feed: Prepare the milk to manufacturer’s guidelines. Add instant carobel as below. Shake well (30-60 seconds). Leave for 3-4 minutes to thicken. Shake again and feed immediately.  As a spoon-feed or paste: this method is appropriate for breastfed infants but may be the preferred method for bottle fed infants. Add instant carobel as indicated below. **Stir well and leave for 3-4 minutes to thicken.** Stir again and feed immediately, by spoon, prior to and during the feed as instructed. |
| **Administration:** | Via bottle feed or as a spoon-feed. |
| **Dosage:** | 1. scoop: 1.7g Always use the scoop provided   **Prepare according to dietician/SALT instructions**  The following are different from the manufacturer’s instructions but are the concentrations used by the SALT and dieticians at Birmingham Children’s Hospital:  For use on SALT advice for concern regarding swallowing/ coordination of feeds:  Stage 1: 1.7% Carobel 1 level scoop to 100mls milk  Stage 2: 3.15% Carobel 2 level scoops to 110mls milk  For use for gastro-oesophageal reflux:  2.2% Carobel 1 level scoop to 80mls milk  Can be made more concentrated if symptoms persist (see manufacturer’s instructions) |
| **Frequency:** | Each feed. |
| **Routes:**  **Other:** | PO/NG  Carobel will continue to thicken up to 4-15 minutes after mixing. Therefore it is advisable to add carobel one scoop at a time, stir well and allow to thicken, and then add more carobel until the desired consistency is achieved.  Must be stored in drug cupboard after use |
| **Reference:** | As per manufacturer’s instructions |

Written by: Gemma Holder (Neonatal Consultant)

|  |  |
| --- | --- |
|  | **CEFOTAXIME** |
| **Indications for use:** | Infection – please refer to Antibiotic Policy  Neonatal Gonococcal Infection (see ‘Conjunctivitis’ guideline on intranet)  [IM only where impossible venous access whilst alternative modes of venous access are sought or for gonococcal conjunctivitis)] |
| **Preparation:** | 500mg vial  Reconstitute 500mg vial with 1.8 mls of water for injection to give **250mg/ml solution.**  For IV administration:  If <2kg: Take 1ml of 250mg/ml solution and dilute to 10ml with water for injection to give 25mg/ml solution.Take required dose and infuse over 30 mins  If >2kg: Take 1ml of 250mg/ml solution and dilute to 2.5ml with water for injection to give 100mg/ml solution.Take required dose and infuse over 30 mins  For IM administration:  No further dilution required |
| **Administration:** | IV: Infuse over 30 minutes  IM: To inject into anterolateral thigh. If dose bigger than 0.5mls, split dose and inject into different sites |
| **Dosage:** | **IV:**  Birth – up to 28 days old: 25mg/kg  Dose can be doubled in severe infections or meningitis  More than 28 days old: 50mg/kg  (do not double dose in severe infections or meningitis, frequency can be increased, see below)  **IM using 25g 16mm orange needle (to be used only if impossible venous access whilst alternative modes of venous access are sought):**  All ages: 25mg/kg  Dose can be doubled in severe infections  Treatment of **Neisseria Gonorrhoeae**  Single dose 100mg/kg IM  If systemically unwell, treat with 50mg/kg (frequency documented below) for at least 7 days  **Indication for use should ALWAYS be documented**  **Prescribe in dedicated antibiotic section on new prescription chart**  **Review culture results after 36 hours (where possible) and at most 48 hrs and ensure regular review is undertaken and the outcome documented as stipulated on prescription chart.** |
| **Frequency:** | Birth – up to 28 days old:  Less than 7 days old 12 hourly  7 - 20 days old 8 hourly  21 - 28 days old 6 hourly  More than 28 days old: 8 hourly (note higher dose); can be increased to 6 hourly in severe infections and meningitis |
| **Routes:** | IV/UVC/IM ((IM only where impossible venous access whilst alternative modes of venous access are sought or for gonococcal conjunctivitis) |
| **Other:**  **Reference:** | May cause positive Coomb’s test  May cause false positive urinary glucose (if tested for reducing substances)  BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 16.01.2017]  West of Scotland monograph available at: [WoS Neonatal IV Drug Monographs (perinatalnetwork.scot)](https://perinatalnetwork.scot/wp-content/uploads/2022/11/Isoprenaline-WoS_PI.pdf) Accessed 21.02.24 | |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services and Sadiya Hussain (antimicrobial Pharmacist)

|  |  |  |
| --- | --- | --- |
|  | | **CEFTAZIDIME** |
| **Indications for use:** | | Infection – please refer to Antibiotic Policy |
| **Preparation:** | | 500mg vial  **Villerton (Bowmed) brand**  Reconstitute 500mg vial with 4.8mls of water for injection to give **100mg/ml solution**  **Fresenius Kabi brand**  Reconstitute 500mg vial with 4.5mls of water for injection to give **100mg/ml solution**  Displacement value varies greatly between different products, consult package insert if a different brand is available. |
| **Administration:** | | By slow bolus |
| **Dosage:** | | 25 mg/kg  Double dose in severe infections and meningitis |
| **Frequency:** | | Less than 7 days old 24 hourly  7 - 21 days old 12 hourly  More than 21 days old 8 hourly  **Indication for use should ALWAYS be documented**  **Prescribe in dedicated antibiotic section on new prescription chart**  **Review culture results after 36 hours (where possible) and at most 48 hrs and ensure regular review is undertaken and the outcome documented as stipulated on prescription chart.** |
| **Routes:** | IV / UVC |
| **Other:** | Prescribe first dose to be administered as soon as possible  Subsequent doses should be prescribed 12 hrly at 02.00/14.00, 06.00/18.00 or 12.00/23.59 or 8 hrly at 02.00/10.00/18.00  Please use immediately after reconstitution and discard the remainder  Incompatible with amphotericin, dobutamine, erythromycin, fluconazole, gentamicin, midazolam, phenytoin sodium, sodium bicarbonate, vancomycin.  Decrease dose in renal failure-Refer to BNF-C and consult product literature |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 19.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **CEFUROXIME** |
| **Indications for use** | Infection – please refer to Antibiotic Policy |
| **Preparation:** | 250mg vial  **GlaxoSmithKline (Zinacef®) brand**  Reconstitute 250 mg vial with 2.3ml of water for injection to give **100mg/ml** |
| **Administration:** | By bolus |
| **Dosage:** | Birth – 28 days old: 25mg/kg  More than 28 days old: 20mg/kg  Increase dose to 50mg/kg in all age groups in severe infections  **Indication for use should ALWAYS be documented**  **Prescribe in dedicated antibiotic section on new prescription chart**  **Review culture results after 36 hours (where possible) and at most 48 hrs and ensure regular review is undertaken and the outcome documented as stipulated on prescription chart.** |
| **Frequency:** | Less than 7 days old 12 hourly  7 - 21 days old 8 hourly  22 - 28 days old 6 hourly  >28 days old 8 hourly (may be increased to 6 hourly in severe infection) |
| **Routes:** | IV / UVC |
| **Other:**  **Incompatibility:** | Prescribe first dose to be administered as soon as possible  Subsequent doses should be prescribed 12 hrly at 02.00/14.00, 06.00/18.00 or 12.00/23.59 or 8 hrly at 02.00/10.00/18.00  Please use immediately after reconstitution and discard the remainder  Decrease dose in renal failure-Refer to BNF-C and consult product literature  Aminoglycosides, fluconazole, midazolam, ranitidine, sodium bicarbonate, vancomycin |
| **Reference:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 19.08.15]  Trissel, L.A. Handbook of Injectable drugs. Available at <http://www.medicinescomplete.com/mc/hid/current/> [Accessed 19.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **CHLORAL HYDRATE** |
| **Indications for use:** | Sedation  e.g.   * Pre procedure e.g. MRI * Cerebral irritability * When requiring sedation for respiratory support and other forms of sedation e.g. morphine deemed inappropriate |
| **Preparation:**  **License status:** | Oral suspension: 500 mg in 5 ml solution  Rectal: 50mg and 100 mg suppositories  Unlicensed Special Products |
| **Administration:** |  |
| **Dosage:** | \*Pre- procedure:  30 – 50mg/kg 45 – 60 mins before procedure. Doses up to 100mg/kg may be used with respiratory monitoring  Other reasons for sedation:  20 – 30 mg/kg 8 hourly  NB: please repeat dose if necessary, but not more than 8 hourly. This is based on clinical practice and is outside BNF-C guidelines (caution: drug known to accumulate). |
| **Routes:**  **Other:** | NG / Oral / PR  Avoid in severe renal/ hepatic impairment  Try to avoid any repeat doses in preterm infants and neonates < 7 days old. Only prescribe “as required” and review after 48 hours. |
| **References:** | \* BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  Guy’s and St Thomas’, Kings College and University Lewisham Hospitals Paediatric Formulary (9th Edn) London: Guy’s and St Thomas’ NHS Foundation Trust ; 2012. Available online at <http://www.guysandstthomas.nhs.uk/resources/publications/formulary/paediatric-formulary-9th-edition.pdf> [accessed 19.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **CHLOROTHIAZIDE** |
| **Indications for use:** | Chronic lung disease  Congenital heart disease |
| **Preparation:** | Oral Suspension 250mg / 5ml |
| **License status:** | Unlicensed Special Products |
| **Administration:** |  |
| **Dosage:** | 10-20 mg/kg |
| **Frequency:** | Start once daily and monitor electrolytes and effect  Can be increased to twice daily |
| **Routes:** | Oral/NG |
| **Caution:** | Avoid in very jaundiced babies (theoretical risk kernicterus) & in babies with liver disease.  Hypokalaemia  Renal impairment |
| **Other:** | Usually prescribed with Spironolactone |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **CUROSURF® PORACTANT ALFA** |
| **Indications for use:** | Surfactant Deficiency  See ‘Surfactant – Initial management’ guideline on Intranet |
| **Preparation:** | 80mg/ml  Vials available: 1.5 ml containing 120mg  3 ml containing 240mg  Store in fridge |
| **Administration:** |  |
| **Dosage :** | Prophylaxis:  ( dose 100mg – 200mg/kg)   |  |  | | --- | --- | | Weight of baby (kg) | Whole vials required | | 0.6 – 1.2 | 1 x 120mg | | 1.2 – 2.4 | 1 x 240mg |   Maximum combined dose 400mg/kg  (in genuine surfactant deficient lung disease 2 doses are usually required)  In established RDS an initial dose of 200mg/kg may be required.  If in doubt about how much to prescribe, please check with On Call Consultant. |
| **Frequency:** | To be given as soon as possible after birth  Can be repeated 12hrly |
| **Routes :** | ETT |
| **Storage:** | In a refrigerator but warm to room temperature before use. Gently turn upside down a few times, without shaking in order to obtain a uniform suspension |
| **Reference:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |  |  |
| --- | --- | --- | --- |
|  | DEXAMETHASONE | | |
| **Indications for use:** | Aid weaning from ventilator in babies with chronic lung disease – ensure consent is obtained from parents and clearly documented prior to administering  Extubation in upper airway obstruction | | |
| **Preparation:**  **Administration:** | **Should be prescribed as dexamethasone base to minimise confusion**  Oral Solution 2mg in 5ml (as dexamethasone base)  To obtain smaller doses accurately may further dilute if necessary. Take 1ml of oral solution and make up to 4ml with water for injection to give a solution containing 100 micrograms/ml  IV preparation:  Hospira brand 6.6mg/2ml (as dexamethasone base)  **Check strength and preparation carefully**  Prepare as per prescription label for Dexamethasone made by Hospira. Some preparations include phosphate or sodium phosphate in the drug weight: discuss with pharmacist if other preparation supplied. | | |
|  | **DEXAMETHASONE** | **Dose** | **Frequency** |
|  | **(product made by Hospira only)**  Take 0.3ml (1mg) of dexamethasone base 6.6mg/2ml and make up to 1ml with 0.9% sodium chloride to give 1mg/ml dexamethasone base. | Route  IV | Pharmacy |
|  | Prescribers Signature | Date  Commenced | Date  Cancelled |
|  |  | | |
| **Dosage :** | Chronic lung disease:  10 day tapering course as follows:  60 micrograms/kg (dexamethasone base) 12 hourly for 3 days  40 micrograms/kg (dexamethasone base) 12 hourly for 3 days  20 micrograms/kg (dexamethasone base) 12 hourly for 2 days  8 micrograms/kg (dexamethasone base) 12 hourly for 2 days  There may be situations where this course is repeated or a prolonged course of low dose steroid is given. This would normally be on the advice of the Respiratory Team at Birmingham Children’s Hospital and should be clearly documented in the casenotes.  Extubation in upper airway obstruction (usually given as iv bolus):  0.1mg/kg Dexamethasone base 8 hrs prior and at extubation with 3rd dose 8hrs later if symptoms. | | |
| **Routes :** | IV / NG / Oral | | |
| **Compatibility:** | Glucose 5%, 0.9% sodium chloride | | |
| **Interactions:** | Rifampicin, carbamazepine, phenobarbital and phenytoin enhance metabolism of dexamethasone and reduce its effect. Dexamethasone antagonises the effects of insulin. May cause hypokalaemia, caution if used concurrently with loop diuretics **incompatible with midazolam** | | |
| **Other:** | **Monitoring:** Measure blood pressure before starting Dexamethasone and then daily. If an arterial line is in situ, blood pressure should be monitored continuously, otherwise non- invasive blood pressure should be used.  Blood sugar should be monitored with each gas and urine checked for glucose if blood glucose >11mmol/L | | |
| **References:** | \*Doyle LW, Davis PG, Morley CJ, McPhee A, Carlin JB and DART study investigators. Low-Dose Dexamethasone Facilitates Extubation Among Chronically Ventilator- Dependent Infants: A Multicenter, International, Randomized Controlled Trial. *Pediatrics.* 2006;117;75 – 83  \*\*experience from local practice  Stockley’s Drug Interactions. Available at: http://www.medicinescomplete.com/mc/stockley/current/interactions.htm?q=phenytoin+dopamine&searchButton=Search . [accessed 19.08.15]  Trissel, L.A. Handbook of Injectable drugs. Available at <http://www.medicinescomplete.com/mc/hid/current/> [Accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 19.08.15]  BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15] | | |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **DIGOXIN** |
| **Indications for use:** | Supraventricular arrhythmias |
| **Preparation:** | Injection: 100 micrograms in 1 ml – available as 1 ml vials (Unlicensed Special Product)  250 micrograms in 1ml (2ml ampoules)  For IV doses less than 50 microgram every effort should be made to use the 100microgram/ml solution and method for preparation  Suspension: 50 micrograms in 1 ml  CHECK EACH DOSE CAREFULLY AS OVERDOSE CAN CAUSE DEATH |
| **Administration:** | DOSES BELOW ARE RECOMMENDED IN BNF-C. CONSULTANT CARDIOLOGIST MAY REQUEST DIFFERENT DOSE – THIS SHOULD BE STATED IN CASE NOTES AND ON DRUG PRESCRIPTION CHART  For intravenous infusion dilute with 0.9% sodium chloride or 5% glucose to concentration of 5micrograms/ml.   |  | | --- | | Using digoxin 100microgram/ml  Dilute 1ml to 10ml using sodium chloride 0.9% to give a 10microgram/ml solution. Withdraw the dose required and further dilute to at least twice the volume containing dose to be given i.e. at least to 5microgram/ml |  |  | | --- | | Using digoxin 250microgram/ml  Dilute 1ml to 10ml using sodium chloride 0.9% to give a 25microgram/ml solution. Withdraw the dose required and further dilute to at least five times the volume containing the dose i.e. at least to 5microgram/ml. |   Can be further diluted with sodium chloride 0.9% or glucose 5%.  Loading dose: over 30-60 minutes  Maintenance dose: over 20 minutes  NB: protect infusion from light  Oral solution must NOT be diluted (e.g. do not add to milk) |
| **Dosage :** | **Oral Dose:**  **Less than 1.5kg** initially 25 micrograms/kg/day in 3 divided doses for 24 hours, then 4 – 6 micrograms/kg daily in 1 – 2 divided doses  **1.5 – 2.5kg** initially 30 micrograms/kg/day in 3 divided doses for 24 hours then 4 – 6 micrograms/kg daily in 1 -2 divided doses  **Greater than 2.5kg** initially 45 micrograms/kg/day in 3 divided doses for 24 hours then 10 micrograms/kg daily in 1 - 2 divided doses  **IV infusion Dose:**  **Less than 1.5kg** initially 20 micrograms/kg/day in 3 divided doses for 24 hours (50% immediately, then 25% at 6 hours and 12 hours- see table below). then 4 – 6 micrograms/kg daily in 1 – 2 divided doses  **1.5 – 2.5kg** initially 30 micrograms/kg/day in 3 divided doses for 24 hours (50% immediately, then 25% at 6 hours and 12 hours- see table below). then 4 – 6 micrograms /kg daily in 1 – 2 divided doses  **Greater than 2.5kg** initially 35 micrograms/kg/day in 3 divided doses for 24 hours (50% immediately, then 25% at 6 hours and 12 hours- see table below). then 10 micrograms/kg daily in 1 - 2 divided doses   |  |  |  | | --- | --- | --- | | Age/weight | 1st part of load (50%) | 2nd and 3rd part of load, 6 and 12 hours later (25% each) | | under 1.5kg | 10 microgram/kg | 5 microgram/kg | | 1.5-2.5kg | 15 microgram/kg | 7.5 microgram/kg | | over 2.5kg | 17.5 microgram/kg | 8.75 microgram/kg |   Start maintenance dosing 12 hours after full load complete. |
| **Routes :** | Oral / NG  **IV at request of consultant cardiologist only**  On Call Neonatologist can request if oral/NG route not available |
| **Compatibility:** | Sodium Chloride 0.9% or glucose 5% |
| **Incompatibility** | Amiodarone, amphotericin liposomal (Ambisome®), dobutamine, fluconazole, insulin |
| **Other:** | Trough level to be taken after one week of starting therapy,  however levels may not be stable for two weeks due to long  neonatal half life (2 – 4 days).  Levels require 0.2mls of serum or plasma at least 6 hours after last dose.  OPTIMAL RANGE = 0.8-2 micrograms/L  Increased toxicity if hypokalaemia occurs  Use reduced dose in renal failure and monitor levels closely- Refer to BNF-C and consult product literature  Erythromycin, omeprazole, gentamicin, spironolactone and trimethoprim may increase blood levels.  When switching from IV to oral route may need to increase dose by 20% to maintain the same plasma digoxin concentration, discuss with consultant |
| **Reference:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  Guy’s and St Thomas’, Kings College and University Lewisham Hospitals Paediatric Formulary (9th Edn) London: Guy’s and St Thomas’ NHS Foundation Trust ; 2012. Available online at <http://www.guysandstthomas.nhs.uk/resources/publications/formulary/paediatric-formulary-9th-edition.pdf> [accessed 19.08.15]  Stockley’s Drug Interactions. Available at: http://www.medicinescomplete.com/mc/stockley/current/interactions.htm?q=phenytoin+dopamine&searchButton=Search . [accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 19.08.15]  Trissel, L.A. Handbook of Injectable drugs. Available at <http://www.medicinescomplete.com/mc/hid/current/> [Accessed 19.08.15]  BCH Digoxin Administration guide June 2013. Accessed 28/07/21 |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **DINOPROSTONE (PROSTAGLANDIN E2)** |
| **Indications for use:** | Maintaining patency of ductus arteriosus |
| **Preparation:** | 1mg in 1ml – solution supplied as 0.75mg/0.75ml vial (Prostin®) |
| **License status:** | Not licensed for use in children  Prepare as per prescription label: |
|  | **DIINOPROSTONE**  Take 0.5ml of 1mg/ml solution and add to 500mls of …………………….i.e. 1microgram per 1ml. Withdraw 50ml from the bag into a syringe and infuse at rate of …………mls/hour (0.3 x weight in kg) to give 5 nanogram/kg/min  Signed……………………………Date…………… |
|  |  |
| **Administration:** | Continuous intravenous infusion |
| **Dosage:** | Use starting dose 5 nanograms/kg/min increasing as necessary in 5 nanogram/kg/min increments up to a maximum of 20 nanograms/kg/min.  If more than 20 nanograms/kg/min are necessary please consult cardiologist. |
| **Routes:** | IV / UVC |
| **Compatibility:** | Glucose 10% \*  Glucose 5%  Sodium chloride 0.9% |
| **Incompatibility:** | Prostaglandin E2 should never be infused simultaneously through the same line as any other drug |
| **Other:** | May cause apnoea  NB: The above doses are suitable for maintaining duct patency. Higher doses will be required to reopen the duct  Doses up to 100nanograms/kg/min have been used but are associated with increased side effects  The 500ml bag containing Dinoprostone should NEVER be infused directly into the patient. Follow preparation instructions above to run through syringe pump. Discard the bag immediately. |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusa.wales.nhs.uk/> [Accessed 26.08.15]  \*local practice |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **DOBUTAMINE HYDROCHLORIDE** |
| **Indications for use:** | Hypotension (Refer to Diaphragmatic Hernia Guidelines for specific management of hypotension in this condition) |
| **Preparation:** | 12.5mg in 1 ml – solution supplied in 20ml ampoules  Prepare as per prescription label (NOTE: Single, double and quadruple strength labels are available. Please select correct label) |
|  | **SINGLE STRENGTH**  **Dobutamine**  Take…………mgs Dobutamine (wt in Kgs x 30) and make up to 50 mls with ………………………... i.e. 1ml/hour = 10 micrograms/kg/min.  Run at ……… ml/hour (i.e.…… micrograms/kg/min)  Signed…………………………Date……………… |
| **Administration:** |  |
| **Dosage :** | Use starting dose 5 micrograms/kg/min increasing stepwise to a maximum of 20 microgram/kg/min  **NOTE: If commencing adrenaline because baby is unresponsive to first line medications (dopamine, dobutamine and hydrocortisone) the dopamine should be weaned and stopped (as should dobutamine if possible)**  **A combination of all of the above may result in tachycardia, decreased filling in diastole and subsequent decreased cardiac output** |
| **Routes :** | IV / UVC / CVL  **Administer centrally whenever possible and must be given centrally if more concentrated than single strength**  **Do not infuse through UAC** |
| **Compatibility:** | Sodium Chloride 0.9%  Sodium Chloride 0.45%  Glucose 10%  Glucose 5% |
| **Incompatibility:** | Aciclovir, Alkaline solutions, Amphotericin, Calcium Gluconate, Ceftazidime, Digoxin, Flucloxacillin, Furosemide, Heparin, hydrocortisone, Magnesium Sulphate, Midazolam, omeprazole, Phenytoin, Sodium Bicarbonate, THAM |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  Guy’s and St Thomas’, Kings College and University Lewisham Hospitals Paediatric Formulary (9th Edn) London: Guy’s and St Thomas’ NHS Foundation Trust ; 2012. Available online at <http://www.guysandstthomas.nhs.uk/resources/publications/formulary/paediatric-formulary-9th-edition.pdf> [accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 19.08.15]  Stockley’s Drug Interactions. Available at: http://www.medicinescomplete.com/mc/stockley/current/interactions.htm?q=phenytoin+dopamine&searchButton=Search . [accessed 19.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |  |
| --- | --- | --- |
|  | **DOPAMINE HYDROCHLORIDE** | |
| **Indications for use:** | Hypotension (Refer to Diaphragmatic Hernia guideline for specific management of hypotension in this condition) | |
| **Preparation:** | 40mg in 1 ml – solution supplied in 5ml ampoules  Prepare as per prescription label (NOTE: Single, double and quadruple strength labels are available. Please select correct label) | |
|  | **SINGLE STRENGTH**  **Dopamine**  Take…………mgs Dopamine (wt in Kgs x 30) and make up to 50 mls with ………………………….. i.e. 1ml/hour = 10 micrograms/kg/min.  Run at ……… ml/hour (i.e.…… micrograms/kg/min)  Signed…………………………Date……………… | |
|  | |
| License Status: | Not licensed for children under 12 years | |
| **Dosage:** | Use starting dose 5 micrograms/kg/min increasing stepwise to a maximum of 20 microgram/kg/min  **NOTE: If commencing adrenaline because baby is unresponsive to first line medications (dopamine, dobutamine and hydrocortisone) the dopamine should be weaned and stopped (as should dobutamine if possible)**  **A combination of all of the above may result in tachycardia, decreased filling in diastole and subsequent decreased cardiac output** | |
| **Routes:** | IV / UVC / CVL  **Administer centrally whenever possible and must be given centrally if given more concentrated than single strength**  **Do not infuse through UAC** | |
| **Compatibility:** | Sodium Chloride 0.9%  Sodium Chloride 0.45%  Glucose 10%  Glucose 5%  Glucose 10% + sodium chloride 0.18% | |
| **Incompatibility:** | Aciclovir, Alkaline solutions, Aminoglycosides,Amphotericin  Furosemide, Insulin, Penicillins, Sodium Bicarbonate, THAM, lipid emulsion | |
| **Interactions:** | Phenytoin  There are reports of this drug causing severe hypotension in patients on dopamine | |
| **Other:** | Stop infusion if blanching develops along site of vein  Extravasation can cause dangerous ischemia |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 19.08.15]  Stockley’s Drug Interactions. Available at: http://www.medicinescomplete.com/mc/stockley/current/interactions.htm?q=phenytoin+dopamine&searchButton=Search . [accessed 19.08.15]  Email correspondence- Jim Glare, West Midlands Medicines Information and UKDILAS |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Amar Iqbal/ Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **ERYTHROMYCIN** |
| **Indications for use:** | Infection – please refer to Antibiotic Policy |
| **Preparation:** | Injection: 1g vial  Reconstitute 1g vial with 20mls of water for injection to give 50 mg/ml solution. Take 1 ml and dilute to 10ml with 0.9% sodium chloride to give **5 mg/ml.** Flush with 0.9% sodium chloride after administration  Suspension: 125 mg in 5 ml |
| **Administration:** |  |
| **Dosage:** | IV: 10-12.5 mg/kg infused over 1 hour  Oral: 12.5 mg/kg |
| **Frequency:** | 6 hourly  **Indication for use should ALWAYS be documented**  **Prescribe in dedicated antibiotic section on new prescription chart**  **Review culture results after 36 hours (where possible) and at most 48 hrs and ensure regular review is undertaken and the outcome documented as stipulated on prescription chart.** |
| **Routes :** | IV / Oral / NG |
| **Other:** | Prescribe first dose to be administered as soon as possible  Subsequent doses should be prescribed 12 hrly at 02.00/14.00, 06.00/18.00 or 12.00/23.59 or 8 hrly at 02.00/10.00/18.00  Reduce dose in severe renal impairment-Refer to BNF-C and consult product literature  Caution neonate under 2 weeks (risk of hypertrophic pyloric stenosis) |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **EYE TREATMENT** |
| **Indications for use:** | 1. Antibiotics for infection (see Conjunctivitis Guideline on Intranet) 2. Steroid drops post laser treatment |
| **Administration:** |  |
| **Dosage:** | Chloramphenicol 0.5% 1 drop each eye, 2 hourly for the first 48 hours then qds thereafter (first line, unless specified by microbiologist)Chloramphenicol 1% eye ointment each eye qds (alternative first line)  Fusidic Acid 1% twice daily (staph infections)  Following laser surgery:  \*Prednisolone 0.5% 1 drop to each treated eye qds  for 5 days |
| **Routes :** | Topically to both eyes for a minimum of five days and then review (continue for 48 hours after healing)  NB: please use a separate tube of ointment for each eye to avoid cross infections. Eye drops are supplied as single use Minims® |
| **Other:** | See Conjunctivitis Guideline on Intranet for specific treatment of Gonococcal, Chlamydia and Herpetic Ophthalmia |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  **\***Local guideline for Laser Therapy for Retinopathy of Prematurity available  on intranet |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **FENTANYL**  **\*CONTROLLED DRUG\*** |
| **Indications for use:** | In accordance with premedication guidelines for elective intubations  Prescribe and administer on dedicated pre-intubation prescription chart |
| **Preparation:**  **License status:** | 50 micrograms/ml solution (as citrate) – solution supplied in 2ml ampoules  Take 1ml of 50micrograms/ml solution and dilute to 10mls with 0.9% sodium chloride to give **5 micrograms/ml solution**.  Not licensed for children under 2 years old |
| **Administration:** |  |
| **Dosage:** | 2 micrograms/kg over 30 seconds |
| **Routes :** | IV |
| **Compatibility:** | Sodium Chloride 0.9%  Glucose 5% |
| **Other:** | Can be associated with muscle rigidity in higher doses or with rapid administration, particularly in preterm neonates  Order via the ward CD requisition book  Store in the Controlled Drugs Cupboard and record administration and destruction in the CD record book |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **FLUCLOXACILLIN** |
| **Indications for use:** | Infection – please refer to Antibiotic Policy |
| **Preparation:** | Injection: 500mg vial  **Villerton (Bowmed) brand**  Reconstitute 500mg vial with 4.7mls of water for injection to give **100 mg/ml solution**  **Wockhardt brand**  Reconstitute 500mg vial with 4.6mls of water for injection to give **100 mg/ml solution**  Suspension: 25 mg in 1 ml (usually) |
| **Administration:** | By bolus over 3-4 minutes |
| **Dosage:** | 25 mg/kg  IV dose may be doubled in severe infection  100 mg/kg in suspected meningitis or osteomyelitis |
| **Frequency:** | Less than 7 days old 12 hourly  7 - 21 days old 8 hourly  More than 21 days old 6 hourly  **Indication for use should ALWAYS be documented**  **Prescribe in dedicated antibiotic section on new prescription chart**  **Review culture results after 36 hours (where possible) and at most 48 hrs and ensure regular review is undertaken and the outcome documented as stipulated on prescription chart.** |
| **Routes :** | IV / UVC  Oral |
| **Other:** | Prescribe first dose to be administered as soon as possible  Subsequent doses should be prescribed 12 hrly at 02.00/14.00, 06.00/18.00 or 12.00/23.59 or 8 hrly at 02.00/10.00/18.00  Incompatible with atropine , calcium gluconate, dobutamine, erythromycin lactobionate, gentamicin sulfate, midazolam, morphine sulfate  Risk of kernicterus in jaundiced neonates when high doses given parenterally  Use with caution in patients with hepatic impairment  Refer to BNF-C and consult product literature for dosing in renal impairment |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 20.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services

|  |  |
| --- | --- |
|  | **FLUCONAZOLE** |
| **Indications for use:** | Invasive fungal infection  For prophylaxis against fungal infection in babies commenced on antibiotics for suspected late onset infection if:   * born <30 weeks gestation or <1500g   AND   * have proven current candida colonisation or a suspicion of candida colonisation (eg inflamed broken skin)   OR   * have ever had abdominal surgery regardless of birth gestation or corrected gestational age   AND   * have proven current candida colonisation or a suspicion of candida colonisation (eg inflamed broken skin)   Nystatin should be used first line if all above conditions not met  Use miconazole for treatment of oral or napkin candidiasis |
| **Preparation:** | Injection: 2 mg in 1 ml  Suspension: 10 mg in 1 ml |
| **Administration:** | IV infusion should be given over 30 mins |
| **Dosage:** | **Invasive fungal infection:**  Up to 13 days of age: 12mg/kg every 72 hours, treatment continued according to response  14 – 28 days of age: 12mg/kg every 48 hours, treatment continued according to response  Over 28 days: 12mg/kg every 24 hours, treatment continued according to response  **Prophylaxis against fungal infection:**  Up to 13 days of age: 6mg/kg every 72 hours  14 – 28 days of age: 6mg/kg every 48 hours  Over 28 days: 6mg/kg every 24 hours  To be continued for duration of antibiotic treatment |
| **Routes :**    **Incompatibility:** | IV infusion over 30 mins/ Oral / NG (good oral absorption)  Amphotericin, Calcium gluconate, cephalosporins (cefotaxime, ceftazidime, ceftriaxone sodium, cefuroxime sodium)**,** clindamycin**,** digoxin, fat emulsion, furosemide |
| **Other:** | Monitor liver function before commencing treatment and weekly thereafter to assess for signs of damage  Reduce dose in renal impairment-Refer to BNF-C and consult product literature |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2021 - 2022 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm>  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> ]  Nice Guidelines NG195 20th April 2021 |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **FLUMAZENIL** |
| **Indications for use:** | Reversal of sedative effects of benzodiazepines |
| **Preparation:**  **License status** | 100 microgram/ml available in 5ml amp  Not licensed for use in children under 1 year |
| **Administration:** |  |
| **Dosage:** | 10 micrograms/kg over 15 seconds |
| **Frequency:** | Can be repeated at 1 minute intervals if required |
| **Routes :**  **Other:** | IV/UVC  Do not give this medicine by IV injection via a line being used for an infusion containing a medicine additive without first stopping the running infusion. Flush the line both before and after giving the injection. |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 20.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **FOLIC ACID** |
| **Indications for use:** | Babies with haemolytic disease  Supplementation for babies with a birth weight less than 1800g and/or <33+6 weeks gestation whilst they weigh <1800g and receiving unfortified mebm/debm |
| **Preparation:** | 2.5mg in 5ml syrup |
| **Administration:** | Start if DAT 2+ positive or higher  Should be discharged home on folic acid and will be reviewed in outpatient clinic |
| **Dosage :** | Haemolytic Disease: 1mg once daily  Supplementation for babies for babies with a birth weight less than 1800g and/or <33+6 weeks gestation whilst they weigh <1800g and receiving unfortified mebm/debm: see vitamin guideline addendum 1  Prescribe as a TTO and should be continued until there is no further evidence of haemolysis and the baby is discharged from follow up clinic |
| **Routes :** | Oral/ NG |
| **Other:** | Prescribe at 14.00 |
| **Reference:** | Rath, MEA, Smits-Wintjens VEH, Walther, FJ, Lopriore E. Hematological morbidity and management in neonates with haemolytic disease due to red cell alloimmunization. 2011 Early Human Development (87) 583 - 588 |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **FUROSEMIDE** |
| **Indications for use:** | Controlling symptoms of heart failure  Oliguria  During transfusion of blood products if:   * PDA present * On regular Furosemide * Baby is felt to be at risk of volume overload |
| **Preparation:** | Injection: 20 mg in 2 ml  Suspension: 20 mg or 40mg in 5 ml |
| **Administration:** | Can be administered undiluted To aid slow administration can be diluted to any suitable volume with sodium chloride 0.9%, e.g. 1mg in 1mL, or 2mg in 1mL  For Continuous IV infusion:  Take 20mg of Furosemide 10mg in 1ml and make up to 20mls with sodium chloride 0.9% to give **Furosemide 1mg/ml solution** |
| **Dosage:** | IV bolus: 1mg/kg over 5-10 mins at a usual rate of 100 microgams/kg/min (not exceeding 500 micrograms/kg/min)  **Continuous IV infusion(at Consultant request only)**: (Note no dosing information in BNFc for neonates only **for Child >1month**)  Give **Furosemide 1mg/ml** solution using an infusion pump at a rate of 0.1mg/kg/hr (100micrograms/kg/hour) titrated against urine output. Maximum 0.4mg/kg/hr..  Should have at least 6 hourly gases to monitor sodium trend  Note information below  Oral: 1mg/kg  Start once daily and monitor electrolytes and effect.  Can be increased to 12 hourly if required in babies with a corrected gestational age of >31 weeks |
| **Routes:** | IV / Oral / NG  IV: Do not allow to mix with any other medicines or infusions. Precipitation can occur if mixed with any IV fluid (such as glucose or glucose sodium chloride mixtures) with a pH <5.6, so it should always be separated by a 1ml ‘bolus’ of 0.9% sodium chloride or water when given IV |
| **Interactions:**  **Other:**  **Monitoring:** | Increases risk of aminoglycosides ototoxicity  Risk of hypokalaemia  Furosemide liquid (Frusol®) contains 10% v/v alcohol  Furosemide is unstable in acid solutions and may precipitate out of solutions of low pH  Do not dilute furosemide injection with glucose injections.  Existing line must be flushed with 0.9% sodium chloride prior to administration or use a separate line. Must not come in to contact with any other infusions made up in glucose  Preferably administer via a central venous access device to avoid potential venous irritation as the preparation has a high pH.(8) If a central venous access device is unavailable a risk benefit analysis should be made on an individual patient basis. If given peripherally, the insertion site must be monitored closely for phlebitis using a recognised infusion phlebitis scoring tool.  Monitor blood pressure, fluid balance, electrolytes (sodium and potassium) and creatinine. |
| **References:** | BNF fo**r** Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 06.03.17]  Phelps SJ, Hagemann TM, Kelley RL, Thompson AJ, editors. The Teddy bear book: Pediatric injectable drugs. 10th ed. Bethesda, Maryland: American Society of Heath-System Pharmacists; 2013. |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | GAVISCON INFANT® |
| **Indications for use:** | Gastro-oesophageal reflux  **(in babies 34 weeks and older only)**  **Gaviscon Infant should not be used in conjunction with Carobel** |
| **Preparation:** | Prepare as per prescription label:  1 ‘dose’ is half a dual sachet.   |  |  |  | | --- | --- | --- | | Drug Approved  Name | **DOSE** | **FREQUENCY** | | **Infant Gaviscon**  (Sodium alginate 225 mg, Magnesium Alginate 87.5 mg per each ‘dose’) | See Directions | With Feeds | |  | **Route** | **Pharmacy** | | **Add 1 ‘dose’ (i.e. half dual sachet) to 5 mls water. Add 1 ml of this solution to each 25 ml of feed OR add 1 ‘dose’ to not less than 115ml of feed** |  |  | | Prescriber  Signature | Date  Commenced | Date Cancelled | |
| **Administration:** | Infants receiving bottle/NG feed: Mix with feed as prepared above  Infants receiving breast feed:   * Mix each sachet with 5ml of cooled boiled water until a smooth paste is formed * Add another 10ml of cooled boiled water and mix * For breast fed infants give Gaviscon Infant part way through each feed using a spoon or feeding bottle. Give appropriate amount depending on expected volume of feed * If NG top up is required, no further gaviscon should be given |
| **Dosage:** | 1 dose (1/2 dual sachet) to not less than 115 mls feed or give equivalent dose in water before breast feed  **Use with caution with Breast Milk Fortifier and Nutriprem 1** |
| **Route:** | Oral / NG  **Each paired sachet contains enough powder for 2 standard ‘doses’** |
| **Other:** | Caution renal impairment (high sodium content may add to risk of hypernatraemia) |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  Neonatal Formulary: Drug Use in Pregnancy and the First Year of Life (6th Edn) London: Wiley-Blackwell;2011 |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **GENTAMICIN** |
| **Indications for use:** | Infection – please see Antibiotic Guidelines |
| **Preparation:** | 20mg in 2 ml vial |
| **Administration:** | By slow bolus |
| **Dosage:**  **&** | < 7 days of age : ALL gestations 5mg/kg **36 hourly** |
| **Frequency:** | ≥ 7 days of age : <32 weeks CGA: 5mg/kg **36 hourly**  ≥ 32 weeks CGA 5mg/kg **24 hourly**  First trough level pre 2nd dose <2mg/L, subsequent levels <1mg/L    Prescribe on dedicated Gentamicin prescription chart  **Indication for use must always be documented**  **Review culture results after 36 hours (where possible) and at most 48 hours and either discontinue or indicate length of course on prescription chart**  **Please prescribe subsequent doses at routine drug times: 02.00, 06.00, 10.00, 12.00, 1400, 18.00, 22.00 or 23.59 unless on TC when drug times are 11.00 and 23.00** |
| **Routes:** | IV / UVC |
| **Other:** | Levels – levels are done in Microbiology at BCH at 10.30 and 16.00. They need to reach the BWH lab by 12.00 to ensure they make the 16.00 run. Levels are usually telephoned through to the NNU by 17.00  URGENT requests may be taxied to BCH on request of Consultant with shift leader authorisation  Take trough level pre 2nd dose (give 2nd dose if renal function satisfactory), then take level every 3rd dose unless more frequent monitoring is indicated  First trough level (pre 2nd dose) :  Level 2 – 3mg/L increase dosing interval  Level above 3mg/L STOP gentamicin, take pre-dose level at the time the next dose would have been due and wait for results before administering further dose  Subsequent trough levels:  Level 1 – 2mg/L increase dosing interval  Level above 2mg/L STOP gentamicin, take pre-dose level at the time the next dose would have been due and wait for results before administering further dose  If there is no significant renal impairment the dose may be given without level being available (as per NICE guidelines) but this should be documented  ‘Peak’ or post dose levels are not routinely required unless specific indications (see BNF for Children)  **N.B.** If level greater than 4 mg/L or baby has received greater than 7 days treatment will need enhanced hearing follow up  Use vial immediately and discard the remaining solution. Store vials at room temperature |
| **Interactions:** | Increased toxicity with cephalosporins, vancomycin, Furosemide and amphotericin B.  Preferably not given with potentially ototoxic diuretics e.g. furosemide. If concurrent use unavoidable administration should be separated by as long a period as practicable  Aminoglycosides enhance effects of non-depolarising muscle relaxants (e.g.rocuronium) and depolarising muscle relaxants (e.g. suxamethonium).  Possible increases level of digoxin  Incompatible with: aciclovir, amphotericin, cephalosporins, erythromycin, flucloxacillin, furosemide, heparin, lipid, penicillins  Gentamicin activity may be impaired by beta-lactam antibiotics. However gentamicin may be used with penicillins and cephalosporins but the injections should be given at separate sites |
| **Caution:** | **Renal impairment** |
| **Reference:** | NICE Guidelines 2012: Antibiotic use in early-onset neonatal infections  BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 24.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **GLUCAGON** |
| **Indications for use:** | Persistent hypoglycaemia secondary to hyperinsulinism  On advice of Northern Congenital Hyperinsulinism Service NORCHI Manchester |
| **Preparation:**  **License status:** | Make as per prescription label below.  Note:  Shake the vial gently until the powder is completely dissolved and the solution is clear  Do not use the reconstituted solution if it is not clear  **GLUCAGON**  Reconstitute TWO 1mg glucagon vials, each with 1.1ml water for injections (provided) to make two vials of solution 1000 microgram in 1ml  Take 2000microgram (2ml of 1000microgram/ml solution) and make up to 50mls with 0.9% sodium chloride to give a concentration of 40microgram/ml.  i.e. 0.125ml/kg/hr = 5microgram/kg/hr  Run at …..............…...ml/hr (…......................micrograms/kg/hr) Route……………..  Signed…………………………………. Date……………..  **Unlicensed for IV route** |
| **Administration:** |  |
| **Dosage:** | 5 – 20 microgram/kg/hr (max 50microgram/kg/hr) as guided by NORCHI team  Usual starting dose 5micrograms/kg/hr |
| **Routes:** | IV/ LL/UVC -preferably central  Glucagon has a low pH and may cause venous irritation and tissue damage in cases of extravasation. If a central venous access device is unavailable, administer via a large peripheral vein monitoring insertion site closely |
| **Compatibility:** | Glucose 5% |
| **Incompatibility:** | Sodium Chloride 0.9%  Do not infuse with any other medicines  Glucagon has a very limited compatibility and is normally administered via a dedicated lumen  Do not add to infusion fluids containing calcium (including PN); precipitation may occur  NORCHI advise not to use 10% glucose as a diluent as it may precipitate glucagon |
| **Other:** | Store unopened ampoules between 2-8oC in a refrigerator  Ampoules and diluent are presented as part of the GlucaGen(r) Hypokit (in orange plastic box)  Usual expiry is 24 hours (as per Medusa), however if there are concerns about efficacy NORCHI team may request that the infusion is given a 12 hour expiry. This should be clearly documented on the prescription and in the medical notes. |
| **References** | BNF for Children London: BMJ Group and Pharmaceutical Press; 2021 - 2022 Available <https://bnfc.nice.org.uk>  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/>  CHI drug prescriptions Glucagon infusion\_ver3 May 14\_ M Skae, L Rigby & D Freeman Z Mohammed (CHI Fellow) Glucagon infusion calculation for syringe driver- for patients under 10kg |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | (ORAL) GLUCOSE GEL |
| **Indications for use:** | * Blood glucose 1-1.9mmol/l in infant with no abnormal clinical signs * Infants ≥ 35 weeks’ gestational age and younger than 48 hours after birth   Must be used in conjunction with a feeding plan  For babies with severe hypoglycaemia (BG <1mmol/l) use oral dextrose gel only  as an interim measure while arranging for urgent medical review and treatment with IV |
| **Preparation:** | 400mg per 1g (40% gel) |
| **Administration:** |  |
| **Dosage:** | 200mg/kg glucose gel (0.5 ml/kg of 40% glucose gel)  Up to two doses given 30 minutes apart per episode of hypoglycaemia and a  maximum of six doses of buccal glucose gel in 48 hours.  If more than one dose is required, baby should be discussed with the neonatal team  and it is advisable for the baby to be examined before the 3rd dose is administered.   |  |  | | --- | --- | | Weight of Baby (kg) | Volume of gel (ml) | | 1.5 – 1.99 | 1 | | 2 – 2.99 | 1.5 | | 3 – 3.99 | 2 | | 4 – 4.99 | 2.5 | | 5 – 5.99 | 3 | | 6 – 6.99 | 3.5 |  * Draw up correct volume of 40% glucose gel using a 2.5 or 5ml oral /   enteral syringe   * Dry oral mucosa with gauze, gently squirt gel with syringe (no needle) onto the   inner cheek and massage gel into the mucosa using latex-free gloves   * Offer a feed preferably breast milk, immediately after administering glucose gel * Repeat blood sugar measurement as requested |
| **Routes:** | Buccal |
| **Reference:** | I  dentification and Management of Neonatal Hypoglycaemia in the Full term Infant – A Framework for Practice BAPM April 2017 |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | GLUCOSE SOLUTIONS (CONCENTRATED) |
| **Indications for use:** | Hypoglycaemia  (a hypoglycaemia screen should be undertaken in unexplained hypoglycaemia prior to increasing glucose concentration. Stickers are available detailing tests required for hypoglycaemia screen) |
| **Preparation:** | Prepare as per prescription labels:  **12.5% Glucose**  Take 500mls of 10% glucose and remove 31.5 mls. Add 31.5mls of 50% glucose.  **15% Glucose**  Take 500mls of 10% glucose and remove 62.5 mls. Add 62.5mls of 50% glucose.  **20% Glucose**  500ml bag available as stock (Baxter) |
| **Administration:** | Centrally via UVC/CVL |
| **Dosage:** | To be used when sugars not controlled on 10% Glucose infusion. |
| **Other:** | The above percentages made will be **approximate** due to an **overage** in all manufactured bags. Overage is designed to ensure that each bag contains the designated volume plus enough fluid to prime a giving set.  The manufacturer’s target fill volume for a 500mL Baxter Viaflo® infusion bag is 530mL. The product licence limits allow a 500mL bag to contain between 520mL and 540mL.  Based on the product licence limits, and using the above methods, the concentration of  glucose produced will vary between the following range:   |  |  |  |  | | --- | --- | --- | --- | | **Target Glucose Strength %w/v** | **Actual Glucose Strength %w/v** | | | | **500mL Bag** | **520mL Bag** | **540mL Bag** | | *12.5 % w/v* | 12.5 | 12.4 | 12.3 | | *15% w/v* | 15 | 14.8 | 14.6 | |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **GLYCEROL (GLYCERIN) SUPPOSITORIES** |
| **Indications for use:** | Constipation |
| **Preparation:** | Suppositories: 1g contains gelatin 140mg, glycerol 700mg, purified water |
| **Administration:** | Moisten with water before insertion |
| **Dosage:** | ¼ g - ½ g as required |
| **Frequency:** | Usually not required more than twice in 24 hours |
| **Routes :** | PR |
| **Other :** |  |
| **Reference:** | Dose not available for preterm babies in BNFc. Above based on experience at BWH |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **GLYCERYL TRINITRATE (GTN)** |
| **Indications for use:** | Severe peripheral tissue ischaemia caused by vasospasm secondary to peripheral arterial catheterisation or extravasation of vasopressors  Consider elevating affected limb and warming contralateral limb to encourage vasodilation first |
| **Preparation:** | 0.4% ointment  patches 5 mg (releasing 5 mg per 24 hours) |
| **Administration:** | Ointment: Apply thin film to affected area  Patch: applied above the ischaemic area to encourage blood flow and change every 24 hours or less, do not leave on for longer than clinically indicated. Duration of treatment depends on effect. |
| **Dosage:** | Ointment: 2mg i.e. 0.5ml of 0.4% ointment drawn up into 1ml syringe. Repeat 8 hourly if necessary  Patch: Cut 5mg patch in quarter to half (depending on size of baby) to provide 1.25mg-2.5mg dose and apply above affected area Do NOT put on a full patch |
| **Routes :** | Topically to affected area |
| **Other:** | Monitor carefully for hypotension or tachycardia  Monitor methaemoglobin levels  Absorption and systemic effects are likely to be most marked in extremely premature babies due to their thin skin |
| **References:** | North Trent Neonatal Network Clinical Guideline. ‘Extravasation injuries in neonates’. Dr P Adiotomre, L Elliot. Written March 2005; updated Jan 2013  Paediatric Formulary, Evelina London Children’s Hospital, Guys and St Thomas’s NHS Foundation Trust Accessed 24.01.24  Ashford and St Peter’s Hospitals NHSFT. Extravasation Injuries Management in Neonatal Unit. April 2023. Accessed online at : [Microsoft Word - Extravasation Injuries Management in Neonates Apr 2023 (ashfordstpeters.net)](https://ashfordstpeters.net/Guidelines_Neonatal/Extravasation%20Injuries%20Management%20in%20Neonates%20Apr%202023.pdf) 24.1.24 |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **HEPARIN SODIUM** |
| **Indications for use:** | To maintain patency of arterial lines  To maintain patency of broviac lines when a continuous infusion is not running |
| **Preparation:** | Heparin sodium 1000 units/ml  For arterial lines:  Add 500 units of heparin to 500mls of 0.45% sodium chloride to give concentration of 1 unit/ml. Run at 0.5mls/hr (0.5 unit/hr)  To maintain broviac line patency:  A 10 unit/ml preparation is available from Boots on a named patient basis |
| **Administration:** | \*For arterial lines: |
| **Dosage:** | 0.5mls/hr of above solution = 0.5unit/hr of heparin  \*\*To maintain patency of broviac line:  Heplock twice weekly with 0.4mls of 10units/ml heparin sodium instilled into line. DO NOT FLUSH LINE. |
| **Frequency :** | For arterial lines:  Change solution every 24 hours  To maintain patency of broviac line:  Twice weekly |
| **Route:** | UAC/ IA  Broviac lines |
| **Caution:** | Only use 0.9% sodium chloride if concerns re hyponatraemia  Use with caution in uncorrected thrombocytopaenia platelets<50  if concerns re patency 1000 units to 500ml may be used |
| **References:** | Neonatal Formulary: Drug Use in Pregnancy and the First Year of Life (6th Edn) London: Wiley-Blackwell;2011  **\*\***Taken from Birmingham Children’s Hospital recommendations for Heplocking Broviac Lines  BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 24.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **HUMAN MILK FORTIFIER (COW AND GATE NUTRIPREM BRAND)** |
| **Indications for use:** | **To provide recommended nutritional intake and improve growth in pre-term babies receiving breast milk**  **SEE FEEDING GUIDELINES FOR FULL CRITERIA FOR USE**  Babies born at <34 weeks +/- <1800g; to commence when on 100ml/kg/day of MEBM or DEBM    It is not appropriate for babies born at term who require additional nutrient supplementation.  Please discuss with dietitian if unsure    Stopping HMF:  When HMF should be weaned and stopped depends on the growth trajectory and potential of the individual baby.  Many babies will self wean as they gradually establish suck feeds at the breast. In this scenario, provided that they are growing along an appropriate\* centile, HMF should continue to be added to the NG feeds but not given pre breast feed and stopped when full suck feeds are achieved    Other considerations:   * HMF should be continued if the baby is not following an appropriate\* centile even if receiving full sucking feeds * If discharged before 37 weeks, babies should be discharged with HMF and follow the Network home fortifier guidelines (<http://wmnodn.org.uk/guidelines/home-fortifier-instructionsv3final/> ) with regards to weaning * All babies should be weaned off fortified breast milk supplements by 6 weeks post-term or 3.5kg body weight, whichever is sooner     \*if you are in any doubt about whether the growth trajectory is appropriate or whether HMF should be continued please discuss with the dietitian/nutrition team    **DIFFERENT BRANDS OF HUMAN MILK FORTIFIER ARE NOT INTERCHANGEABLE DUE TO DIFFERENT VITAMIN AND MINERAL REQUIREMENTS.  PLEASE SEEK ADVICE IF NUTRIPREM HMF IS NOT AVAILABLE.** |
| **Preparation:** | **Cow and Gate Nutriprem1g sachets**  **Each sachet contains (in addition to a range of vitamins and minerals)**  **4 kcal**  **0.33g protein**  **0.37g carbohydrate**  **0.36mmol sodium** |
| **Administration:** |  |
| **Dosage:** | For Tube or bottle feeding: Add the contents of one sachet (1g) to every 25ml of warm human milk (approx 37°c).  Maximum feed volume is 165mls/kg/day    If less milk is available, make a HMF concentrate as follows:   * Mix 1 sachet with 5ml of EBM * Place 1ml of this concentrated HMF solution into a feeding bottle and make UP TO 5mls with EBM (note: ratio 1ml HMF concentrate, 4ml EBM for EVERY 5ml feed required… 2ml HMF concentrate made up to 10ml with EBM etc etc) * Discard remaining HMF concentrate solution     Swirl gently until dissolved completely.    **If breast feeding: mix 2 sachets with 3 – 5mls of expressed breast milk and administer using, breast shield, teat or syringe.  Give immediately prior to breast feed so that it is diluted  in the stomach with breast milk.**    To calculate number of sachets to give/ day (equivalent to 2 sachet to 50ml feed = 1dose) –   * eg. Breast fed baby weighing 1.5kg. assume taking 165ml/kg/d at the breast = 165 x 1.5 = 247.5ml/d = 250ml/50ml = 5 doses (10 sachets) Round to the nearest whole sachet. Therefore give 5 doses (2x 5 sachets) spread evenly throughout the day as above. |
| **Frequency:** | **With feeds** |
| **Routes:** | **NG/ oral** |
| **Other:** | **It should be ideally added to milk immediately prior to giving feed**    If not administered immediately, fortified breast milk must be refrigerated at temperature 2 – 40C and used within **12 hours**  Discard  any unused fortified breast milk after 12hours.    **USE WITH CAUTION IN BABIES RECEIVING DEXAMETHASONE DUE TO THE CATABOLIC EFFECTS OF STEROIDS (Monitor urea)** |

Written by: Gemma Holder (Neonatal Consultant), Rachel Hoban(Neonatal Dietitian)

Checked by: Louise Whitticase (Lead Pharmacist-Birmingham Women’s Hospital

|  |  |
| --- | --- |
|  | **HYALURONIDASE** |
| **Indications for use:** | Treatment of extravasation injury  NB: **Hyaluronidase is not recommended in the extravasation of vasoconstrictive medication such as Dopamine, adrenaline and noradrenaline since the vasoconstriction could extend with its use. It is also contra- indicated when the site of extravasation appears to be infected**  **Use not advisable in extreme preterm infants** |
| **Preparation:** | 1500 unit ampoule  Dissolve 1500 units ampoule in 3 mls of water for injection to give a solution containing **500 units/ml** |
| **Administration:** |  |
| **Dosage:** | 500 -1000 units |
| **Routes:** | 1. Inject 500 - 1000 units subcutaneously around the periphery of the extravasated site using aseptic technique (can inject via the tissued cannula if still in place) 2. Make 3 - 4 small incisions with a scalpel around the periphery of the area of extravasation 3. Using a yellow cannula inject 0.9% sodium chloride through the subcutaneous space in 25 - 100 mls aliquots through each incision in turn. The sodium chloride should exit freely through the remaining incisions 4. Massage the excess fluid towards the incisions if the limb becomes oedematous during the procedure 5. Cover the affected area with a jelonet dressing after the procedure for 24 – 48 hours |
| **References:** | Neonatal Formulary: Drug Use in Pregnancy and the First Year of Life (6th Edn) London: Wiley-Blackwell;2011 |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **HYDROCORTISONE** |
| **Indications for use:** | Prevention of CLD in all babies <28 weeks gestation (From Premiloc study)  Hypotension resistant to inotropic treatment and volume replacement  Adrenal insufficiency |
| **Preparation:** | Supplied as 100 mg powder in a vial (as sodium succinate)  Reconstitute powder with1.9 ml of water for injection to give a concentration of 50 mg / ml and shake vial until solution is clear. Take 0.2 ml and make up to 10 ml with 0.9% sodium chloride or 5% glucose to make a solution of 1 mg /ml.  Take required amount and give by slow IV injection over 3-5 minutes or infuse over 30 minutes. |
| **Administration:** |  |
| **Dosage:** | **Routine low dose hydrocortisone in all babies <28 weeks gestation (to start as soon as possible after delivery and must be initiated within 24 hours of birth):**  **Day 1 (day of birth) –day 7:** 0.5mg/kg **12 hourly** then  **Day 8-10:** 0.5mg/kg **24 hourly** then stop.  If baby requires treatment for hypotension with hydrocortisone within this 10 day regimen, revert to hypotension dose until blood pressure improves, then return to low dose hydrocortisone regimen (with appropriate weaning if necessary) to complete a **total** of 10 days hydrocortisone treatment  **Hypotension**  2.5mg / kg  Repeat if necessary after 4 hours then same dose every 6 hours for 48 hours or until blood pressure recovers  Reduce dose gradually over at least 48 hours.  **\*Hypotension for babies receiving therapeutic hypothermia:**  1mg/kg 6 hourly  **Adrenal Insufficiency**  Dose as advised by endocrine team |
| **Routes :** | IV. over 3-5 minutes |
| **Other:** | Monitor blood sugars due to risk of hyperglycaemia  Check blood pressure at least once daily (more frequently if being used to manage hypotension) |
| **Cautions:** | Steroid use increases the risk of fungal infection, and increases the risk of focal gut perforation, especially if the baby also receives treatment to aid duct closure  Stop hydrocortisone if gut perforation is confirmed  Paracetamol should be first choice for medical closure of PDA if baby receiving hydrocortisone. Ibuprofen and hydrocortisone must not be prescribed concurrently. |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 07.06.2021]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 07.06.21]  Baud O, Trousson C, Biran V et al Two year developmental outcomes of extremely preterm infants treated with early hydrocortisone: treatment effect according to gestational age at birth Arch Dis Child Fetal Neonatal Ed 2019; 104: F30 – F35  **\*\*** Local Guideline: Therapeutic Hypothermia as a Neuroprotective Intervention for Neonatal Hypoxic Ischaemic Encephalopathy – Procedural Document. 2010. Dr Archana Mischra, Dr Melanie Sutcliffe |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **HYOSCINE HYDROBROMIDE PATCHES** |
| **Indications for use:** | Excessive respiratory secretions |
| **Preparation:** | 1mg patches (releasing 1mg/72hours) |
| **License status:** | Not licensed for use in excessive respiratory secretions |
| **Administration:** |  |
| **Dosage:** | 250 micrograms (1/4 patch)  NB: not licensed in babies |
| **Frequency:** | Change every 72 hours |
| **Routes:** | Transdermal  Rotate sites as plaster can irritate skin |
| **Other:** | Apply to dry, hairless skin behind ear  To obtain ¼ patch, either cut with scissors along full thickness ensuring membrane not peeled away, or cover portion to prevent contact with skin  Wash hands after handling and wash application site after removing |
| **Reference:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **IBUPROFEN (PEDEA®) \*\*TWO DIFFERENT BRANDS ARE ON THE MARKET SINCE SEPTEMBER 2013- check label and preparation carefully.** |
| **Indications for use:** | Treatment of haemodynamically significant patent ductus arteriosus in preterm newborn infants <34 weeks gestational age. |
| **Preparation:** | 2ml ampoule of clear, colourless to slightly yellow  Each 2ml ampoule contains 10mg Ibuprofen  **\*NOTE different concentration to NeoProfen®\*\*** |
| **Compatibility:** | Sodium Chloride 0.9%  5% glucose  It is preferable to give the preparation undiluted |
| **Dosage:** | 3 doses 1st dose 10mg/kg  2nd & 3rd dose 5mg/kg  Flush the infusion line before and after administration over 15 minutes, with 1.5-2mL sodium chloride 0.9% or glucose 5%, to avoid contact with any acidic solution |
| **Routes:** | IV infusion over 15 minutes, 24 hourly for 3 doses |
| **Interactions:** | Refer to Appendix 1 of BNF for Children for full list of drug interactions with NSAIDs |
| **Other:** | **DO NOT ADMINISTER IF THE PATIENT HAS:**   * Low platelets * DIC * Renal failure * NEC * Life threatening infection * Marked unconjugated hyperbilirubinaemia * Pulmonary hypertension   **IF PLATELETS ARE <50 AND URINE OUTPUT <0.5ML/KG/HR, DISCUSS WITH CONSULTANT PRIOR TO GIVING DOSE.**  Monitor weight, U&E’s, platelets and urine output  A second course of 3 doses as above may be given if duct does not close 48 hours after last dose  Do not infuse with any other medicines or infusion fluids |
| **Reference:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  Pedea 5 mg/ml solution for injection SPC Available at <http://www.medicines.org.uk/emc/medicine/20804> [Accessed 24.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **INSULIN (soluble)** |
| **Indications for use:** | Hyperglycaemia   * Consider when 2 blood sugars at least 2 hours apart are above 14 or above 12 in association with glycosuria 2% * May be appropriate to reduce percentage of glucose being delivered if requiring additional infusions i.e. from 10% to 5% (but do not compromise nutrition by stopping parenteral nutrition)   For use in hyperkalaemia – see next page  NB: first administer 0.5ml/kg of calcium gluconate 10% in hyperkalaemia |
| **Preparation:** | 100 units in 1 ml – available as 10 ml vial Human Actrapid® insulin  Hyperglycaemia  Prepare as per prescription label (Single and double strength labels are available. Please ensure correct label is chosen)  **INSULIN MUST BE DRAWN UP VIA AN INSULIN SYRINGE**  Add insulin to diluent volume and invert syringe several times to ensure even mixing of insulin.  Insulin adheres to plastic. Consistent glucose control will not be achieved for several hours unless delivery tubing is first flushed with at least **20mls fluid** |
|  | SINGLE STRENGTH INSULIN INFUSION Step 1: Take 5 units Human Actrapid® insulin (short acting) and make up to 50ml …………………………% sodium chloride.  This will give **0.1 units/ml i.e. 0.5ml/kg/hr = 0.05units/kg/hr**  Run infusion at……………ml per hour.  Represcribe and change infusion after 24 hours  Signed…………………………….  Date……………………………… |
| **Dosage:** | **Insulin prescriptions must include the term 'units' next to the dose of insulin. Abbreviations such as “U” or “IU” must not be used**  Monitor serum potassium and ensure close monitoring of blood glucose  Start at 0.05 units/kg/hour  Check blood glucose 1 hr after starting insulin and 1 hr after every change in infusion rate  Continue to check glucoses hourly until within goal range for at least 6-hours with no dosing adjustments required. Once this criteria is met, may space glucose checks to every 4 hours while on stable drip dosing  If a change to either insulin dose or glucose infusion rate is made, the glucose should be checked hourly for at least 6 hours as above   |  |  | | --- | --- | | **Blood Glucose** | **Insulin Infusion Rate** | | >8mmol | Increase infusion rate in steps of 0.05 – 0.1 unit/kg/hr. Rate of increase will be dependent on rate of fall in blood glucose | | 6 – 8mmol/l | Maintain at current rate | | >4 - <6mmol | Reduce infusion rate in steps of 0.05 – 0.1 unit/kg/hr to  maintain blood glucose above 4mmol/l.  Rate of reduction will be dependent on rate of fall in blood glucose | | 4mmol/l or less | Stop infusion and re- check blood glucose after 1 hour |  |  |  |  | | --- | --- | --- | | Dose required  Unit/kg/hr | Infusion Rate (ml/kg/hr)  **NB - Multiply number by weight (kg)** | | |  | **Single Strength** | **Double Strength** | | 0.05 | 0.5 (x weight) | 0.25 (x weight) | | 0.1 | 1 (x weight) | 0.5 (x weight) | | 0.15 | 1.5 (x weight) | 0.75 (x weight) | | 0.2 | 2 (x weight) | 1 (x weight) | | 0.25 | 2.5 (x weight) | 1.25 (x weight) | | 0.3 | 3 (x weight) | 1.5 (x weight) | | 0.35 | 3.5 (x weight) | 1.75 (x weight) | | 0.4 | 4 (x weight) | 2 (x weight) | |
|  |  |
| **Route:** | IV/UVC  Preferably given via peripheral iv as incompatible with dopamine, also need to be aware of dead space in line if given via a long line  **Do not** administer a bolus infusion via line insulin is running on. |
| **Compatibility:** | Sodium Chloride 0.9% |
| **Incompatibility:** | Incompatible with digoxin, **dopamine**, noradrenaline, ranitidine, rocuronium Insulin can be added to a line containing midazolam or morphine |
| **Storage:** | Unopened Insulin vials should be kept refrigerated. Once opened should be kept at room temperature and can be stored for 4 weeks. Each vial should be for single patient use. Prepare a new solution every 24 hours |
| **Reference:** | Semin Fetal neonatal Med.2005 Aug;10(4):377 – 87. Hyperglycaemia and the very preterm baby. Hey E  Neonatal Formulary: Drug Use in Pregnancy and the First Year of Life (6th Edn) London: Wiley-Blackwell;2011  Guy’s and St Thomas’, Kings College and University Lewisham Hospitals Paediatric Formulary (9th Edn) London: Guy’s and St Thomas’ NHS Foundation Trust ; 2012. Available online at <http://www.guysandstthomas.nhs.uk/resources/publications/formulary/paediatric-formulary-9th-edition.pdf> [accessed 24.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 24.08.15]  Trissel, L.A. Handbook of Injectable drugs. Available at <http://www.medicinescomplete.com/mc/hid/current/> [Accessed 24.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **INSULIN (soluble)** |
| **Indications for use:** | Hyperkalaemia  **Refer to addendum 2 and full guidelines on intranet**  Ensure ECG monitoring is in situ  Hyperglycaemia – see previous entry  Use prescription label |
| **Preparation:** | 100 units in 1 ml – available as 10 ml vial Human Actrapid® insulin  **Step 1:**  Draw 1ml of 100units in 1ml Human actrapid® insulin into an insulin syringe and make up to 10ml using 0.9% sodium chloride to give 10 unit in 1ml solution.  **Step 2:**  Add 5 units (0.5ml of 10units/ml) solution to 500mls of 10% glucose. Run 10ml/kg of this solution over 10 minutes |
| **Dose:** | 0.1unit/kg with 1g/kg of glucose simultaneously over 10 minutes  **Insulin prescriptions must include the term 'units' next to the dose of insulin. Abbreviations such as “U” or “IU” must not be used**  Blood sugars **must** be monitored before, during and after infusion. Check blood sugar level 5 mins after completing the infusion, then every 15 mins for the first hour, then hourly for a further 3 hours if stable. Watch for late hypoglycaemia and refer to senior medical staff if any concerns.  Potassium levels should be re-checked immediately post infusion and at regular intervals for four to six hours |
| **Route:** | IV/UVC |
| **Compatibility:** | Sodium Chloride 0.9%  10% glucose  Insulin can be added to a line containing midazolam or morphine |
| **Incompatibility:** | Incompatible with digoxin, **dopamine**, noradrenaline, ranitidine, rocuronium |
| **Storage:** | Unopened Insulin vials should be kept refrigerated. Once opened should be kept at room temperature and can be stored for 4 weeks. Each vial should be for single patient use. |
| **Interactions:** |  |
| **Reference:** | Birmingham Children’s Hospital Injectable Medicine Guide. R Isaac. Version 1.0.2 May 2012  Neonatal Formulary: Drug Use in Pregnancy and the First Year of Life (6th Edn) London: Wiley-Blackwell;2011  Guy’s and St Thomas’, Kings College and University Lewisham Hospitals Paediatric Formulary (9th Edn) London: Guy’s and St Thomas’ NHS Foundation Trust ; 2012. Available online at <http://www.guysandstthomas.nhs.uk/resources/publications/formulary/paediatric-formulary-9th-edition.pdf> [accessed 25.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 25.08.15]  Trissel, L.A. Handbook of Injectable drugs. Available at <http://www.medicinescomplete.com/mc/hid/current/> [Accessed 25.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **ISOPRENALINE** |
| **Indications for use:** | |  | | --- | | Bradyarrhythmia or heart block | |
| **Preparation:** | Isoprenaline hydrochloride **1mg/5ml** ampoule  **Care as other strengths exist** |
| **Dose:** | * 1. nanograms/kg/min (0.05-0.5 microgram/kg/min) by continuous IV infusion   Titrate infusion rate according to clinical response and/or side effects. May increase dose every 2-3 minutes until appropriate response obtained.  Take**…………ml** Isoprenaline **200micrograms/ml** (wt in Kgs x 3)  and make up to 50 ml with 10% glucose (also compatible with glucose 5% and sodium chloride 0.9%)  Run at 0.25-2.5 ml/hour (i.e 50-500 nanograms/kg/min of isoprenaline  Signed…………………………Date……………… |
| **Route:** | Central line |
| **Compatibility:** | Adrenaline, Dobutamine, Dopamine, Morphine, Midazolam, Noradrenaline |
| **Incompatibility:** | Furosemide |
| **Storage:** | Protect unopened ampoules from light. |
| **Other:**  **Monitoring:** | **Possible Adverse Effects**   1. Hypotension 2. Arrhythmias 3. Decreased perfusion to kidney, heart, brain. 4. Tremors, irritability. 5. Gastrointestinal disturbances (nausea, vomiting and diarrhoea). 6. Myocardial necrosis.   **Special Considerations**   1. Titrate infusion rate according to clinical response and/or side effects. May increase dose every 2-3 minutes until appropriate response obtained. 2. Hypovolaemia, metabolic acidosis should be corrected before infusion commences. 3. Simultaneous administration with adrenaline may lead to serious arrhythmias.   Continuous heart rate, ECG and blood pressure  Monitor for hypoglycaemia – stimulates insulin secretion |
| **Reference:** | <http://www.adhb.govt.nz/newborn/DrugProtocols/IsoprenalinePharmacology.htm>  NHS Injectable Medicines Guide, Medusa. Accessed at [http://medusaimg.nhs.uk/](http://medusa.wales.nhs.uk/) [Accessed 11.04.17]  Guy’s and St Thomas’, Kings College and University Lewisham Hospitals Paediatric Formulary (9th Edn) London: Guy’s and St Thomas’ NHS Foundation Trust ; 2012. Available online at <http://www.guysandstthomas.nhs.uk/resources/publications/formulary/paediatric-formulary-9th-edition.pdf> [accessed 24.07.15]  Neonatal Formulary: Drug Use in Pregnancy and the First Year of Life (6th Edn) London: Wiley-Blackwell;2011  West of Scotland monograph available at: [WoS Neonatal IV Drug Monographs (perinatalnetwork.scot)](https://perinatalnetwork.scot/wp-content/uploads/2022/11/Isoprenaline-WoS_PI.pdf) Accessed 21.02.24 |

Written by: Louise Whitticase (Lead Pharmacist-Women’s Services)

Checked by: Gemma Holder

|  |  |
| --- | --- |
|  | **JOULIES PHOSPHATE** |
| **Indications for use:** | * See Metabolic Bone Disease Appendix 11 |
| **Preparation:** | approx 1mmol per ml (Unlicensed Product) |
| **Administration:** |  |
| **Dosage:** | See Appendix 11 |
| **Routes:** | Oral/NG |
| **Compatibility:**  **Other:** | Prescribe at different times to Calcium supplements Do not give with feeds |
| **Reference:** |  |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |  |
| --- | --- | --- |
|  | | **LaBiNIC® (PROBIOTICS)** |
| **Indications for use:** | | * All babies born < 32 weeks gestation should be commenced on LaBiNIC® when receiving 20mls/kg/day enteral feeds, unless they have a stoma. * In babies with stomas, LaBiNIC® should be commenced when receiving 50mls/kg/day enteral feeds * LaBiNIC® should be discontinued if enteral feeds are stopped for any reason and restarted when the baby is receiving 20mls/kg/day enteral feeds (unless they have a stoma) * LaBiNIC® should be stopped when the baby reaches 34 weeks corrected gestational age |
| **Preparation:** | | LaBiNIC® drops  Liquid formulation containing lactobacillus acidophilus, bifidobacterium infantis and bifidobacterium bifidum 1.5 million colony forming units (cfu) per 0.16ml  Although this is classed as a foodstuff and not a licensed medication, it should be prescribed on the drug chart and be checked by 2 trained nursing staff prior to administration |
| **Dosage:**  **Administration:** | | 0.16ml once daily immediately followed by milk feed  Always shake the bottle prior to use  Prescribe at 18.00  LaBiNIC is considered a food supplement and not a drug, and therefore does not undergo the same QC/QA processes as drugs.  Details of administration MUST be recorded in the LaBiNIC® folder on the drug trolley to detail the batch given at each dose |
| **Routes:** | | Oral/NG |
| **Compatibility:**  **Other:** | | Do not mix with other medicines  As LaBiNIC is an oily suspension a milk feed should be given straight after to ‘flush’ the dose through the NGT and prevent blockage  Only give to babies tolerating milk |
| **Reference:** | Probiotics for prevention of NEC in preterm infants. Al Faleh K, Anabrees J Cochrane Database of Systematic Reviews 10/4/2014  Newcastle Hospitals NHS Foundation Trust. LaBiNIC Probiotic Information Pack. October 2016 | |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **LACTULOSE** |
| **Indications for use:** | Constipation (may take up to 48 hours to act) | |
| **Preparation:** | 3.1 – 3.7 g in 5 ml solution – supplied as 300 ml pack | |
| **Administration:** |  | |
| **Dosage:** | 0.5ml/kg (max 2.5ml) 12 – 24 hourly for up to 5 days, then increase to 1ml/kg 12 hourly (max 2.5ml) if required | |
| **Routes:** | Oral / NG | |
| **Other:** | No dose for lactulose for neonates in either BNF for Children or the Northern Neonatal Formulary for infants less than 1 month  These doses have been used effectively and with no side effects | |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **LEVETIRACETAM** |
| **Indications for use:** | See seizure treatment algorithm  Alternative 3rd line anticonvulsant used after discussion with Neurology team at BCH  Consultant decision only |
| **Preparation:**  **License status:** | Injection: Levetiracetam 100mg/ml (5ml vials)  Oral solution: 100mg/ml  For IV infusion: dilute concentrate to 10mg/ml prior to infusion  Take 1mL (100mg) of 100mg/mL levetiracetam concentrated injection and add to 9mL of glucose 5% or sodium chloride 0.9%, mix well. This creates a solution containing 100mg in 10mL (10mg/mL).    IV route unlicensed in children under 4 years old |
| **Administration:** |  |
| **Dosage:** | Loading dose 30mg/kg  Maintenance dose 15mg/kg bd  Loading dose should be infused over 30mins  If given iv:  Maintenance dose should be infused over 15mins |
| **Routes :** | IV/ LL/UVC or oral |
| **Compatability:** | Glucose 5%  Sodium Chloride 0.9% |
| **Incompatibility:** |  |
| **Other:** | Reduce dose in renal failure  Bioavailability is almost 100% after oral administration, there is no need to alter the dose or the dosing frequency when switching between parenteral and enteral routes  Should not be discontinued suddenly. A gradual dose reduction is advisable. As a guide a reduction of 10mg/kg/day every 4-6 weeks may be advisable. |
| **References** | BNF for Children London: BMJ Group and Pharmaceutical Press; 2021 - 2022 Available <https://bnfc.nice.org.uk>  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> 13/9/2022  Dose recommendation via email correspondence Dr Raj Gupta, Consultant Neurologist BCH 30/06/2022  Hnaini M. et al, High Dose Levetiracetam for Neonatal Seizures: A retrospective review. Seizures 2020. Available at: [https://www.sciencedirect.com/science/article/pii/S1059131120302703](https://gbr01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.sciencedirect.com%2Fscience%2Farticle%2Fpii%2FS1059131120302703&data=05%7C02%7Clouise.whitticase%40nhs.net%7C8879a828045343d6bb6e08dc3f5f18d9%7C37c354b285b047f5b22207b48d774ee3%7C0%7C0%7C638454924862205519%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=ab1ZUrbGjE3AZ5C8Osy%2FS%2B52DlchkOUQ5%2B0ONML6r9I%3D&reserved=0) |

|  |  |
| --- | --- |
|  | **LIDOCAINE HYDROCHLORIDE** |
| **Indications for use:** | See seizure treatment algorithm  4th line anticonvulsant for babies receiving therapeutic hypothermia unresponsive to other drug treatment. **Consultant decision only** |
| **Preparation:** | Injection 2%: lidocaine hydrochloride 20mg/ml  Take **100mg/kg** (5mls/kg) of 2% Lidocaine hydrochloride 20mg/ml and make up to 50mls with Glucose 5%. **1ml of solution is equal to 2mg/kg** of Lidocaine hydrochloride. |
| **License status:** | Not licensed for use in children under 1 year |
| **Administration:**  **Dosage:** | **Weight 2 – 2.5kg:**  Initially run at **6ml/hr for 10 minutes** (1ml or 2mg/kg received over 10 mins)  Change rate to **3 ml/hr for 3.5 hours** (6mg/kg/hr)  Reduce rate to **1.5 ml/hr for 12 hours** (3 mg/kg/hr)  Reduce rate to **0.75 ml/hr for 12 hours** (1.5 mg/kg/hr)  Then STOP  **Weight ≥ 2.5 – 4.5kg:**  Initially run at **6 ml/hr for 10 minutes** (1ml or 2mg/kg received over 10 mins)  Change rate to **3.5 ml/hr for 3.5 hours** (7mg/kg/hr)  Reduce rate to **1.75 ml/hr for 12 hours** (3.5mg/kg/hr)  Reduce rate to **0.88 ml/hr for 12 hours** (1.75mg/kg/hr)  Then STOP  Monitor for hypotension and bradycardia/ arrhythmias and **discontinue infusion if either develops** |
| **Routes :** | IV/ LL/UVC |
| **Compatability:**  **Incompatibility:** | Glucose 5%  Sodium Chloride 0.9%  Sodium chloride 0.45%  Dopamine, dobutamine, morphine  Amphotericin, fentanyl, phenytoin, sodium bicarbonate |
| **Other:** | USE WITH CAUTION IN THOSE BABIES WHO HAVE RECEIVED PHENYTOIN DUE TO RISK OF CARDIOTOXICITY- MUST BE DISCUSSED WITH CONSULTANT  Must have continuous ECG monitoring  Increased risk of lidocaine toxicity if administered with propranolol.  Neuromuscular blockade enhanced and prolonged when lidocaine given with suxamethonium  Action of lidocaine antagonised by hypokalaemia caused by furosemide or chlorothiazide  Use with caution in hepatic and renal impairment  Contraindicated in sino-atrial disorders, AV block and severe myocardial depression  Levels may be considered if toxicity suspected |
| **References** | Van den Broek MPH, Rademaker CMA, van Straaten HLM et al. Anticonvulsant treatment of asphyxiated newborns under hypothermia with lidocaine: efficacy, safety and dosing. *Arch Dis Child Fetal neonatal Ed 2013;98:F341 – F345*  BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 25.08.15]  Trissel, L.A. Handbook of Injectable drugs. Available at <http://www.medicinescomplete.com/mc/hid/current/> [Accessed 25.08.15] |

Written by: Gemma Holder (Neonatal Cons) Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **MAGNESIUM SULFATE** |
| **Indications for use:** | Hypomagnesaemia  For babies at risk of seizures (including those receiving therapeutic hypothermia, maintain magnesium levels within normal limits (>1mmol/L)  Reducing pulmonary hypertension – please see Congenital Diaphragmatic Hernia management guideline |
| **Preparation:** | USUALLY PROVIDED AS MAGNESIUM SULFATE 10%; PLEASE CHECK PREPARATION  Magnesium Sulfate 10% (approximately 0.4mmol/ml of Magnesium; 100mg/ml of Magnesium Sulfate)  Magnesium Sulfate 50% (approximately 2mmol/ml of Magnesium; 500mg/ml of Magnesium Sulfate)  For bolus:  Use ready prepared 10% if available or dilute 50% preparation to 10% (100mg/ml Magnesium Sulfate)  For continuous infusion:   |  | | --- | | Make as per sticker: | |  | | Take 500mg/kg i.e.…………………..mg of Magnesium Sulfate and make up to 20mls with …………………… | | Run at 0.8 – 3mls/hr (20 – 75mg/kg/hr) | |  | | Signed……………………………… Date……………….. | |  |   Up to 20% solution may be given in fluid restriction.  Rate of administration should not exceed 10mg/kg/min of Magnesium Sulfate. |
| **Administration:** | By iv injection/infusion. See below. |
| **Dosage:** | **Hypomagnesaemia/ Magnesium <1mmol/L in those at risk of seizures** :  0.4mmol/kg Magnesium (100mg/kg Magnesium Sulfate) 6-12 hourly over at least 10 minutes  May be repeated as tolerated if effective, to keep magnesium at upper limit of normal range  Recheck serum magnesium level at least daily  **\*\*Pulmonary Hypertension** (see Diaphragmatic Hernia Guidelines)  Initially 200mg/kg over 20-30 minutes; if response occurs then by continuous intravenous infusion of 20-75mg/kg/hour given for up to 5 days to maintain plasma-magnesium concentration between 3.5-5.5mmol/litre.  May cause hypotension. Should only be used with active management of systemic blood pressure |
| **Routes:** | IV (IM rarely indicated in neonates) |
| **Compatibility:** | Glucose 5%, Glucose 10%, Sodium Chloride 0.45%  Sodium Chloride 0.9%, Glucose 4% + Sodium Chloride 0.18%, Glucose 10% + Sodium Chloride 0.18% |
| **Incompatibility:** | Due to potential physical incompatibilities, Magnesium Sulfate should not be mixed with Sodium Bicarbonate or TPN in the same syringe or line.  Incompatible with amphotericin, calcium salts, dobutamine, hydrocortisone and phosphates preparations |
| **Caution:** | Renal failure-avoid or reduce dose; increased risk of toxicity-Refer to BNF-C and consult product literature  Monitor blood pressure, renal function, electrolytes and blood glucose |
| **References:** | \*\* BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  \*Neonatal Formulary: Drug Use in Pregnancy and the First Year of Life (6th Edn) London: Wiley-Blackwell;2011  Guy’s and St Thomas’, Kings College and University Lewisham Hospitals Paediatric Formulary (9th Edn) London: Guy’s and St Thomas’ NHS Foundation Trust ; 2012. Available online at <http://www.guysandstthomas.nhs.uk/resources/publications/formulary/paediatric-formulary-9th-edition.pdf> [accessed 25.08.15]  Trissel, L.A. Handbook of Injectable drugs. Available at <http://www.medicinescomplete.com/mc/hid/current/> [Accessed 25.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 25.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **MEROPENEM** |
| **Indications for use:** | Broad spectrum antibiotic with activity against aerobic & anaerobic gram positive and gram negative organisms.  Must be approved by a consultant before use  **Criteria for meropenem use on NICU**   * **Use meropenem;**   + For very unwell babies with late-onset sepsis   + For babies known to have colonisation with gentamicin resistant Gram negative bacilli organism and showing signs of sepsis * **Do not use meropenem**   + For babies with low index of suspicion of late-onset sepsis or babies colonised with serratia, enterobacter or other gram negatives and is sensitive to gentamicin, use flucloxacillin+gentamicin. Change to meropenem only if lack of clinical response or baby very unwell. * Review of all meropenem prescriptions:   + Should take place on a daily basis   + If blood culture is negative at 48 hrs, review and if antibiotic is still indicated, change to flucloxacillin+gentamicin for the rest of the course |
| **Preparation:**  **License status:** | 500 mg vial  Hickma brand:  Reconstitute 500mg vial with 9.5ml of water for injection to give solution containing **50mg/ml**  **Take 2ml of 50mg/ml solution and dilute to 5ml with 0.9% sodium chloride or glucose 5% to give 20mg/ml solution**  Take required dose and infuse over 15- 30 mins  Not licensed for use in children under 3 months |
| **Dosage:** | Less than 7 days old:  20 mg/kg every 12 hours  Over 7 days old :  20 mg/kg every 8 hours  (In severe infections / meningitis see BNFc)  **Indication for use must always be documented**  **Prescribe in dedicated antibiotic section on new prescription chart**  **Review culture results after 36 hours (where possible) and at most 48 hrs and ensure regular review is undertaken and the outcome documented as stipulated on prescription chart.** |
| **Routes:** | Intravenous infusion |
| **Caution:** | In liver or renal impairment refer to BNFc for specific advice/ discuss with pharmacist |
| **Other:** | Give first dose as soon as possible  For subsequent doses, prescribe 12hrly doses at 02.00/14.00, 06.00/18.00 or 12.00/23.59  Prescribe 8 hrly doses 02.00/10:00/18.00  Discard after use |
| **Incompatibility:** | Aciclovir, amphotericin, calcium gluconate, sodium bicarbonate, zidovudine |
| **Reference:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  Trissel, L.A. Handbook of Injectable drugs. Available at <http://www.medicinescomplete.com/mc/hid/current/> [Accessed 25.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 25.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **METHYLPREDNISOLONE (as sodium succinate)** |
| **Indications for use:** | For use following advice from Respiratory Team in babies with significant chronic lung disease |
| **Preparation:**  **Dosage:** | DO NOT CONFUSE WITH METHYLPREDNISOLONE ACETATE (DEPO-MEDRONE) WHICH MUST NOT BE GIVEN INTRAVENOUSLY  Methylprednisolone (as sodium succinate) powder for reconstitution  Available as 40mg vials  **Solu-Medrone methylprednisolone:** Reconstitute 40mg vial with 1ml water for injections provided. The final concentration is 40mg in 1mL  Take 1mL (40mg) of reconstituted solution and add to 3mL of glucose 5% or sodium chloride 0.9%, mix well. This creates a solution containing 40mg in 4mL (10mg/mL). Draw up dose and administer over 30 minutes. |
| 10mg/kg once daily for 3 days |
| **Routes :** | IV/CVL  Over 30 mins |
| **Compatibility:** | Glucose 5%, glucose 10%, sodium chloride 0.9%, sodium chloride 0.45% |
| **Incompatibility:** | calcium gluconate, ciprofloxacin, doxapram, rocuronium bromide, vecuronium bromide |
| **Other:** | **Monitoring:** Measure blood pressure before, during and after infusion and then daily. If an arterial line is in situ, blood pressure should be monitored continuously, otherwise non- invasive blood pressure should be used.  Blood sugar should be monitored with each gas and urine checked for glucose if blood glucose >11mmol/L.  Treat hyperglycaemia if glycosuria with glucose >11mmol/ |
| **References** | **BNF for Children London: BMJ Group and Pharmaceutical Press; 2021 - 2022 Available** [**https://bnfc.nice.org.uk**](https://bnfc.nice.org.uk)  **NHS Injectable Medicines Guide, Medusa. Accessed 6.2.23 at** [**http://medusaimg.nhs.uk/**](http://medusaimg.nhs.uk/) |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services

|  |  |
| --- | --- |
|  | **METRONIDAZOLE** |
| **Indications for use:** | Infection –refer to Antibiotic Guidelines  Antibiotic with good activity against anaerobic bacteria and protozoa |
| **Preparation:** | 5mg in 1 ml (supplied as 100ml Ecoflac bottle) |
| **Administration:** |  |
| **Dosage and**  **Frequency:** | <26 weeks CGA: 15mg/kg as a single loading dose followed after 24 hours by 7.5mg/kg daily  26-34 weeks CGA: 15mg/kg as a single loading dose followed after 12 hours by 7.5mg/kg every 12 hours  >34 weeks CGA AND < 56 days of age: 15mg/kg as a single loading dose followed after 8 hours by 7.5mg/kg every 8 hours  > 34 weeks CGA AND >56 days old: 7.5mg/kg every 8 hours  Infuse over 20 - 30 mins  **Indication for use must always be documented**  **Prescribe in dedicated antibiotic section on new prescription chart**  **Review culture results after 36 hours (where possible) and at most 48 hrs and ensure regular review is undertaken and the outcome documented as stipulated on prescription chart.** |
| **Routes:** | IV infusion |
| **Other:** | Prescribe first dose to be administered as soon as possible  Subsequent doses should be prescribed 12 hrly at 02.00/14.00, 06.00/18.00 or 12.00/23.59 or 8 hrly at 02.00/10.00/18.00  Discard after use  Use cautiously if liver function impaired, may require an increase in dose interval. Refer to BNF-C and product literature |
| **Incompatibility:** | Amphotericin |
| **Reference:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  Trissel, L.A. Handbook of Injectable drugs. Available at <http://www.medicinescomplete.com/mc/hid/current/> [Accessed 25.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusa.wales.nhs.uk/> [Accessed 25.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **MICONAZOLE (DAKTARIN®)** |
| **Indications for use:** | Treatment of oral and perineal candidiasis (nystatin to be used if miconazole oral gel unavailable) |
| **Preparation:** | Oral Gel: 24 mg/ml  Cream: 2% preparation miconazole nitrate |
| **License status:** | Oral gel-Not licensed for use in children under 4 months of age or during first 6 months of life of an infant born pre-term  Cream- licensed for use in children |
| **Administration:** |  |
| **Dosage:** | Oral: 1 mls smear around the inside of the mouth 2-4 times daily after feeds; continue for at least 1 week after lesions have healed or symptoms have cleared.  Perineal: Apply twice daily to buttocks; continue for at least 10 days after lesions have healed  Usually both are prescribed together |
| **Routes:** | Oral / Topical |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **MIDAZOLAM**  **\*CONTROLLED DRUG\*** |
| **Indications for use:** | Seizure control – as alternative to intravenous Clonazepam which is no longer available. Please see guideline for Therapeutic Hypothermia as Neuroprotective Intervention for Neonatal Hypoxic Ischaemic Encephalopathy |
| **Preparation:** | 1mg/ml solution for injection 5ml ampoules (as Midazolam hydrochloride)  1mg/ml solution for infusion 50ml vial  **For bolus**: Take required amount and administer as a slow bolus over 5 mins  **For Intravenous Infusion:**  Withdraw 50ml of the midazolam 50mg in 50ml into syringe, giving a 1mg in 1ml (1000microgram/ml) solution. A rate of (0.06ml/kg/hr provides a dose of 60 micrograms/kg/hr |
| **Administration:** | By bolus over 5 mins followed by intravenous infusion |
| **Dosage:** | Bolus dose: 150 – 200 micrograms/kg  Infusion should be started at 60microgram/kg/hour [ rate ml/hr = 0.06 x weight of baby (kg) ]  and increased in steps of 60 micrograms/kg/hr only after consultant review to a maximum of  300 microgram/kg/hr [ rate ml/hr = 0.3 x weight of baby (kg) ]  It should be stopped if no response after 24hours. |
| **Frequency:** | Bolus dose followed by intravenous infusion |
| **Routes:**  **Compatability:** | IV / UVC  Preferably administer via a central venous access device to avoid potential venous irritation as the preparation has a low pH.  Infusion can be given via a peripheral vein but use the largest bore vein available. The insertion site should be monitored closely for phlebitis  Do not mix with any other medicines or infusion fluids  If difficult venous access please check compatibilities with pharmacist  Adrenaline, dopamine, insulin soluble, milrinone, morphine sulfate, vancomycin, |
| **Other:** | Review continuous infusion after 24 hour period. Benzodiazepines can suppress aEEG but does not affect recovery.  Flumazenil should always be available  Midazolam is a Schedule 3 Controlled Drug  Order via the ward CD requisition book  Store in the Controlled Drugs Cupboard and record administration and destruction in the CD record book |
| **Reference:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 10/03/2016]]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 25/10/2017] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **MILRINONE** |
| **Indications for use:** | Congestive Heart Failure  Low cardiac output following cardiac surgery (eg post PDA repair)  Babies with Diaphragmatic Hernia (see guideline)- do not give a loading dose  DO NOT GIVE IF SEVERELY HYPOVOLAEMIC |
| **Preparation:**  **License status:** | Milrinone 1mg/ml  10mg in 10ml ampoule  Take 10ml of 1mg/ml solution and make up to 50 ml with glucose 5% or sodium chloride 0.9% to give a solution of 200 microgram/ml  Not licensed for use in children under 18 years |
| **Administration:**  **Dosage:** | **Loading dose**  50micrograms/kg (0.25ml/kg of 200 microgram/ml solution) over 30 mins  Reduce or omit this dose if at risk of hypotension  Do not give a loading dose in babies with Congenital Diaphragmatic Hernia  **Maintenance Infusion**  0.5-0.75micrograms/kg/min (0.15 – 0.23 ml/kg/hr of 200 microgram/ml solution) for 2 – 3 days (usually for 12 hours after cardiac surgery)    Monitor blood pressure, heart rate, ECG, central venous pressure (if possible), fluid and electrolyte status, renal function, platelet count and hepatic enzymes |
|  |
| **Routes:** | IV/ UVC / CVL |
| **Compatibility:** | Sodium Chloride 0.9%  Glucose 5% |
| **Incompatibility:** |  |
| **Other:** | Reduce dose to 50 – 75% if impaired renal function (eGFR <50ml/min/1.73m2) |
| **References:** | Paediatric Formulary Committee. BNF for Children (online) London: BMJ Group, Pharmaceutical Press, and RCPCH Publications <http://www.medicinescomplete.com> [Accessed on [18.05.2017] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |  |
| --- | --- | --- |
|  | **MORPHINE SULFATE (INTRAVENOUS)**  **\*CONTROLLED DRUG\*** | |
| **Indications for use:** | Pain relief and sedation of ventilated babies  Pain relief and sedation in those babies receiving therapeutic hypothermia  Treatment of opiate withdrawal (See ‘Oramorph’) | |
| **Preparation:** | Injection: 10 mg in 1 ml  Prepare as per prescription label: | |
|  | **MORPHINE LOADING DOSE**  Unit Number………………………………………………….  Name………………………………………………………….  Step 1: **Prepare Stock Solution of morphine 1 milligram**  **(1000micrograms) per millilitre**  Add 0.5mls of morphine sulfate 10mg/ml (i.e. 5mg) to 4.5mls of 0.9% sodium chloride to make a solution of 1 milligram per millilitre  Step 2: The dose in millilitres is (0.05 x weight in kilograms)….. millilitres of Stock Solution. This is a dose of (50 x weight in kilograms) micrograms (i.e. 50 micrograms per kilogram). Make up to 2 millilitres with 0.9% sodium chloride. Infuse over 20 mins  Signed………………………Date……………… | |
|  | Prepare as per prescription label (NOTE: Single, double and quadruple strength labels are available. Please select correct label) | |
|  | **MORPHINE MAINTENANCE DOSE**  Unit Number………………………………………………….  Name………………………………………………………….  Step 1: **Prepare Stock Solution of morphine 1 milligram**  **(1000micrograms) per millilitre**  Add 0.5mls of morphine sulfate 10mg/ml (i.e. 5mg) to 4.5mls of 0.9% sodium chloride to make a solution of 1 milligram per millilitre  Step 2: To make the infusion solution take (1 x weight in kilograms) ….. millilitres of Stock Solution. This is (1000 x weight in kilograms)……….. micrograms of morphine, and make up to 50mls with ……………………………….  This solution gives 20 micrograms per kilogram per ml. Run at 0.25 – 1 ml per hour (i.e. 5– 20 micrograms per kilogram per hour.  Signed…………………………Date……………… | |
| **Administration:** | |  |
| **Dosage:** | | IV loading dose: 50 microgram/kg over 20 mins  Maintenance : 5 - 20 microgram/kg/hr  **For babies receiving therapeutic hypothermia:**  Discontinue after 24 – 48 hours to lessen risk of accumulation and toxicity |
| **Routes:** | | IV / UVC |
| **Compatibility:** | | Sodium Chloride 0.9%  Sodium chloride 0.45%  Glucose 10%  Glucose 5%  May be infused with dopamine, dobutamine, adrenaline, noradrenaline |
| **Incompatibility:** | | Aciclovir, amphotericin, furosemide, phenytoin, heparin, sodium bicarbonate |
| **Other:** | | **NALOXONE IS A SPECIFIC MORPHINE ANTAGONIST**  Order via the ward CD requisition book  Store in the Controlled Drugs Cupboard and record administration and destruction in the CD record book |
| **Reference:** | | Neonatal Formulary: Drug Use in Pregnancy and the First Year of Life (7th Edn) London: Wiley-Blackwell;2014  **\*** Local Guideline: Therapeutic Hypothermia as a Neuroprotective Intervention for Neonatal Hypoxic Ischaemic Encephalopathy – Procedural Document. 2010. Dr Archana Mischra, Dr Melanie Sutcliffe  Trissel, L.A. Handbook of Injectable drugs. Available at <http://www.medicinescomplete.com/mc/hid/current/> [Accessed 25.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [25.08.15]  BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **MORPHINE SULFATE ORAL SOLUTION (previously known as ‘Oramorph’)**  **\*CONTROLLED DRUG\*** |
| **Indications for use:** | Management of opioid withdrawal in babies |
| **Preparation:** | 100 micrograms/ml (unlicensed) Newcastle RVI 60ml bottle- DO NOT FURTHER DILUTE  \*If unavailable use 10mg/5ml  Prepare as per prescription label below |

|  |  |  |
| --- | --- | --- |
| **DRUG APPROVED NAME**  MORPHINE SULFATE ORAL SOLUTION | **DOSE** | **FREQUENCY** |
| Take 0.1ml of stock soln  (10mg/5ml) dilute to 2ml  with water to give 0.1mg/ml  (=100 micrograms/ml)  Give required dose | ROUTE |  |
| **Prescriber Signature** | **Date Commenced** | **Date Cancelled** |

|  |  |
| --- | --- |
| **License status:** | Not licensed for use in children under 1 year |
| **Administration:** |  |
| **Dosage:** | Starting dose 0.04mg/kg 4 hrly (40microgram/kg)  1st reduction 0.03mg/kg 4 hrly (30microgram/kg)  2nd reduction 0.02mg/kg 4 hrly (20microgram/kg)  3rd reduction 0.01mg/kg 4 hrly (10microgram/kg)  Dose reduced 24 hrly if the baby is feeding well and settles between feeds. |
|  |  |
| **Routes:** | Oral/NG |
| **Other:** | **NALOXONE IS A SPECIFIC MORPHINE ANTAGONIST**  Order via the ward CD requisition book  Store in the Controlled Drugs Cupboard and record administration in the CD record book |
| **Reference:** | Local Guideline: Michele Emery and Dr Imogen Morgan; Opiate Dependant  Mothers – Care of Baby 2008 |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **NALOXONE HYDROCHLORIDE** |
| **Indications for use:** | Reversal of respiratory depression caused by opiates administered to the mother during labour |
| **Preparation:** | 400 micrograms in 1 ml – supplied as 1ml ampoule |
| **Administration:** |  |
| **Dosage:** | IM: 200 micrograms (60 micrograms/kg) as single dose at birth |
| **Routes:** | IM |
| **Other:** | Refer to BNF-C for IV dose  DO NOT GIVE TO BABIES OF MOTHERS DEPENDANT ON OPIATES AS MAY PRECIPITATE FITS/ WITHDRAWAL |
| **Reference:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **NITRIC OXIDE** |
| **Indications for use:** | To improve pulmonary blood flow in babies with persistent pulmonary hypertension.  Usually used with high frequency oscillatory ventilation  **PLEASE SEE GUIDELINES ON INTRANET FOR FULL DETAILS OF USE** |
| **Preparation:** |  |
| **Administration:** |  |
| **Dosage:** | **PLEASE SEE GUIDELINES ON INTRANET** |
| **Routes:** | Inhaled  Inline suctioning must be used |
| **Other:** | Must be prescribed on Prescription Chart and recorded on Daily Observation Chart |

Written by: Gemma Holder (Neonatal Consultant)

|  |  |
| --- | --- |
|  | **NORADRENALINE (NOREPINEPHRINE)** |
| **Indications for use:** | Hypotension |
| **Preparation:** | Noradrenaline **base** **1mg/ml** (as noradrenaline tartrate 2mg/ml)  Prescribe in terms of base to prevent ambiguity  Prepare as per prescription label |
|  | **Noradrenaline**  Take…………micrograms Noradrenaline base (wt in Kgs x600 micrograms (base)) and make up to 50 mls with ………………………... i.e. 0.1 ml/hr provides 0.02micrograms (base)/kg/min  Run at ……… ml/hour (i.e.……………… micrograms(base)/kg/min)  Route……………………..  Signed…………………………Date……………… |
|  | **Dose should always be expressed as base** |
| **License status:** | Not licensed for use in children |
| **Dosage:** | 0.02 – 0.1 microgram (base)/kg/min adjusted according to response.  Max dose 1 microgram (base)/kg/min |
| **Routes:** | Must be infused centrally, tissue extravasation can be dangerous  UVC / CVL |
| **Compatibility:** | Glucose 10% \*  Glucose 5%  Glucose 4% + Sodium chloride 0.18%  0.9% Sodium chloride |
| **Incompatibility:**  **Other:** | Sodium Bicarbonate and alkaline solutions, insulin, ranitidine, furosemide and omeprazole  Monitor limb perfusion, urine output and central vascular pressures (where possible) at high doses |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  Trissel, L.A. Handbook of Injectable drugs. Available at <http://www.medicinescomplete.com/mc/hid/current/> [Accessed 25.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 25.08.15]  \*local practice |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services

|  |  |
| --- | --- |
|  | **NYSTATIN** |
| **Indications for use:** | For prophylaxis of fungal infections in babies commenced on antibiotics for suspected late onset infection if:   * born <30 weeks gestation or <1500g,   AND   * No evidence of or suspicion of current candida colonisation   OR   * Ever had any abdominal surgery regardless of birth gestation or corrected gestational age   AND   * No evidence of or suspicion of current candida colonisation   Use IV fluconazole instead if baby is known or suspected to be colonised with candida  Use miconazole for treatment of oral or napkin candidiasis (nystatin only to be used if miconazole oral gel unavailable) – note dose difference for treatment and prophylaxis |
| **Preparation:** | Nystatin oral suspension 100 000 units per ml |
| **License status:** | Not licensed for use in neonates for the treatment of candidiasis |
| **Dosage:** | **Prophylaxis**  1ml (100 000 units) three times daily  To be continued for duration of antibiotic treatment  **Treatment of oral candidiasis**  1ml (100 000 units) four times a day after feeds; usually for 7 days, and continued for at least 48 hours after lesions have healed or symptoms have cleared. |
| **Routes:** | To be smeared over buccal mucosa  If baby too small to tolerate full buccal dose, smear small amount round mouth and administer the rest via NG tube  Must be given even if NBM |
| **Compatibility:** |  |
| **Incompatibility:**  **Other:** | (Some) MUST be administered into the mouth as not systemically absorbed  Give after feeds if on oral feeds. |
| **References:** | Neonatal Formulary: Drug Use in Pregnancy and the First Year of Life (7th Edn) London  NICE Guidelines NG195 20th April 2021  BNF for Children London: BMJ Group and Pharmaceutical Press; 2023 - 2024 Available <https://bnfc.nice.org.uk>  [Accessed 06.02.24]  Discussion with Dr M Patel, Consultant Microbiologist BWH |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **OMEPRAZOLE** |
| **Indications for use:** | Gastro-oesophageal reflux disease |
| **Preparation:** | Omeprazole 10mg/5ml oral suspension  Intravenous infusion: Powder for reconstitution (as sodium salt) 40mg vial  Take 5ml of 5% glucose or 0.9% sodium chloride from 100ml bag. Add to vial of omeprazole powder and mix well until completely clear. Withdraw the contents of the vial and return to the 100ml bag of 5% glucose or 0.9% sodium chloride. This solution gives 0.4mg in 1ml.  Take required amount and infuse over 20 – 30 mins |
| **License status:** | Not licensed for use in children < 1 month of age |
| **Administration:** | **Note:** The iv infusion is from 1 month of age. |
| **Dosage:** | IV: 0.5mg/kg once daily, increase to 2mg/kg once daily if necessary  By mouth: 0.7mg/kg once daily, increased if necessary after 7- 14 days to 1.4mg/kg; some neonates may require up to 2.8mg/kg once daily |
| **Routes:** | NG/Oral/ IV |
| **Compatibility:** | 5% glucose  0.9% sodium chloride  Do not infuse with any other medicines |
| **Other:** | Progressive drug accumulation might occur if a baby less than 3 months old is given more than 1.4mg/kg daily  Hepatic impairment: max 0.7mg/kg/day  MHRA/ CHM advice: Proton pump inhibitors (PPIs): very low risk of subacute cutaneous lupus erythematous (September 2015) |
| **Reference:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 25.08.15]  Drug Use in Pregnancy and the First Year of Life (6th Edn) London: Wiley-Blackwell;2011 |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **PALIVIZUMAB (SYNAGIS®)** |
| **Indications for use:** | Prevention of RSV (Respiratory Syncytial Virus) infection in selected babies at high risk of RSV  Selection criteria:   * The groups recommended for immunisation with Palivizumab by the JCVI * The groups within “clinical judgement” encompassing those outlined in section 6.3: Updated 2011 Eligibility Criteria of the Commissioning Policy- The Use of Palivizumab to reduce the risk of Respiratory Syncytial Virus (RSV) in high risk infants, version 4 September 2012 |
| **Preparation:** | 100mg/ml solution for injection, available as 50mg and 100mg vials |
| **Administration:** | 15mg/kg monthly during RSV season (October – March) |
| **Dosage:** | Up to a maximum of 5 doses |
| **Routes:**  **Other:** | IM preferably in the anterolateral aspect of the thigh. Injection volumes over 1 ml (100mg) should be given as a divided dose between 2 or more sites.  Store in the fridge and protect from light  **Note for prescriber:** Before prescribing you must confirm that the patient is eligible for this vaccine- meets the set criteria and have discussed this with the appropriate consultant.  **A Blueteq approval** **form must also be completed and approval granted in order to proceed.** |
| **Reference:** | Department of Health Green Book. Respiratory Syncytial Virus, Chapter 27a. Available at: <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/148494/Green-Book-Chapter-27a-dh_130131.pdf> [accessed 25.08.15]  Southern West Midland Newborn Network/Staffordshire Shropshire, Black Country Newborn Network/Central Newborn Network; Commissioning Policy THE USE OF PALIVIZUMAB TO REDUCE THE RISK OF RESPIRATORY SYNCYTIAL VIRUS (RSV) IN HIGH RISK INFANTS Version 4 –September 2012 |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **PARACETAMOL** |
| **Indications for use:** | Pain relief (see cautions below)  Pyrexia  Prophylaxis of post immunisation pyrexia withMen B routine vaccinations |
| **Preparation:** | Oral: 120 mg in 5 ml suspension  Rectal: 15mg, 30mg and 60 mg suppositories  Intravenous: 10mg in 1ml ampoules (10ml ampoules). Give undiluted. Withdraw calculated dose from ampoule into a 5ml syringe and administer using a syringe pump.  **\*due to the risk of accidental overdose the 50ml and 100ml preparations must not be used for patients weighing <10kg (BBraun communication 16/5/17 agreed with MHRA)** |
| **License status:** | Not licensed for children under 2 months by mouth; not licensed for children under 3 months by rectum; intravenous infusion not licensed in preterm neonates and in infants with body-weight <10kg. Not licensed for use as prophylaxis of post-immunisation pyrexia following immunisation with meningococcal group B vaccine |
| **Administration:**  **Dosage:** | **Oral:**  28 - 32 weeks CGA: 20 mg/kg as single dose, then 10 – 15 mg/kg 8 – 12 hourly;  max 30mg/kg in 24 hours  More than 32 weeks CGA:20 mg/kg as single dose, then 10 – 15 mg/kg 6 – 8 hourly;  max 60 mg/kg in 24 hours |
|  | **Rectal:**  28 – 32 weeks CGA: 20mg/kg as single dose, then 10-15mg/kg every 12 hours as necessary;  max 30mg/kg in 24 hours  More than 32 weeks CGA: 30mg/kg as single dose, then 15-20mg/kg every 8 hours as necessary;  max 60mg/kg in 24 hours  Please note suppositories available in 15mg/30mg/ 60mg strength -ensure sensible doses are prescribed e.g 15mg/ 30mg (full suppository)  **Intravenous:**    <32 weeks gestation 7.5mg/kg 12 hourly infused over 15 mins (max 15mg/kg/day or 2 doses)   32 weeks to  1month CGA age 7.5mg/kg 8 hourly infused over 15 mins (max 22.5mg/kg/day or 3 doses)  >1month CGA to  10 kg 7.5mg/kg 6 hourly infused over 15mins (max 30mg/kg/day or 4 doses) |
| **Routes:** | Oral / NG / Rectal/ IV  **Oral/NG,rectal and IV should NEVER be prescribed interchangeably ie PO/IV** |
| **Caution:** | Use with caution in liver impairment  Due to limited pharmacokinetic and safety data in extreme preterms, the intravenous route should only be used in those babies who are NBM post surgery  New 2015\*\*JCVI have recommended that paracetamol should be given prophylactically when 4CMenB is given with the routine vaccines in infants under one year of age. Three doses of paracetamol should be given orally, with the first dose provided as soon as possible after vaccination, and two subsequent doses in accordance with their gestation.  MHRA alert: Intravenous Paracetamol (Perfalgan: Risk of accidental overdose) July 2010 |
| **Reference:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  Paediatric Formulary, Evelina London Children’s Hospital, Guys and St Thomas’s NHS Foundation Trust Accessed 15.05.23  Department of Health Green Book. Meningococcal, Chapter 22. Available at: <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/448875/2904185_Green_Book_Chapter_22_v3_0W_July2015.PDF> [accessed 19.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **PARACETAMOL (for PDA Closure)** |
| **Indications for use:** | Closure of haemodynamically significant patent ductus arteriosus in preterm newborn infants when ibuprofen is contraindicated e.g. In those babies receiving prophylactic hydrocortisone |
| **Preparation:** | Intravenous: 10mg in 1ml ampoules (10ml ampoules). Give undiluted. Withdraw calculated dose from ampoule into a 5ml syringe and administer using a syringe pump.  **\*due to the risk of accidental overdose the 50ml and 100ml preparations must not be used for patients weighing <10kg (BBraun communication 16/5/17 agreed with MHRA)** |
| **License status:** | Intravenous infusion not licensed in preterm neonates and in infants with body-weight <10kg. |
| **Administration:**  **Dosage:** |  |
|  | **Intravenous (all intravenous infusions should be infused over 15 mins)**  **Maintenance dose to commence SIX hours after loading dose**  **23+0 - 25+6 and < 7days old at the time of treatment**:  20mg/kg loading dose followed by 12.5mg/kg 6 hourly for total 5 days  **23+0 – 25+6 and > 7 days old at the time of treatment**:  20mg/kg loading dose followed by 15mg/kg 6 hourly for total 5 days  **≥26+0 gestational age *at birth***:  20mg/kg loading dose followed by 15mg/kg 6 hourly for total 5 days  **Check Paracetamol trough level immediately before 3rd dose**  **Desired Level 15 – 25mg/L**  **INITIAL dose adjustment if level outside of target range 15 – 25mg/L**  **23+0 - 25+6 and < 7days old at the time of treatment**:   |  |  | | --- | --- | | **Level (mg/L)** | **Action** | | **<15** | **Increase dose to 15mg/kg every 6 hours** | | **15 – 25** | **Continue same dose 12.5mg/kg every 6 hours** | | **26 - 34** | **Decrease dose to 10mg/kg every 6 hours** | | **35 - 40** | **Decrease dose to 10mg/kg every 8 hours** | | **>40** | **STOP** |   **If the maintenance dose has been increased to 15 mg/kg every 6 hours, check a paracetamol trough level, just before the third maintenance dose – desired level = 15-25 mg/L**   |  |  | | --- | --- | | **Level (mg/L)** | **Action** | | **<25** | **Continue same dose 15mg/kg every 6 hours** | | **26 - 40** | **Decrease dose to 12.5mg/kg every 6 hours** | | **>40** | **STOP** |   **Whenever there has been a change in dose, check a paracetamol trough level, just before the third new maintenance dose – desired level = 15-25 mg/L**  **23+0 – 25+6 and > 7 days old at the time of treatment**:   |  |  | | --- | --- | | **Level (mg/L)** | **Action** | | **<25** | **Continue same dose 15mg/kg every 6 hours** | | **26 - 34** | **Decrease dose to 12.5mg/kg every 6 hours** | | **35 - 40** | **Decrease dose to 10mg/kg every 6 hours** | | **>40** | **STOP** |   **Whenever there has been a change in dose, check a paracetamol trough level, just before the third new maintenance dose – desired level = 15-25 mg/L**  **>26+0 gestational age *at birth***   |  |  | | --- | --- | | **Level (mg/L)** | **Action** | | **<25** | **Continue same dose 15mg/kg every 6 hours** | | **26 - 34** | **Decrease dose to 12.5mg/kg every 6 hours** | | **35 - 40** | **Decrease dose to 10mg/kg every 6 hours** | | **>40** | **STOP** |   **Whenever there has been a change in dose, check a paracetamol trough level, just before the third new maintenance dose – desired level = 15-25 mg/L**  **FURTHER dose adjustments if level outside of target range 15 – 25mg/L**   |  |  | | --- | --- | | **Level (mg/L)** | **Action** | | **<25** | **Continue current dose** | | **26 - 34** | **Decrease dose by 20%** | | **35 - 40** | **Decrease dose by 30%** | | **>40** | **STOP** | |
| **Route:** | IV |
| **Caution:** | Use with caution in liver impairment  Due to limited pharmacokinetic and lack of long term safety data in extreme preterms paracetamol should not be used for routine first line treatment of patent ductus arteriosus.  Do not give with any other preparation containing paracetamol  Doses higher than the recommended entail the risk of very serious liver damage. Clinical signs and symptoms of liver damage are not usually seen until 2-6 days after administration.      MHRA alert: Intravenous Paracetamol (Perfalgan: Risk of accidental overdose) July 2010 |
| **Compatibility:**  **Incompatibility:** | Sodium Chloride 0.9%  Glucose 5%  All other IV fluids and infusions |
| **Other information:** | DO NOT GIVE ANY OTHER DRUG CONTAINING PARACETAMOL  Clinical signs and symptoms of liver failure not usually seen until 2 – 6 days after administration |
| **References:** | Ohlsson, A, Shah,P. Paracetamol (acetaminophen) for patent ductus arteriosus in preterm or low birth weight infants. Cochrane Database of Systematic Reviews 2015  Bardanzellu F, Neroni P, Dessi A et al. Paracetamol in Patent Ductus Arteriosus Treatment – Efficacious and Safe? Biomed research International. Vol 2017 Article ID 1438038  West of Scotland Neonatal Parenteral Drug Monograph- Paracetamol for PDA Treatment June 2018 |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services

|  |  |
| --- | --- |
|  | **PARALDEHYDE (RECTAL)** |
| **Indications for use:** | Status epilepticus |
| **Preparation:** | Paraldehyde 50% mixed with olive oil 50% for rectal administration (30ml) |
| **License status:** | Unlicensed product  Not licensed for use in children as an enema |
| **Administration:**  **Dosage:** | * Attach a rectal tube/straw or kwill or an oral syringe. * Draw required dose into a syringe immediately prior to administration. * Dip the rectal tube/straw/ kwill into some lubricating gel and administer immediately. * Do not delay administration as the paraldehyde will “melt” the plastic syringe.   0.8ml/kg of premixed solution |
|  |  |
| **Routes:** | RECTAL |
| **Caution:**  **Monitoring/Other:** | Contraindicated in gastric disorders, colitis  Bronchopulmonary disease  Do not use the solution if it has a brownish colour or smells of acetic acid/ vinegar.  Prescribe on the once only section of the drug chart |
| **Reference:** | Paediatric Formulary Committee. BNF for Children (online) London: BMJ Group, Pharmaceutical Press, and RCPCH Publications <http://www.medicinescomplete.com> [Accessed on 20.12.17] |

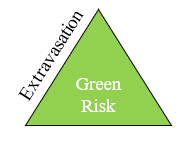
Written by: Louise Whitticase (Lead Pharmacist-Women’s Services)

Checked by: Gemma Holder (Neonatal Consultant)

**PARENTERAL NUTRITION (Unlicensed Products)**

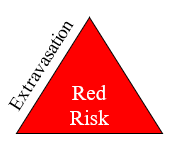
**Refer to Parenteral Nutrition Guidelines**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Composition (ml) | **Start up & peditrace** | | **Preterm Maintenance 12 + peditrace** | **Preterm Maintenance 15 + peditrace** | **Term baby + peditrace** |
| Per volume (ml)/kg | **90** | **100** | **100** | **110** | **100** |
| Nitrogen (g) | 0.49 | 0.54 | 0.56 | 0.56 | 0.49 |
| Protein(g) | 3.06 | 3.40 | 3.5 | 3.49 | 3.06 |
| Glucose (g) | 9 | 10 | 12 | 15 | 15 |
| Nitrogen calories (Kcal) | 12.66 | 14.07 | 14.5 | 14.5 | 12.6 |
| Non-nitrogen calories (Kcal) | 36 | 40 | 48 | 60 | 60 |
| Total calories (Kcal) | 48.66 | 54.07 | 62.5 | 74.5 | 72.6 |
| Sodium (mmol) |  |  | 5 | 5 | 4.93 |
| Potassium (mmol) |  |  | 2 | 2.5 | 2.5 |
| Calcium (mmol) |  |  | 1.97 | 1.97 | 1.48 |
| Magnesium (mmol) | 0.18 | 0.2 | 0.2 | 0.2 | 0.2 |
| Phosphate (mmol) |  |  | 2 | 2 | 2 |
| Acetate (mmol) |  |  | 1.38 |  |  |
| Chloride (mmol) |  |  | 1.63 | 3.5 | 3.43 |
| Zinc (micromol) | 3.43 | 3.83 | 3.056 | 3.83 | 3.83 |
| Selenium (nanomol) | 22.77 | 25.3 | 20.24 | 25.3 | 25.3 |
| Copper (micromol) | 0.28 | 0.31 | 0.25 | 0.32 | 0.32 |
| Manganese (nmol) | 16.38 | 18.2 | 14.56 | 18.2 | 18.2 |
| Fluoride (micromol) | 2.7 | 3 | 2.4 | 3 | 3 |
| Iodide (nmol) | 7.08 | 7.88 | 6.3 | 7.88 | 7.88 |
|  |  |  |  |  |  |
| Max Peditrace in Neo 12 =0.8ml/kg/day |  |  | peditrace ltd by vaminolact amount\* |  |  |

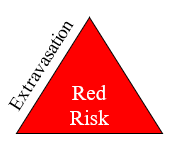


**Indication for use:**

**Start Up & peditrace** – Use as initial infusion fluid for up to 24 hours of life. Other uses include when central access is temporarily unavailable in a baby already established on PN or if electrolyte free PN is required.



**Preterm Maintenance 12 & peditrace**- initial maintenance PN to be infused for at least 48 hours; when glucose tolerance established move to Preterm Maintenance 15 (see below). Prolonged use may be required in infants with glucose intolerance or acidosis (contains acetate). Please note this does not provide adequate nutrition for long term growth.



**Preterm Maintenance 15 & peditrace**- standard maintenance PN for all preterm infants.

**Term Baby** **& peditrace–** for use in preterm infants over 2.5kg and/or infants born from 37 weeks onwards.

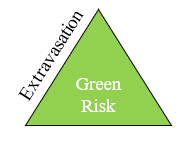
If Parenteral Nutrition is being commenced after a baby has previously tolerated enteral feeds they do not require a start up bag and should commence on the appropriate maintenance bag of vamin. They can start at maximum volume of lipid

For infants likely to require PN for longer than 14 days- consider ordering bags with Peditrace to ensure recommended micronutrient intakes are met. Discuss with Nutrition Lead, Pharmacist or Dietitian.

**Intralipid**

Usually prescribe (refer to guidelines for further details):

Note the slight difference in dose when prescribing an intralipid / SMOFlipid® syringe or intralipid 20% bag due to added vitamin component in the syringes



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **g fat/kg/d** | **Intralipid syringe dose**  **(inc vitamins)** | **SMOFlipid® syringe dose (inc vitamins)** | **Intralipid 20% bag dose**  **(no vitamins)** |
| **1st day PN (including start up)** | 2g | 12mls/kg/day | 12mls/kg/day | 10mls/kg/day |
| **2nd day PN** | 3g | 18mls/kg/day | 18mls/kg/day | 15mls/kg/day |
| **3rd day PN** | 3.4g | 20mls/kg/day | 20mls/kg/day | 17mls/kg/day |

The total volume in an intralipid / SMOFlipid® syringe is 50ml. In a baby weighing more than 2.5kg, where the lipid infusion rate exceeds 2.1ml/hr, prescribe only one syringe per 24 hour period to prevent excessive vitamin administration. An intralipid 20% bag should be prescribed to administer the remaining lipid requirement for the 24 hour period (note differing dose as table above).

Please check with either Dr Holder or Louise Whitticase if unsure

**SMOF Lipid** (**s**oybean oil, **m**edium chain triglycerides, **o**live oil and **f**ish oils).

Please refer to guidelines for details. It should be prescribed at the same rate as intralipid syringes as detailed above.

SMOFlipid® is a blend of soybean oil, medium chain triglycerides, olive oil and fish oils. Fish oil contains primarily omega-3 polyunsaturated fatty acids, which are anti-inflammatory and potentially hepatoprotective, and no phytosterols. SMOFlipid® has been shown to be safe to use in preterm infants, but currently there is no evidence to suggest any benefits of its routine use over Intralipid 20%6,7 in non-cholestatic infants (direct bilirubin <50 µmol/L).There is a recent study showing that the use of SMOFlipid® improves the liver function tests in those with cholestasis, but does not prevent the development of PNALD. SMOFlipid® should only be considered in babies with a direct bilirubin >50 µmol/L and rising trend.

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **PHENOBARBITAL SODIUM (PHENOBARBITONE)**  **\*CONTROLLED DRUG\*** |
| **Indications for use:** | Seizure control |
| **Preparation:** | Injection: 60mg in 1 ml  Take 60mg of phenobarbital and make up to 10mls with sodium chloride 0.9% or glucose 5% to give solution of **6mg/ml**. Take required amount and infuse over 20mins  Although water for injections is recommended by the manufacturer as a suitable diluent for the infusion, it is rarely used in practice as it is likely to cause haemolyses and hyperkalaemia  Oral solution: Alcohol free 50mg in 5ml solution (special order)  NB 15mg in 5ml contains 38% alcohol |
| **Administration:** |  |
| **Dosage:** | Loading dose: 20mg/kg IV over 20mins (no faster than 1mg/kg/minute)  Maintenance dose (if required): 2.5 – 5mg/kg once daily. Dose and frequency adjusted according to response  **\*Babies receiving therapeutic hypothermia:**  Loading dose:20mg/kg IV over 20mins (no faster than 1mg/kg/minute)  Up to 2 doses can be given within 40 – 60mins  Do not give further doses until plasma levels have been checked  Do not give maintenance dose as high plasma levels may occur |
| **Routes:** | Loading dose : IV  Maintenance dose: IV / NG / Oral  Extravasation is likely to cause tissue damage. Preferably administer via a central venous access device to avoid potential venous irritation. If this is not possible, use a large peripheral vein |
| **Compatibility:** | Water for injection, sodium chloride 0.9%, glucose 5% |
| **Other:** | Do not infuse with any other medicines or infusion fluids  Levels can be measured in 50 micro-litres of plasma  Long half life in neonates means timing of sample not critical, levels may be monitored after 24-48 hours, but note early levels will not necessarily give an accurate reflection of therapeutic levels due to steady state not being reached; serum concentration may continue to rise for up to 4 weeks  Therapeutic trough level 15 – 40mg/L  Caution hepatic and renal impairment-Refer to BNF-C and consult product literature  If necessary loading dose has been repeated safely  Order via the ward CD requisition book  Store in the Controlled Drugs Cupboard and record administration and destruction in the CD record book |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at http://medusaimg..nhs.uk/ [Accessed 26.08.15]  Guy’s and St Thomas’, Kings College and University Lewisham Hospitals Paediatric  Formulary (9th Edn) London: Guy’s and St Thomas’ NHS Foundation Trust; 2012.  Available online at <http://www.guysandstthomas.nhs.uk/resources/publications/formulary/paediatric-formulary-9th-edition.pdf> [accessed 26.08.15]  Neonatal Formulary: Drug Use in Pregnancy and the First Year of Life (6th Edn) London: Wiley-Blackwell;2011  \* Local Guideline: Therapeutic Hypothermia as a Neuroprotective Intervention for Neonatal Hypoxic Ischaemic Encephalopathy – Procedural Document. 2010. Dr Archana Mischra, Dr Melanie Sutcliffe |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **PHENYTOIN** |
| **Indications for use:** | Seizure Control |
| **Preparation:** | 50mg in 1ml – solution supplied in 5ml ampoules  MUST be flushed with 0.9% sodium chloride before and after administration at the same rate as drug infusion  **Do not dilute for loading dose.**  Oral suspension: 30mg in 5 ml |
| **Dosage:** | IV Loading dose into a large vein (preferably central but if not possible then largest bore vein available): 20mg/kg over 20 mins **monitoring ECG and BP**  Maintenance dose if required: 2.5 – 5mg/kg bd adjusting dose according to response and plasma levels. Usual Max dose 7.5mg/kg bd  Do not give maintenance dose if baby receiving therapeutic hypothermia  Enteral feeds should be interrupted for at least one hour before and after giving oral phenytoin. |
| **Routes:** | Loading dose: IV  Maintenance dose: NG/oral |
| **Compatibility:** | Sodium Chloride 0.9% |
| **Incompatibility:** | Lines/solutions containing glucose  **Lines should be flushed before and after with 0.9% sodium chloride**  Do not infuse or mix phenytoin with any other medicines or infusions as precipitation or crystallisation may occur |
| **Other:** | If diluted, use only sodium chloride 0.9% and use a 0.22-0.5 micron in-line filter  Pre-dose levels should be performed (50 microlitres of plasma required)  Neonate-3 months Therapeutic levels 6 – 15 mg/L (therapeutic plasma-phenytoin concentrations reduced in first 3 months because of reduced protein binding)  May have a cardiac depressant effect if used when baby receiving therapeutic hypothermia  **IV injection** must be given **slowly** at a rate not exceeding **1 mg/kg/minute** to avoid hypotension and arrhythmias.  **BP and ECG should be monitored during infusion.**  Caution in liver disease and renal impairment.  Monitor carefully when plasma protein binding is altered (e.g. low plasma albumin).  Signs of toxicity: nystagmus, drowsiness, ataxia, dysarthria, lethargy, confusion, tremors, seizures and cardiac arrest  Antidote- intralipid 20% with specialist advice (Poisons centre 0344 892 0111) |
|  |
| **Reference:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 26.08.15]  Patient Safety Alert: Risk of death and severe harm from error with injectable phenytoin. 9th November 2016 |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **POTASSIUM CHLORIDE** |
| **Indications for use:** | To prevent hypokalaemia in babies on intravenous fluids  To treat hypokalaemia  To replace potassium in babies with excess losses due to stomas or drainage of gastric contents via nasogastric tube |
| **Preparation:** | Oral: Potassium chloride 7.5%-1mmol/ml potassium and chloride syrup (Kay-Cee-L®)  IV: Strong Potassium chloride 15% 2mmol in 1ml (10ml ampoules)-MUST BE DILUTED BEFORE USE- ENSURE MIX THOROUGHLY  **Ready made**  10mmol in 500ml bag 10% glucose + 0.18% sodium chloride (for hypokalaemia)  10mmol in 500ml bag 0.9% sodium chloride (for replacement in babies with excess losses due to stomas or drainage of gastric contents via nasogastric tube) |
| **Administration:** | Enteral: Nasogastric/Oral  Intravenous:  As continuous IV infusion in maintenance fluids  10mmol/500ml bag 0.9% sodium chloride - ml for ml replacement of stoma/NG losses |
| **Dosage:** | **Oral:** 0.5 mmol/kg potassium twice daily (total daily dose may alternatively be given in 3 divided doses), adjusted according to plasma-potassium concentration  **Maintenance IV infusion:**  Whenever possible, use ready made 10mmol 500ml bag 10% glucose + 0.18% sodium chloride  120mls/kg/day 10mmol/500ml bag 10% glucose +0.18% sodium chloride gives 2.4mmol/kg/day potassium  150mls/kg/day 10mmol/500ml bag 10% glucose +0.18% sodium chloride gives 3mmol/kg/day  ***Maximum infusion rate 0.2mmol/kg/hr***  **Severe hypokalaemia:**  There may be occasions where a baby needs an additional potassium infusion that cannot be given using a premade bag e.g on PN requiring a side arm infusion.  **See worked example below:**  Weight of baby: 1.7kg  Requires 2mmol/kg potassium in 0.5ml/hour side arm infusion  Total daily amount of side arm fluid: 0.5ml/hr = 0.5 x 24 =12ml  Amount of potassium chloride to be given in 24 hours: 2mmol/kg/day  = 2 x 1.7 = 3.4mmol  Therefore 12mls of fluid needs to contain 3.4mmol of potassium chloride.  A 50ml syringe of 5% or 10% glucose will need to contain 50/12 x 3.4mmol  = 14.17mmol potassium chloride to deliver 2mmol/kg/day to baby  Strength of 15% potassium chloride is 2mmol/ml. Therefore you need to add 14.17/2 =7.08ml 15% potassium chloride  Ensure preparation is thoroughly mixed prior to administration to prevent layering.  Potassium solutions must always be administered using a suitable administration pump.  There are rare occasions when the required rate of administration of potassium will need to exceed the recommended 0.2mmol/kg/hr. This should be done ONLY WITH THE ADVICE OF A CONSULTANT  Continuous ECG monitoring is essential  Higher concentrations than 20mmol/500ml must be administered centrally  **DO NOT EXCEED RATE OF 0.4mmol/kg/hour**  Check potassium level during infusion hourly for the 1st 3 hours, then at least 2 hourly whilst the infusion is running  **Replace stoma/NG losses:**  10mmol per 500ml bag 0.9% sodium chloride (premade bags are available)  Withdraw 50mL from the bag into a syringe to run through a syringe pump  The 500ml bag containing 10mmol/500ml should not be infused directly into the patient. Discard the bag immediately. |
| **Routes:** | NG/Oral/UVC/LL/IV    Check the Extravasation Risk Rating- risk is concentration dependent  **Peripheral infusion:**  Max concentration 20mmol potassium /500mls  (this is a 50 fold dilution by volume to prevent venous irritation)  **Central administration:**  Higher concentrations than 20mmol/500ml can be used  Maximum concentration is 1mmol/ml  Continuous ECG monitoring required |
| **Incompatibility:** | Amphotericin, phenytoin |
| **Other:** | You must determine the cause of the hypokalaemia e.g. inappropriate infusion, diuretics, exceptional losses, hyperaldosteronism due to hypoalbuminaemia.  If running in addition to PN take potassium content of any concurrent parenteral nutrition into account. It may be administered simultaneously with the PN providing it does not exceed a maximum concentration 200mmol/L- including amounts provided by amino acid, trace element solutions and lipid emulsions. |
| **Storage:** | The oral solution is stored in the cupboard below 25 degrees.  Order via the ward CD requisition book  Store in the Controlled Drugs Cupboard and record administration in the CD record book |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  Guy’s and St Thomas’, Kings College and University Lewisham Hospitals Paediatric Formulary (9th Edn) London: Guy’s and St Thomas’ NHS Foundation Trust ; 2012. Available online at <http://www.guysandstthomas.nhs.uk/resources/publications/formulary/paediatric-formulary-9th-edition.pdf> [accessed 026.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 26.08.15]  Fresenius Kabi Ltd - Stability Statement |

Written by: Louise Whitticase (Lead Pharmacist-Women’s Services)

Checked by: Gemma Holder (Neonatal Consultant)

|  |  |  |  |
| --- | --- | --- | --- |
|  | **RANITIDINE** | | |
| **Indications for use:** | Gastric irritation  Inhibits gastric acid secretion  Gastro-oesophageal reflux | | |
| **Preparation:** | Injection: 25 mg in 1 ml - solution supplied in 2ml ampoules  Prepare as per prescription label: | | |
|  | **RANITIDINE INJECTION**  **25 mg in 1 ml** | Dose | Frequency  TDS |
|  | Route  IV | Pharmacy |
|  | Other Directions  Dilute 0.2mls to 5 ml with water  (= 1 mg in 1 ml). Take required dose and infuse | Infuse over  20 minutes |  |
|  | Prescriber Signature | Date Commenced | Date Cancelled |
|  | Oral solution: 15 mg in 1 ml (note Rosemont brand contains 8% w/v alcohol) | | |
| **License status:** | Oral preparations not licensed for use in children under 3 years; injection not licensed for use in children under 6 months | | |
| **Administration:** |  | | |
| **Dosage:** | **IV:** 0.5 – 1 mg/kg every 6 – 8 hours  **Oral:** 1 - 3mg/kg tds  IV and oral doses are NOT equivocal as oral dose poorly absorbed | | |
| **Routes:** | IV / NG / Oral | | |
| **Compatibility:** | Sodium Chloride 0.9%  Sodium Chloride 0.45%  Glucose 10%  Glucose 5%  Glucose 4% + sodium chloride 0.18% | | |
| **Incompatibility:** | Amphotericin, cephalosporins, insulin, midazolam, noradrenaline, phenobarbital | | |
| **Caution:** | Use with caution in renal impairment-Refer to BNF-C and consult product literature  Rapid administration must be avoided as it could cause cardiac arrhythmia | | |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 26.08.15]  Trissel, L.A. Handbook of Injectable drugs. Available at <http://www.medicinescomplete.com/mc/hid/current/> [Accessed 26.08.15] | | |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

**RETINOPATHY OF PREMATURITY SCREEN**

A close-up of a document

Description automatically generated

**ROP Screening Prescription Chart**

|  |  |
| --- | --- |
|  | **ROCURONIUM BROMIDE** |
| **Indications for use:** | When paralysis is required to aid effectiveness of mechanical ventilation |
| **Preparation:**  **Rocuronium Bolus:**  Take 1ml of 10mg/ml solution and make up to 10ml with 0.9% sodium chloride to give solution of 1mg (1000microgram)/ml.  Give ………mg (weight (kg) x 0.6) Route…………..  Signed…………………………………Date…………….. | 5 ml vials with concentration 10mg/ml  Prepare as per prescription label |
|  | **Rocuronium Infusion:**  Take 4mls of 10mg/ml solution and make up to 40mls with ……………………. to give solution of  **1 mg/ml**. Run at …………….ml/hour (i.e. ….............mg/kg/hour)  NB Preset volume for 24hrs then stop infusion unless Consultant advises otherwise. Observe for movements before restarting  Route…………………………………..  Signed………………………………….Date……………….. |
|  |  |
| **License status:** | Not licensed for use in children for assisted ventilation in intensive care |
| **Administration:** |  |
| **Dosage:** | Loading dose: 600 microgram/kg (0.6 mg/kg) (as IV bolus)  Maintenance: 300 - 500 microgram/kg/hour (0.3 -0.5mg/kg/hour) initially (as continuous infusion)  \*ALWAYS PRESCRIBE CARMELLOSE 0.5% EYE DROPS - 1 DROP EACH EYE QDS TO PREVENT CORNEAL IRRITATION\* |
| **Routes:** | IV / UVC |
| **Compatibility:**  **Incompatibility:** | Sodium Chloride 0.9%  Glucose 5%  Insulin, furosemide, SMOFlipid®, vancomycin |
| **Interactions:** | Aminoglycoside antibiotics:  May increase length of time neuromuscular blockade lasts for |
| **Other:** | Rocuronium is cumulative if there is renal impairment and in liver impairment (e.g. in babies with conjugated hyperbilirubinaemia)  DOSE SHOULD BE REDUCED IF THERE IS A RAISED CREATININE OR ABNORMAL LFTs- Refer to BNF-C and product literature |
| **Reference:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  NPPG message board correspondence Anna Burgess, Noah's Ark Children's Hospital for Wales, Cardiff. 02.03.17 |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **SODIUM BICARBONATE** |
| **Indications for use:** | Treatment of acidosis  It is important that the underlying cause of acidosis is identified and managed appropriately  NB If a baby has a chronic on going loss of bicarbonate and requires oral supplementation, please discuss dose and preparation to use with pharmacist |
| **Preparation:** | 4.2% sodium bicarbonate contains 0.5mmol of sodium bicarbonate in 1 ml – supplied as 10 ml ampoules  8.4% sodium bicarbonate contains 1mmol of sodium bicarbonate in 1 ml – supplied as 10 ml ampoules |
| **Administration:** |  |
| **Dosage:** | Calculate dose in mmol using formula:  ½ correction(mmol) = base deficit x wt in kg x F  2  F: In neonates <37 weeks 0.5  In neonates >37 weeks 0.4  (in infants and children 0.3 is used. The different multiplication factors relate to the amount of extracellular fluid in these age groups)  Bolus should be avoided except during resuscitation  Ideally infuse over at least 6 hours with regular blood gases  **Prolonged infusions should not be routinely needed.**  Dilute to a maximum concentration of 0.1mmol/ml for peripheral infusion with 5% or 10% glucose or 0.9% sodium chloride. (i.e. 8.4% sodium bicarbonate 1ml made up to 10ml or 4.2% sodium bicarbonate 1ml made up to 5ml). Sodium bicarbonate 4.2% may be given undiluted ONLY over a short period for emergency peripheral administration. Extravasation can cause severe tissue damage  max rate 0.5mmol/kg/min |
| **Routes:** | IV / UVC |
| **Incompatibility:** | MUST RUN SEPARATE TO OTHER INFUSIONS VIA ITS OWN LINE.  Do not infuse with any other medicines or infusion fluids |
| **Caution:** | Ensure baby is adequately ventilated to prevent hypercapnoea  Extravasation can cause severe tissue necrosis. If given via a peripheral line observe closely. Use of a dilute preparation reduces the risk of serious tissue damage  Use with caution in hypokalaemia |
| **References:** | Guy’s and St Thomas’, Kings College and University Lewisham Hospitals Paediatric Formulary (9th Edn) London: Guy’s and St Thomas’ NHS Foundation Trust ; 2012. Available online at <http://www.guysandstthomas.nhs.uk/resources/publications/formulary/paediatric-formulary-9th-edition.pdf> [accessed 26.08.15]  Neonatal Formulary: Drug Use in Pregnancy and the First Year of Life (6th Edn) London: Wiley-Blackwell;2011  NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 26.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **SODIUM CHLORIDE** |
| **Indications for use:** | Sodium supplementation (added to feeds or maintenance fluids) |
| **Preparation:** | Oral: 1mmol per ml oral solution  IV: 30% sodium chloride 5mmol/ml |
| **Administration:** | Concentrations of sodium chloride exceeding 1.8% (0.3mmol/ml) should always be administered via a central venous access device due to high osmolarity. |
| **Dosage:**        Check the Extravasation Risk Rating- risk is concentration dependent | **Oral Supplementation:**  **Oral supplementation should only be used when a baby is tolerating 50ml/kg/day milk feeds**  When required, initially commence 3mmol/kg/day in 3 divided doses ie 1mmol/kg/dose at 02.00, 10.00 and 18.00  In bigger babies, where a larger volume may be required, the dose 3 mmol/kg/day may be given in 4 divided doses (ie 0.75mmol/kg/dose prescribed at 06.00, 12.00, 18.00, 23.59)  No routine sodium chloride is required for babies on fortified breast milk (180mls/kg/day fortified breast milk provides approx 4.9 mmol/kg/day sodium)  Babies with ‘ostomies’:  Measure urine electrolytes Monday and Thursday  Na:K ratio in urine should be at least 2:1  Add sodium as required to ensure this is achieved even if serum Na is normal  **IV Supplementation:**  Requirement usually 3mmol/kg/day  Remember  10% glucose +0.18% sodium chloride contains 0.03mmol/ml sodium  0.45% Sodium Chloride contains 0.075mmol/ml sodium  0.9% Sodium Chloride contains 0.15mmol/ml sodium  150mls/kg/day 10% glucose +0.18% sodium chloride provides 4.5mmol/kg/day sodium  **If supplemental parenteral sodium is required it would be preferable to use either 0.45% sodium chloride or 0.9% sodium chloride. If higher amounts of sodium are required, add to a plain bag of glucose. See worked example below:**  Weight of baby: 1.7kg  Total daily amount of fluid: 150mls/kg/day = 150 x 1.7 = 255mls  Amount of sodium chloride to be given in 24 hours: 3mmol/kg/day  = 3 x 1.7 = 5.1mmol  Therefore 255mls of fluid needs to contain 5.1mmol of sodium chloride.  A 500ml bag of 5% or 10% glucose will need to contain 500/255 x 5.1mmol  = 10mmol sodium chloride to deliver 3mmol/kg/day to baby  Strength of 30% sodium chloride is 5mmol/ml. Therefore you need to add 10/5 =2ml 30% sodium chloride |
| **Reference:** | NHS Injectable Medicines Guide, Medusa. Accessed at <http://medusaimg.nhs.uk/> [Accessed 26.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **SODIUM FEREDETATE (SYTRON® or SODIFER®)** |
| **Indications for use:** | Iron supplementation in babies:  Born at 33+6 weeks gestation or less and /or less than 1800g; start at 2 weeks of age  Born 34−37 weeks <2.5 kg; start at 2 weeks of age  Small for gestational age term babies <2.5 kg; start at 2 weeks of age   * Only required where milk feed does not contain enhanced iron levels to meet recommended intakes – see **Flowchart** * Recommended iron intakes  |  |  |  | | --- | --- | --- | | **Baby** | **Birth weight** | **Iron intake, AIM:** | | Preterm <34 weeks | <1.8 kg | 2−3 mg/kg/day | | ≥34−<37 weeks | <2 kg | 2−3 mg/kg/day | | Term baby ≥37 weeks | 2−2.5 kg | 1−2 mg/kg/day | |
| **Preparation:** | Both these formulations contain Sodium Feredetate 190mg (Equivalent to 27.5mg iron) /5ml  The formulation supplied will depend on availability from manufacturer |
| **License status:** | Not licensed for prophylaxis of iron deficiency |
| **Administration:** |  |
| **Dosage:** | Please prescribe as ‘ Sodium Feredetate 190mg/5ml’ rather than brand name as formulation supplied will depend on availability from manufacturer  Supplements should be commenced when babies are 2 weeks of age (14 days old); providing they are tolerating 100ml/kg/day of enteral feed  **note:** in babies **not** tolerating 100 mL/kg/day enteral feeds at 2 weeks of age discuss administration of iron supplements with neonatal dietitian or pharmacist  Born <34 weeks and/or <1.8 kg  Unfortified M/DBM or M/DBM and Nutriprem HMF  No iron supplementation required  **Weight ≥1.5 kg** 1.0 mL once daily  **Weight <1.5 kg** 0.5 mL once daily  Term formula  Unfortified M/DBM or M/DBM and Nutriprem HMF  M/DBM and SMA BMF or preterm formula  **Weight ≥1kg**  0.5 mL once daily  Born 34−37 weeks <2.5 kg, and  small for gestational age term babies <2.5 kg  Post discharge formula, post discharge SMA fortifier supplements, high energy infant formula or term formula  0.5 mL once daily  No iron supplementation required |
| **Routes:** | Oral / NG |
| **Other:** | Prescribe at 10.00 |
| **Reference:** | West Midlands Perinatal Network guideline, Nutrition and enteral feeding ESPGHAN update Revised Dec23  BDA NDIG, The routine supplementation of vitamins and iron and the management of zinc deficiency in preterm and small for gestational age infants. Published Jan 24 |

Written by: Gemma Holder (Neonatal Consultant),

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services), Sara Clarke (Neonatal Network Dietitian)

|  |  |
| --- | --- |
|  | **SORE BOTTOMS** |
| **Indications for use:** | Range of preparations for use when nappy area red, inflamed and/or broken  If the rash has an appearance of candida, swab and commence miconazole (see separate entry) |
| **Preparations:** | Sudocrem®  Metanium®  Flaminal hydro® |
| **Administration:** |  |
| **Dosage:** | 1 application with nappy changes |
| **Frequency:** | With nappy changes |
| **Routes:** | Topically to nappy area |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

**SPECIAL FEEDS**

Only to be commenced on advice of neonatal or paediatric dietitian

**Ensure neonatal dietitian or paediatric dietitian is aware of any infant on specialised feeds.**

Commonly used feeds:

|  |  |  |
| --- | --- | --- |
| SMA Pro Gold Prem 1®  (order from NHS Supplies for specific baby) | Preterm formula, Partially hydrolysed formula, with MCT fats, low lactose, liquid preparation | MCT requirement i.e. in conjugated hyperbilirubinaemia or evidence of fat malabsorption  For babies <2kg |
| Hydrolysed nutriprem 1 | Preterm formula  Hydrolysed formula  LCT  Liquid preparation | Whole protein intolerance for babies <2kg |
| Cow & Gate Protein Supplement®  (order from NHS Supplies for specific baby) | Protein only supplement | Used in addition to BMF to enhance protein intake of infants <1000g with serum urea persistently <4 mmol/L |
| Pregestimil Lipil®  (order from Pharmacy for specific baby) | Term formula  Hydrolysed casein with MCT fats, clinically nil lactose | Disaccharide and /or whole protein intolerance in conjunction with MCT requirement i.e. in conjugated hyperbilirubinaemia or evidence of fat malabsorption |
| Peptijunior®  (stock item) | Term formula  Hydrolysed whey with MCT fats, clinically nil lactose | Disaccharide and /or whole protein intolerance in conjunction with MCT requirement i.e. in conjugated hyperbilirubinaemia or evidence of fat malabsorption |
| Monogen® (order from Pharmacy for specific baby) | Term formula  Whole protein with 84% MCT fats | Primary fat malabsorption e.g. babies with chylothorax or chylous ascites |
| Infatrini®  (order from Pharmacy for specific baby) | Term nutrient dense infant formula, liquid preparation | To improve catch up growth in term infants with poor weight gain.  For babies>2kg  (N.B. Discuss with dietician if required) |
| Infatrini Peptisorb®  (order from Pharmacy for specific baby) | Term nutrient dense infant formula. Extensively hydrolysed protein, nil lactose, MCT fats liquid preparation | To improve catch up growth in term infants with poor weight gain in conjunction with disaccharide and /or whole protein intolerance +/- MCT requirement i.e. in conjugated hyperbilirubinaemia or evidence of fat malabsorption  For babies >2kg  (N.B. Discuss with dietician if required) |
| Carobel®  (stock item) | Feed thickener | For thickening feeds and the prevention of reflux/vomiting |

Use scoop provided with each tin (scoop size varies between formulas)

There may be situations when more concentrated feeds are indicated. See dietitian recipe in blue nursing folder.

Rarely, other feeds or supplements may be indicated. These will be detailed in the dietitian instruction sheets which will be filed in the blue nursing folder. These need to be prescribed on prescription chart as per dietitian instructions.

Written by: Gemma Holder (Neonatal Consultant)/ Sara Clarke (Network Dietician)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **SPIRONOLACTONE** |
| **Indications for use:** | Chronic lung disease  Congenital heart disease |
| **Preparation:**  **License status:** | There are five different strengths available.  **Please check carefully.** Pharmacy usually dispenses either  5mg/5ml or 50mg/5ml  Not licensed for reduction of hypokalaemia induced by diuretics |
| **Administration:** |  |
| **Dosage:** | 1 mg/kg |
| **Frequency:** | Start once daily and monitor electrolytes and effect.  May be increased to twice daily if required |
| **Routes:** | Oral/NG |
| **Caution:** | Renal impairment  Check potassium for hyperkalaemia |
| **Other:** | Usually prescribed with Chlorothiazide |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **STOMA CARE** |
| **Indications for use:** | For babies with ostomies following surgical procedure |
| **Preparation:** | ConvaTec Orahesive® Powder  ConvaTec Orahesive® Paste |
| **Administration:** |  |
| **Dosage:** | Apply around stoma as advised by Stoma Care Nurse/ Surgical Liaison Nurse |
| **Frequency:** | As required |
| **Routes:** | Topically to skin |
| **Other:** | This is not available from pharmacy, but from general stores |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **SUCROSE** |
| **Indications for use:** | Short term procedural pain  Please refer to ‘Pain Guideline’ on intranet  **PRE-PRINTED ON DRUG CHART**  **CIRCLE APPROPRIATE DOSE AND SIGN**  **NOT TO BE USED IN INFANTS:**  <28 weeks gestation corrected gestational age  At high risk of NEC  Nil by mouth  Sedated or on other pain medications  Of diabetic mothers until blood sugars have stabilised  With known carbohydrate malabsorption or enzyme deficiency |
| **Preparation:** | Sucrose 24% |
| **Administration:** | Must be used in conjunction with environmental and behavioural measures to relieve pain e.g. swaddling, containment holding  Dose can be repeated up to 3 times per procedure  **Max 8 doses of sucrose may be given on one day** |
| **Dosage:** | < 31 weeks CGA and <1000g: 0.1ml (max 0.3ml per  procedure)  >31 weeks CGA and 1000 – 2000g: 0.2ml (max 0.6ml per  procedure)  >2000g: 0.5ml (max 1.5ml per  procedure) |
| **Routes:** | Drop prescribed dose onto pacifier and place in baby’s mouth  Or  Give prescribed dose onto the tongue or buccal membrane |
| **Reference:** | Pain Assessment and Management Guideline ; Neonatal Guidelines 2013 – 15 – Southern West Midlands Newborn Network |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **SUXAMETHONIUM CHLORIDE** |
| **Indications for use:** | Short acting depolarising muscle relaxant used for short duration paralysis prior to intubation  Prescribe on dedicated Preintubation drug chart |
| **Preparation:** | 50mg/ml  Take 50mg (1ml) of suxamethonium chloride and dilute to 10mls with 0.9% sodium chloride to give 5mg/ml. Take required amount and administer as iv bolus  Flush with 1ml 0.9% sodium chloride over 1 minute to ensure no muscle relaxant remains within the line |
| **Administration:** |  |
| **Dosage:** | 2mg/kg slow bolus  Prescribe on dedicated Preintubation drug chart |
| **Frequency:** | Above dose produces 5 – 10 mins of paralysis. It cannot be reversed  WARNING: staff must never paralyse a baby unless they are confident they can keep the airway open and hand ventilate the baby  Dose can be repeated if required. |
| **Routes:** | IV/UVC |
| **Other:** | Bradycardia may occur which can be reduced by administering atropine prior to the dose  Effects of suxamethonium can be enhanced by vancomycin and gentamicin  Contraindicated in hyperkalaemia (may increase plasma potassium concentrations)  Prolonged apnoea may occur in severe liver disease because of reduced hepatic synthesis of pseudocholinesterase |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  Neonatal Formulary: Drug Use in Pregnancy and the First Year of Life (6th Edn) London: Wiley-Blackwell;2011 |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  | | --- | --- | |  | **(THAM) TROMETAMOL** | | **Indications for use:** | Correction of acidosis, particularly in babies with high serum sodium precluding the infusion of Bicarbonate | | **Preparation:** | (Unlicensed Special Product)  1ml of THAM 7% is approx equivalent to 1mmol bicarbonate | | **Administration:** |  | | **Dosage:** | Calculate dose in ml THAM for half correction of base deficit using formula:  F = 0.5 in neonates < 37 weeks gestation  0.4 in neonates >37 weeks gestation  **½ correction = F x base deficit (mmol/L) x weight (kg)**  **(ml of THAM) 2**  Give half correction first and recheck blood gas prior to giving further doses. Do not exceed total dose of 15mmol/kg/24 hours  Dilute at least 1 in 2 (equal volumes of THAM and diluent) with 5% glucose or water for injection  Do not exceed administration rate of 0.5mmol/kg/min | | **Routes:** | IV / long line | | **Incompatibility:** | MUST BE GIVEN VIA A SEPARATE LINE.  Do not infuse with any other medicines or infusion fluids | | **Other:** | Can be given undiluted in fluid restricted patients via central or long line  Extravasation can cause serious tissue damage  Contraindicated in anuria, chronic respiratory acidosis  If access difficulties UVC may be used, although with caution as liver necrosis has been reported when giving via this route | | **Cautions:** | Renal impairment, may cause hyperkalaemia, | | **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  Guy’s and St Thomas’, Kings College and University Lewisham Hospitals Paediatric Formulary (9th Edn) London: Guy’s and St Thomas’ NHS Foundation Trust ; 2012. Available online at <http://www.guysandstthomas.nhs.uk/resources/publications/formulary/paediatric-formulary-9th-edition.pdf> [accessed 09.06.14] | |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **TRIMETHOPRIM** |
| **Indications for use:** | Prophylaxis, for prevention of Urinary Tract Infection |
| **Preparation:** | Suspension 50 mg in 5 ml |
| **License status:** | Not licensed for use in children under 6 weeks |
| **Administration:** |  |
| **Dosage:** | Prophylaxis for UTI: 2 mg/kg |
| **Frequency:** | Prophylaxis for UTI: 24 hourly at night |
| **Routes:** | Oral / NG |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **URSODEOXYCHOLIC ACID AND FAT SOLUBLE VITAMINS** |
| **Indications for use:** | Cholestasis (persistent conjugated hyperbilirubinaemia >50)  Babies requiring this regime should be referred to the Nutrition Team for review |
| **Preparation:** | Ursodeoxycholic acid Suspension 250mg in 5mls.  Vitamin A drops (Abvit® 10 000 units/ml)  Vitamin D Colecalciferol -care different strengths available  Thorens® 10,000 units/ml oral drops. 1 drop =200 units |
| **License status:** | Ursodeoxycholic acid not licensed for use in children |
| **Administration:** |  |
| **Dosage:** | 10mg/kg 8 hrly |
| **Routes:** | NG/oral |
| **Other:** | Fat soluble vitamins may also be required. The doses are:  Vit A: 1000units/kg/day (max 5000 units/day)    Vit D colecalciferol 400-800 units/kg/day  Vit E: 10mg/kg once daily (max 50mg/day)    Vit K (Phytomenadione): 1mg od  **Abidec should be discontinued if baby is started on Ursodeoxycholic acid and liver vitamin regime until review by nutrition team.**  **If baby on PN do not commence fat soluble vitamins until on <10ml/kg/day intralipid/ SMOFlipid® syringe**  Monitor Vitamin A, D and E levels. These MUST be done at commencement and then as a minimum 4 weekly or as directed by levels or nutrition team.  Results and outstanding levels should be recorded on BADGER to allow follow up. |
| **References:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  BCH Liver Unit guidelines for managing cholestatic liver disease  HEFT, Neonatal Formulary December 2014  Email correspondence Sara Clarke and Sue Breath October 2016  The Bedside clinical guidelines partnership in association with the WMNODN. Neonatal guidelines 2022-24: Liver Dysfunction in preterm babies  Personal correspondence Gemma Holder and Sara Clarke and Jane Hartley February 2024 |

Written by: Gemma Holder (Neonatal Consultant), Sara Clarke (Neonatal Network Dietitian)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

**VACCINATIONS**

|  |  |  |  |
| --- | --- | --- | --- |
| Vaccine | Dose | Route |  |
| Hepatitis B Immunoglobulin | 200 – 250\*units | IM | Give at different site to vaccine  \*Depending on available vial size. If 200unit vial give 200units. If 500unit vial give 250units |
| Hepatitis B recombinant vaccine | 0.5ml (10 micrograms) | IM  thigh | Engerix B®  See handbook for schedule |
| Diptheria, tetanus, acellular pertussis, inactivated polio, Hib, Hep B  DTaP/IPV/HiB/HepB (6 in 1) | 0.5ml | IM  thigh | Infanrix hexa ® |
| BCG \* live vaccine see section below Live attenuated vaccines | 0.05ml | Intradermal | SSI brand  No further injections in left arm for 3/12 post administration |
| Pneumococcal Vaccine | 0.5ml | IM  thigh | Prevenar 13® |
| Rotavirus \* live vaccine see section below Live attenuated vaccines | 1.5ml | By mouth | Rotarix® |
| Meningococcal group B vaccine | 0.5ml | IM  left thigh (ideally on own) | Bexsero® |

**VACCINE SCHEDULE**

|  |  |
| --- | --- |
| Age at administration | Viruses covered |
| 2 months (2 injections and 1 oral vaccine) | * Diptheria, tetanus, pertussis (acellular), polio (inactivated), haemophilus influenza type B, hepatitis B * \*Rotavirus (provided baby is <104 days of age) * Meningococcal group B\*\* |
| 3 months (2 injection and 1 oral vaccine) | * Diptheria, tetanus, pertussis (acellular), polio (inactivated), haemophilus influenza type B, hepatitis B * Pneumococcal conjugate Vaccine * \*Rotavirus (provided baby is <167 days of age) |
| 4 months (2 injections) | * Diptheria, tetanus, pertussis (acellular), polio (inactivated), haemophilus influenza type B, hepatitis B * Meningococcal group B\*\* |

\*Rotavirus vaccine should be given according to the routine vaccine schedule in preterm babies. It is likely to carry a low incidence of transmission if standard infection control measures are maintained.

The rotavirus vaccine is highly attenuated and does not revert back to a high virulence strain. **However**, if the vaccines are delayed for any reason, the initial Rotavirus vaccine **should not** be given if the baby is over 104 days of age.

If this has occurred, or there is a delay in administering the 3 month vaccinations, it should be ensured that the 2nd rotavirus dose is given at least 4 weeks after the first and before the baby is 167 days of age.

Although the vaccine is a live attenuated virus, with the exception of severe combined immune-deficiency (SCID), the benefit from vaccination may exceed any risk in other forms of immunosuppression. Therefore, there are very few infants who cannot receive rotavirus vaccine. Breast feeding and medications for gastro-oesophageal reflux are not contraindications for rotavirus vaccination. The rotavirus vaccine can also be administered before, at the same time as, or after administration of any blood product, including those containing antibody/immunoglobulin. Where there is doubt, appropriate advice should be sought from an immunisation coordinator or consultant in health protection rather than withholding vaccination.

Rotarix® should not be given to:

 infants with a confirmed anaphylactic reaction to a previous dose of rotavirus vaccine;

 infants with a confirmed anaphylactic reaction to any components of the vaccine;

 infants with a previous history of intussusception;

 infants aged 24 weeks and zero days of age or older;

 infants with Severe Combined Immunodeficiency (SCID) disorder;

 infants who have a malformation of the gastrointestinal tract that could predispose them to intussusception;

 infants with rare hereditary problems of fructose intolerance, glucose-galactose malabsorption or sucrase-isomaltase insufficiency.

 children born of mothers who were on immunosuppressive biological therapy during pregnancy (see section below)

Administration of rotavirus vaccine should be postponed in infants:

 suffering from acute severe febrile illness;

 suffering from acute diarrhoea or vomiting. This is to make sure that the vaccine is not regurgitated or passed through the intestines too quickly, which could reduce the effectiveness of the vaccine.

There is a potential for transmission of live attenuated vaccine in Rotarix® from the infant to severely immunocompromised contacts through faecal material for at least 14 days.

Those in close contact with recently vaccinated infants should observe good personal hygiene.

\*\*JCVI have recommended that paracetamol should be given prophylactically when 4CMenB is given with the routine vaccines in infants under one year of age. Three doses of paracetamol should be given orally, with the first dose provided as soon as possible after vaccination, and two subsequent doses in accordance with their gestation.

**Oral:**

28 - 32 weeks CGA:20 mg/kg as single dose, then 10 – 15 mg/kg 8 – 12 hourly; max 30 mg/kg in 24 hours

More than 32 weeks CGA:20 mg/kg as single dose, then 10 – 15 mg/kg 6 – 8 hourly; max 60 mg/kg in 24 hours

Should fever persist following the third dose and provided that the child appears otherwise well, additional doses of paracetamol may be administered for up to 48 hours.

**Live attenuated vaccines: avoid use in those who are clinically immunosuppressed**

**Healthcare professionals should ensure that clinically significant immunosuppression in a patient is identified before administration of a live attenuated vaccine.** Drug Safety Update volume 9 issue 9, April 2016: 7.

children born of mothers who were on immunosuppressive biological therapy during pregnancy will not be eligible to receive rotavirus vaccine (and will need to defer BCG, if indicated, for 6 months). If there is any doubt as to whether an infant due to receive a live-attenuated vaccine may be immunosuppressed due to the mother’s therapy, including exposure through breastfeeding, specialist advice should be sought.

Please see Junior Doctor Handbook for Guidelines for Administration of Vaccines

**References:**

Green Book Chapter 27B: Rotavirus Accessed online: <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/193107/Green_Book_Chapter_27b_v1_0W.pdf>

<https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/193055/130429_Rotavirus_tripartite_letter_FINAL.pdf>

Department of Health Green Book. Meningococcal, Chapter 22. Available at: <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/448875/2904185_Green_Book_Chapter_22_v3_0W_July2015.PDF> [accessed 19.08.15]

Department of Health Green Book. Meningococcal, Chapter 6. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment\_data/file/655225/Greenbook\_chapter\_6.pdf [accessed 20.12.17]

The routine immunisation schedule from Autumn 2017. Available at: <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/633691/Childhood_imm_schedule_2017.pdf>Heptatits B immunoglobulin (issued September 2023) available at: ￼"Hepatitis B immunoglobulin (issued September 2023) - GOV.UK (www.gov.uk)

Written by: Gemma Holder (Neonatal Consultant) Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services

|  |  |  |
| --- | --- | --- |
|  | **VANCOMYCIN - CONTINUOUS INFUSION**  (Hospira brand) | |
| **Indications for use:** | Infection – please refer to Antibiotic Guidelines | |
| **Preparation** | Available 500mg and 1g vials containing powder for reconstitution | |
| **Dosage:** | **Loading dose:** 15mg/kg administered over 1 hour  **Maintenance continuous infusion** to be commenced immediately after the loading dose using 125mg in 30ml infusion solution.   |  |  |  |  | | --- | --- | --- | --- | | Serum creatinine (μmol/L) | Corrected gestational age | Dose over 24 hrs | Infusion Rate (ml/hr) | | <50 | ≥ 40 weeks | 50mg/kg/day | 0.5 x weight | | <50 | < 40 weeks | 40mg/kg/day | 0.4 x weight | | 50-70 | all | 30mg/kg/day | 0.3 x weight | | >70 | all | 20mg/kg/day | 0.2 x weight |   IF THE INFUSION IS INTERRUPTED, RE-START AT THE SAME DOSE AS SOON AS THIS IS POSSIBLE  **Indication for use should ALWAYS be documented**  **Prescribe for 24 hours only initially**  **Review culture results after 36 hours (where possible) and at most 48 hours; either discontinue antibiotic or rewrite prescription documenting length of course and reason for course duration**  NB: If changing from a bolus regimen to a continuous regimen, do not give a loading dose. Start continuous infusion straight away and repeat level after 12 hours. | |
| **Administration:** | **Loading Dose**  Reconstitute each 500mg of Vancomycin with 10ml water for injection. The resultant solution is 50mg/ml.  **Dilute to a concentration of 5mg/ml.**  Take 1ml (50mg) of the reconstituted solution, dilute to 10ml with diluent to give a solution containing 5mg/ml.  Take the required dose and administer over 60 minutes  **Maintenance dose**  Reconstitute each 500mg of Vancomycin with 10ml water for injection. The resultant solution is 50mg/ml.  Take 2.5ml (125mg) of this solution and make up to 30ml with glucose 5%. Run this infusion solution at the prescribed rate specified as per the table (above). | |
| **Monitoring & Dose Adjustment:** | Target range 15-25mg/L   * Take a sample approx. 12 hours after starting the infusion or approx 12 hours after any dose change (see notes below regarding timing of levels) * Follow monitoring as per page 2 of vancomycin prescription chart.  |  |  | | --- | --- | | DOSE ADJUSTMENT BASED ON LEVELS | | | **Vancomycin concentration** | **Suggested dose alteration** | | <10mg/L | Increase the daily dose and rate by 50% | | 10 to <15mg/L | Increase the daily dose and rate by 25% | | 15 to 25mg/L | No change | | >25 to 30mg/L | Decrease the daily dose and rate by 25% | | >30mg/L | Stop until <25mg/L then restart at a lower dose |   Although the dose over 24 hours and the rate will change the concentration of the infusion always remains 125mg/30ml  Rate in ml/hour = dose(mg/kg/day) x weight  100  e.g. If dose is 62.5mg/kg/day: -  Rate (ml/hour) = 62.5mg/kg/day x weight  100 |
| **Routes:** | UVC/ LL or CVL |
| **Other:** | Levels – levels are done in Microbiology at BCH at 10.30 and 16.00. They need to reach the BWH lab by 12.00 to ensure they make the 16.00 run. Levels are usually telephoned through to the NNU by 17.00  URGENT requests may be taxied to BCH on request of Consultant with shift leader authorisation  Please take levels with morning bloods whenever possible (even if this is slightly earlier/ substantially later than 12 hours after starting/changing the infusion)  Ototoxic and nephrotoxic. Increased toxicity risk when co-prescribed with gentamicin, furosemide, ibuprofen or Ambisome® |
| **Compatibility:** | Solution compatibility with sodium chloride 0.45% and 0.9%; Glucose 5% and 10%.  Y- site compatibility with TPN, Intralipid, sodium chloride 0.45% and 0.9%; Glucose 5% and 10%, gentamicin, insulin, fluconazole, aciclovir, amiodarone, caffeine citrate, calcium gluconate, fentanyl, magnesium sulfate, meropenem, midazolam, morphine, potassium chloride, ranitidine |
| **Incompatibility:** | Albumin, amphotericin, benzylpenicillin, cefotaxime, ceftazidime, dexamethasone, flucloxacillin, furosemide, heparin, phenobarbital, phenytoin, rocuronium, sodium bicarbonate |
| **Reference:** | Addenbrookes Trust NICU protocol for use of continuous vancomycin infusion Feb 2012  Yorkhill Hospital NICU protocol for use of continuous vancomycin infusion Aug 2011.  SPC Vancomycin (Hospira) viewed online 14.02.2014  Handbook on Injectable Drugs (viewed on Medicines Complete 14.02.2014)  Violeta Raverdy, Els Ampe, Jean-Daniel Hecq and Paul M. Tulkens, Stability and compatibility of vancomycin for administration by continuous infusion, Journal of Antimicrobial Chemotherapy Advance Access published January 9, 2013 Accessed online 14.02.2014 |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **VANCOMYCIN (INTERMITTENT REGIME)** |
| **Indications for use:** | Infection – please refer to Antibiotic Guidelines |
| **Preparation:** | 500mg vial  Prepare as per prescription label: |
|  | DIRECTIONS  Dissolve VANCOMYCIN 500mg powder in 10mls water to give 50mg/ml.  Take 1ml and dilute to 10ml with glucose 5% or sodium chloride 0.9% to give a solution containing 5mg/ml  Take required amount and Give over 1 hour |
| **Dosage:** | 15 mg/kg  NB: If changing from a continuous regimen to an intermittent regimen, give intermittent dose straight away (providing loading dose not given in preceding 8/12/18 hours depending on CGA)  If serum level was done within last 12 hours and was low/within acceptable range there is no need to do predose level. In all other circumstances, take level before giving dose and adjust dose/frequency when level available |
| **Frequency:** | \*Less than 29 wk CGA 18hourly  29 – 35 wk CGA 12 hourly  More than 35 wk CGA 8 hourly  **Indication for use should ALWAYS be documented**  **Prescribe for 48 hours only initially**  **Review culture results after 36 hours (where possible) and at most 48 hours; either discontinue antibiotic or rewrite prescription documenting length of course and reason for course duration** |
| **Routes:** | IV/UVC |
| **Other:** | Levels – levels are done in Microbiology at BCH at 10.30 and 16.00. They need to reach the BWH lab by 12.00 to ensure they make the 16.00 run. Levels are usually telephoned through to the NNU by 17.00  Please take pre dose levels on the morning dose where ever possible  URGENT requests may be taxied to BCH on request of Consultant with shift leader authorisation  Take trough levels pre 3rd (N.B. pre 4th dose may be more appropriate depending on time of day and when level likely to be available)  Aim for levels 10 – 15mg/L  If level LOW increase the frequency of administration  If level HIGH decrease the frequency of administration  Caution rapid IV infusions may cause severe hypotension (including shock and cardiac arrest), dyspnoea, urticaria pruritis, flushing of the upper body (‘red man’ syndrome),pain and muscle spasm of back and chest  Caution in renal impairment-Refer to BNF-C and consult product literature |
| **Incompatibility:** | Incompatible with some drugs including albumin, amphotericin, aminophylline, dexamethasone, phenytoin, benzylpenicillin, heparin, phenobarbital, cefotaxime, ceftazidime, ceftriaxone, cefuroxime, omeprazole, flucloxacillin, furosemide, rocuronium, sodium bicarbonate  Vancomycin may be added (terminally) to insulin, midazolam or morphine |
| **Reference:** | BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15]  Trissel, L.A. Handbook of Injectable drugs. Available at <http://www.medicinescomplete.com/mc/hid/current/> [Accessed 09.06.14]  \*Dose for babies <29 weeks based on clinical experience at BWH |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **VITAMIN K (PHYTOMENADIONE)** |
| **Indications for use:** | Neonatal prophylaxis of vitamin-K deficiency bleeding |
| **Preparation:** | Konakion® MM Paediatric  2mg/0.2ml (suitable for oral and IM administration) |
| **Administration:** |  |
| **Dosage:** | \*IM:  < 36 weeks gestation: 400micrograms/kg (max 1mg)  > 36 weeks gestation: 1mg  \*\*Oral (if > 36 weeks gestation):  2mg at birth and 2nd dose of 2mg within 1st week of life (at 4-7 days)  3rd dose of 2mg needs to be given at 1 month of age if exclusively breast feeding  We do not routinely administer vit K IV as it does not create a depot store and give the prolonged protection provided by IM depot injection  \*\*Bleeding vit K deficiency:  1mg by slow iv injection. Can be repeated 8 hourly if required |
| **Routes:** | IM  Sick term or preterm babies and term babies who’s mothers are taking anti convulsant medication, rifampicin or warfarin should ALWAYS receive IM vitamin K  Note: babies who may have a coagulation deficiency should **not** receive IM injections  Oral  IV ( in bleeding thought to be secondary to Vit K deficiency)-given very slowly as risk of vascular collapse |
| **Other:** | For all babies receiving oral vitamin K, ‘Konakion® MM Paediatric 2mg’ must be prescribed as a TTO if baby discharged before 4 days old to ensure the baby receives 2nd dose within first week of life.  The 3rd dose will be prescribed by GP if the baby is exclusively breastfed. |
| **References:** | \*Based on local practice which has been found to be effective  \*\* BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

|  |  |
| --- | --- |
|  | **ZIDOVUDINE** |
| **Indications for use:** | Prophylaxis in babies whose mother is known to be HIV Positive.  **Follow plan in mother’s notes.** |
| **Preparation:** | Suspension: 50 mg in 5 ml  Injection: 10 mg in 1 ml (20ml vial)  Take 10mg of solution and make up to 5 mls with 5% glucose to give a solution of **2mg/ml.** Take required amount and infuse over 60 mins – |
| **Administration:** | **Greater 34 weeks:** |
| **Dosage:** | Oral: 4mg/kg 12 hourly within 4 hours of delivery until baby 4 weeks of age  If certain strict criteria are met, baby may only require 2 weeks PEP  **Check the plan in mother’s notes**  Round dose to the nearest whole milligram for ease of administration.  IV: 1.5 mg/kg 6 hourly infused over 60 mins  **30 - 33+6 weeks:**  Oral: 2 mg/kg 12 hrly for 2 weeks then 2mg/kg 8hrly for  2 weeks  IV: 1.5mg/kg 12hrly infused over 60 mins for 4 weeks  **<30 weeks:**  Oral: 2mg/kg 12 hrly for 4 weeks  IV: 1.5mg/kg 12 hrly infused over 60 mins for 4 weeks |
| **Routes:** | IV infusion/ Oral / NG |
| **Location:** | Two 200ml bottles of Zidovudine Syrup 50mg in 5ml are kept on delivery suite. Bottles are stored in the emergency drug cupboard |
| **Reference:** | BHIVA guidelines for management of HIV infection in pregnant women 2012; HIV Medicine 2012;13(suppl 2)87 – 157  Above guidelines available via www.bhiva.org/documents/Guidelines/Pregnancy/2012/hiv1030\_6.pdf  BNF for Children London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2014 – 2015 Available at <https://www.medicinescomplete.com/mc/bnfc/current/index.htm> [Accessed 19.08.15] |

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

**ADDENDUM 1**

**SUMMARY VITAMIN REQUIREMENTS**

Abidec, colecalciferol, folic acid and sodium feredetate, see table and flow chart below-

Joulies phosphate- see individual page

Abidec® (and folic acid if needed) should be commenced when baby on 100ml/kg/day feeds

Note PN lipid syringes contain vitamins, abidec should be started when on intralipid/SMOFlipid® <10ml/kg/day

Sodium feredetate to be commenced at 2 weeks of age (14 days old) providing they are tolerating 100ml/kg/day of enteral feed

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | **Choose ONLY 1 multivitamin preparation** | | | **Folic acid** |
| **Current weight** | **ABIDEC** | **Healthy start vitamins** | **DALIVIT** |
| **Babies born <34 weeks and /or <1.8 kg** | | | | | |
| **Fortified MEBM/DEBM**  **Preterm Formula (Nutriprem 1 or SMA Gold**  **Prem 1)** | ≤1 kg | 0.3 mL once daily | 3 drops once daily | X  Vitamin D **only** Colecalciferol \*\*  200 units daily | X |
| >1 kg | 0.6 mL once daily | 5 drops once daily | X  Vitamin D **only** Colecalciferol \*\*  400 units daily | X |
| **\*Unfortified MBM/DBM** | ≤1 kg | 0.6 mL once daily | 5 drops once daily | 0.3 mL once daily and Vitamin D Colecalciferol \*\* 200 units daily | 50 microgram once  daily |
| >1 kg | 0.6 mL once daily and vitamin D Colecalciferol \*\* 600 units **alternate days** | 5 drops once daily and vitamin D Colecalciferol \*\*600 units **alternate days** | 0.3 mL once daily and vitamin D Colecalciferol\*\* 600 units daily | 50 microgram once  daily |
|  |  | **Choose ONLY 1 multivitamin preparation** | | | **Folic acid** |
|  | **ABIDEC** | **Healthy start vitamins** | **DALIVIT** |
| **Babies born <34 weeks’ gestation when reaching ≥1.8 kg** | | | | | |
| **Post discharge formula**  **(Nutriprem 2/SMA Gold 2)**  **MBM and post-discharge fortifier**  **High energy infant formula (Infatrini/SMA high energy)** | | 0.3 mL once daily | 3 drops once daily | X  Vitamin D **only** Colecalciferol \*\*  200 units daily | X |
| **Unfortified MBM**  **Term formula** | | 0.6 mL once daily | 5 drops once daily | 0.3 mL once daily and vitamin D Colecalciferol \*\* 200 units daily | X |

\*Preterm babies fed exclusively on unfortified breast milk will not meet recommended

intakes for calcium/phosphate and other essential micronutrients. Care needs to be taken to ensure risk of deficiency of micronutrients is minimised, especially the impact on metabolic bone disease see **Metabolic bone disease** guideline for advice on screening and supplementation

\*\*Colecalciferol -care different strengths available

Preparation: Thorens 10,000 units/ml oral drops. 1 drop =200 units

**Flowchart : Iron supplementation to meet recommended intakes**

* Using \*sodium feredetate (27.5 mg iron per 5 mL)

Born <34 weeks and/or <1.8 kg

Born 34−37 weeks <2.5 kg, and

small for gestational age term babies <2.5 kg

Unfortified M/DBM or M/DBM and Nutriprem HMF

No iron supplementation required

**Weight ≥1.5 kg** 1.0 mL once daily

**Weight <1.5 kg** 0.5 mL once daily

Term formula

Unfortified M/DBM or M/DBM and Nutriprem HMF

M/DBM and SMA BMF or preterm formula

**Weight ≥1 kg**

0.5 mL once daily

Post discharge formula, post discharge SMA fortifier supplements, high energy infant formula or term formula

0.5 mL once daily

No iron supplementation required

Sodium feredetate should be continued until 6-12 months of age (until tolerating balanced weaning diet)

Abidec® should be continued until 1 year of age (N.B. PHE advice that all children <5 years old should receive multi vitamins containing vitamins A, D + E)

Nutriprem 2 should not be continued beyond 6 months of age

**Cholestasis (persistent conjugated hyperbilirubinaemia >50)**

Fat soluble vitamins required. See ursodeoxycholic acid page for doses

Abidec should be discontinued if baby is commenced on Ursodeoxycholic acid and liver vitamin regime until review by nutrition team

If baby on PN do not commence fat soluble vitamins until on <10ml/kg/day intralipid/ SMOFlipid® syringe

Reference: West Midlands Perinatal Network guideline, Nutrition and enteral feeding ESPGHAN update Revised Dec23

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

**ADDENDUM 2**

**HYPERKALAEMIA**

Full joint network guidelines available on Intranet

**Serum potassium >7.0 mmol/L without ECG changes**

* Give salbutamol 4 microgram/kg IV in glucose 10% over 5–10 min: effect evident within 30 min but sustained benefit may require repeat infusion after at least 2 hr
  + Take 0.1ml of salbutamol (5mg/5ml) and make up to 10mls with 10% glucose to give solution of 10micrograms/ml.
  + Using drug library on infusion pump, administer 4microgram/kg (0.4mls/kg) over 10 mins
* give furosemide 1 mg/kg IV
* If serum potassium still >7.0 mmol/L, give insulin IV in glucose 10% (see Insulin page in formulary): very effective and has an additive effect with salbutamol
* Check blood sugar immediately before commencing the insulin infusion, 5 mins after completing the infusion then every 15 mins for the first hour after the infusion is complete. The blood sugar should then be monitored hourly for a further 3 hours if stable. Watch for late hypoglycaemia and refer to senior medical staff if any concerns
* Aim for blood glucose 4–7 mmol/L
* Repeat U&E
* Repeat insulin infusion as necessary until K+ <7 mmol/L

**Serum potassium >7.5 mmol/L with ECG changes**

**As above, but first institute emergency measures below:**

* Give 10% calcium gluconate 0.11mmol/kg (0.5ml/kg) IV over 5–10 min
* Flush line with sodium chloride 0.9% or preferably use a different line
* Give IV sodium bicarbonate (1 mmol/kg over 2 min) This is effective even in babies who are not acidotic (2 mL of sodium bicarbonate 4.2% = 1 mmol)

**Further treatments: discuss with consultant**

A cation-exchange resin, such as calcium resonium 500 mg/kg rectally, with removal by colonic irrigation 8–12 hrly, repeat every 12 hr. Dose can be doubled at least once to 1 g/kg in severe hyperkalaemia). Useful for sustained reduction in serum potassium but takes many hours to act and is best avoided **in sick preterms who are at risk of necrotising enterocolitis (NEC)**

**SUBSEQUENT MANAGEMENT**

* Recheck serum K+ after each intervention or:
* 4–6 hrly if K <7mmol/l and no ECG changes
* 2 – 3 hrly if K >7mmol/l with no ECG changes
* Hourly when arrhythmias or ECG changes present with/ without renal failure,
* Monitor urine output and maintain good fluid balance
* If urine output <1 mL/kg/hr, unless baby volume depleted, give furosemide 1 mg/kg IV until volume corrected
* Treat any underlying cause (e.g. renal failure)

Reference: Based on Neonatal Guidelines 21 - 22; Southern West Midlands Newborn Network

Written by: Gemma Holder (Neonatal Consultant)

Checked by: Louise Whitticase (Lead Pharmacist-Women’s Services)

**ADDENDUM 3**

**20% ALBUMIN SOLUTION**

There is much controversy surrounding whether it is beneficial to replace albumin in babies who are significantly hypoalbuminaemic. There are certain circumstances when this may be felt to be desirable, but this should always be at the discretion of the Consultant on call.

3.75mls/kg/day of 20% Albumin is equivalent to giving 15mls/kg/day of colloid which would usually be the maximum colloid dose given per day

Must be given slowly to prevent vascular overload, traditionally given over 3 hours

**Record the batch number and expiry date from each unit used in the patient's case notes or drug chart.**

Incompatible: Do not mix with other medicines, whole blood or packed red cells, parenteral nutrition solutions or solutions containing alcohol. Do not dilute with water for injections as this may result in potentially life threatening haemolysis

Reference: Based on local practice which has been found to be effective

Written by: Gemma Holder (Neonatal Consultant)

**ADDENDUM 4**

**COAGULATION PROBLEMS**

Clotting should be performed in the following circumstances:-

* When a UAC is inserted.
* In any shocked and unwell baby.
* In thrombocytopenia.
* When a baby has >15% bruising.
* When necrotising enterocolitis is suspected

1. Give 10ml/kg fresh frozen plasma if:

i. Significant coagulopathy without need for plasma expansion

PT >2.5 Control

PTT > 2.5 Control

ii. Significant coagulopathy with need for plasma expansion

PT > 1.8 Control

PTT > 1.8 Control

iii. Significant bruising (greater than 5% on BBC)

PT > 1.5 Control

PTT > 1.5 Control  
  
iv. Significant bruising greater than 15% on BBC regardless of PT or PTT

2. Consider cryoprecipitate (10 ml/kg over 30minutes) if:-

i. Fibrinogen < 1.0 as the only coagulation abnormality

ii. Regardless of fibrinogen, if PT in normal range, but prolonged PTT after FFP given.

**(Note if extensive bruising give FFP first).**

1. The blood sample for coagulation tests must either be venous or arterial (not capillary).

If from a line containing heparin, the specimen must be taken with care to “flush” the line first: the labs must be informed and asked to carry out the toludine blue test to detect the presence of heparin in the sample.

2. Repeat coagulation tests after each intervention until normal.

3. Hypotensive/shocked babies – see separate guideline. 10ml/kg FFP given immediately if bruising greater than 15% on BBC (Birmingham Bruising Chart) REGARDLESS OF BP OR COAGULATION RESULTS.

Reference: Based on local practice which has been found to be effective

Written by: Gemma Holder (Neonatal Consultant)

**ADDENDUM 5**

**Privigen liquid (NEONATES)**

This is available as:

5g in 50ml = 10% solution

10g in 100ml = 10% solution

20g in 200ml = 10% solution

i.e all sizes are the same concentration

Dose for haemolytic disease of the foetus and newborn (isoimmune haemolytic jaundice in neonates) = 500mg/kg

**Administration rates in neonatal patients**

|  |  |
| --- | --- |
|  | Rate ml/kg/hour |
| **Initial infusion rate** | 0.3 |
| Rate after 30 minutes | 0.6 |
| Max rate after 60 minutes | 1.2 |

**Infusion rate table (round down to nearest 100g)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Weight** | **0-30 minutes**  **0.3ml/kg/hour** | **30-60 minutes**  **0.6ml/kg/hour** | **Max rate from 60 minutes**  **1.2ml/kg/hr** |
| 2000g | 0.6ml/hr | 1.2ml/hr | 2.4ml/hr |
| 2100g | 0.63 ml/hr | 1.26 ml/hr | 2.52 ml/hr |
| 2200g | 0.66 ml/hr | 1.32 ml/hr | 2.64 ml/hr |
| 2300g | 0.69 ml/hr | 1.38 ml/hr | 2.76 ml/hr |
| 2400g | 0.72 ml/hr | 1.44 ml/hr | 2.88 ml/hr |
| 2500g | 0.75 ml/hr | 1.5 ml/hr | 3 ml/hr |
| 2600g | 0.78 ml/hr | 1.56 ml/hr | 3.12 ml/hr |
| 2700g | 0.81 ml/hr | 1.62 ml/hr | 3.24 ml/hr |
| 2800g | 0.84 ml/hr | 1.68 ml/hr | 3.36 ml/hr |
| 2900g | 0.87 ml/hr | 1.74 ml/hr | 3.48 ml/hr |
| 3000g | 0.9 ml/hr | 1.8 ml/hr | 3.6 ml/hr |
| 3100g | 0.93 ml/hr | 1.86 ml/hr | 3.72 ml/hr |
| 3200g | 0.96 ml/hr | 1.92 ml/hr | 3.84 ml/hr |
| 3300g | 0.99 ml/hr | 1.98 ml/hr | 3.96 ml/hr |
| 3400g | 1.02 ml/hr | 2.04 ml/hr | 4.08 ml/hr |
| 3500g | 1.05 ml/hr | 2.1 ml/hr | 4.2 ml/hr |
| 3600g | 1.08 ml/hr | 2.16 ml/hr | 4.32 ml/hr |
| 3700g | 1.11 ml/hr | 2.22 ml/hr | 4.44 ml/hr |
| 3800g | 1.14 ml/hr | 2.28 ml/hr | 4.56 ml/hr |
| 3900g | 1.17 ml/hr | 2.34 ml/hr | 4.68 ml/hr |
| 4000g | 1.2 ml/hr | 2.4 ml/hr | 4.8 ml/hr |
| 4100g | 1.23 ml/hr | 2.46 ml/hr | 4.92 ml/hr |
| 4200g | 1.26 ml/hr | 2.52 ml/hr | 5.04 ml/hr |
| 4300g | 1.29 ml/hr | 2.58 ml/hr | 5.16 ml/hr |
| 4400g | 1.32 ml/hr | 2.64 ml/hr | 5.28 ml/hr |
| 4500g | 1.35 ml/hr | 2.7 ml/hr | 5.4 ml/hr |
| 4600g | 1.38 ml/hr | 2.76 ml/hr | 5.52 ml/hr |
| 4700g | 1.41 ml/hr | 2.82 ml/hr | 5.64 ml/hr |
| 4800g | 1.44 ml/hr | 2.88 ml/hr | 5.76 ml/hr |
| 4900g | 1.47 ml/hr | 2.94 ml/hr | 5.88 ml/hr |
| 5000g | 1.5 ml/hr | 3 ml/hr | 6 ml/hr |

Written by: Louise Whitticase Checked by: Rachel Bucki

**ADDENDUM 6**

**ACTH (Short Synacthen®) TEST**

**INDICATION**

* This test is used as a diagnostic test for the investigation of

adrenocortical insufficiency.

- In the adrenal cortex it stimulates the biosynthesis of glucocorticoid, mineralocorticoids and to lesser extent androgens.

**CONTRAINDICATIONS**

- Patients with allergic disorders e.g. Asthma

**DRUG DOSAGE AND ADMINISTRATION**

- ***SYNACTHEN® 250 micrograms*** intravenously for children **over**

1 year of age

* ***SYNACTHEN® 125 micrograms*** intravenously for children

**under** 1 year of age.

**SIDE-EFFECTS**

**- *SYNACTHEN®*** may provoke hypersensitivity reactions. This may be in the form of Anaphylactic Shock in children with known sensitivities.

- Local hypersensitivity after the injection can result in pain and redness at the injection site.

- Urticaria, pruritus, flushing, faintness have been noted.

**PATIENT PREPARATION**

- The patient must be as stress free as possible, but may eat and drink

- They should be on bed rest for at least one hour, after the cannula has been inserted and before the test is commenced

**SAMPLE REQUIREMENTS**

- Blood to be collected in a glass tube **without** anticoagulant

- 1 ml of blood (0.5 mls serum ) is required to measure cortisol.

**TEST PLAN**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **TIME**  (MINUTES) | 0 min | GIVE | + 30 mins | + 60 mins |
| **REQUEST**  CORTISOL | **** | DRUG | **** | **** |

**PROCEDURE**

1- Bed rest for patient for 30 minutes prior to test commencing

2- Take venous blood sample for Cortisol at **0** minutes

3- Administer ***Synacthen®*** intravenously **after** 0 minute sample.

4- Take further samples of blood for Cortisol at

+ **30** minutes **most important sample**

+ **60** minutes

**after** the administration of ***Synacthen®.***

Reference: BC protocol

**ADDENDUM 7**

ELECTIVE INTUBATION PROCEDURE

Ensure all resuscitation equipment is ready

Position baby ready for intubation; ensure baby is kept warm by covering with

A blanket up to the nipple line

Put an appropriately sized ventilator bonnet on baby

Give atropine as bolus

Flush line with 0.6mls sodium chloride 0.9%

Commence prophylactic intermittent positive pressure ventilation using

Neopuff and ensure adequate chest expansion is achieved

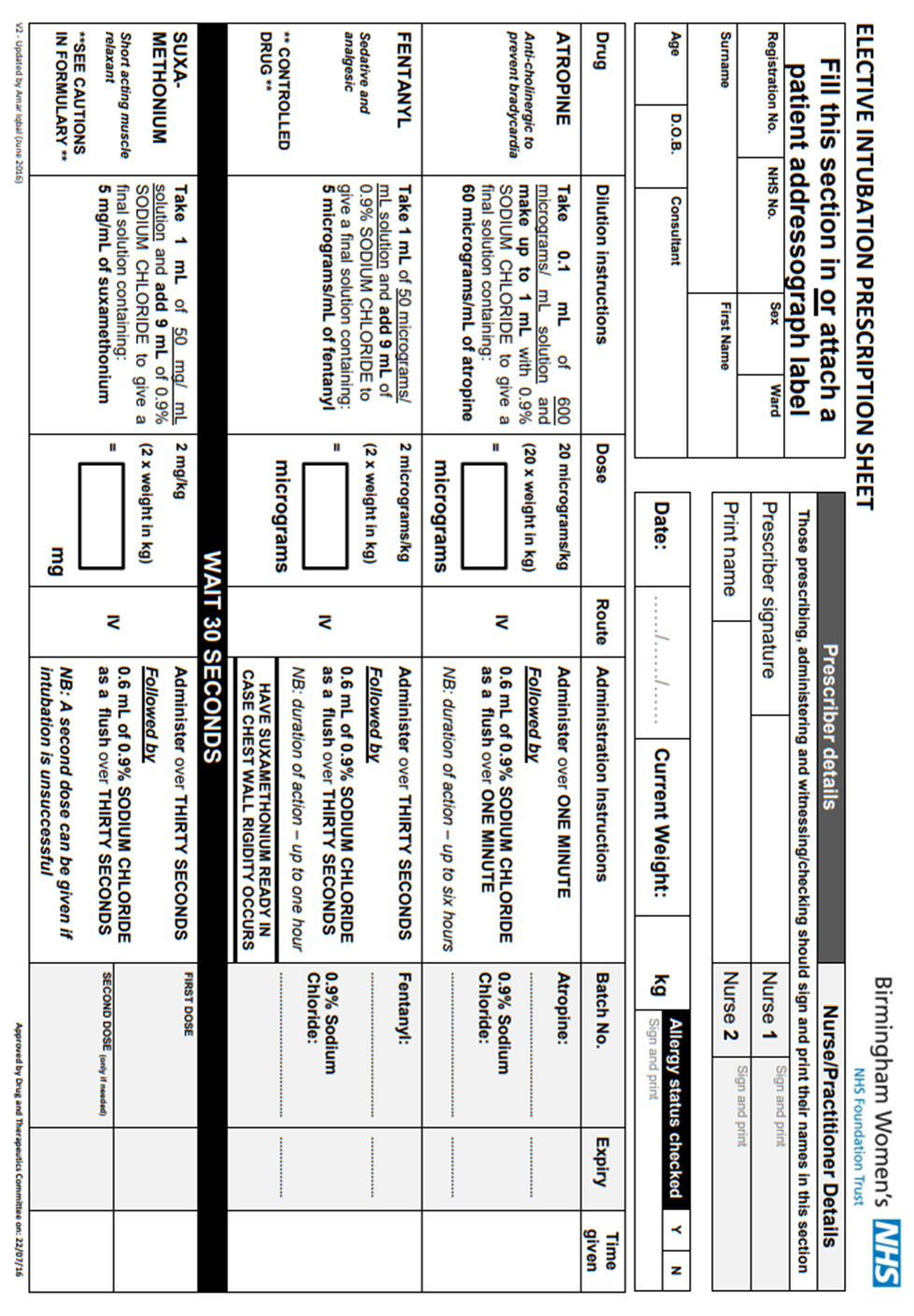
Give the Fentanyl slowly over at least 30 seconds

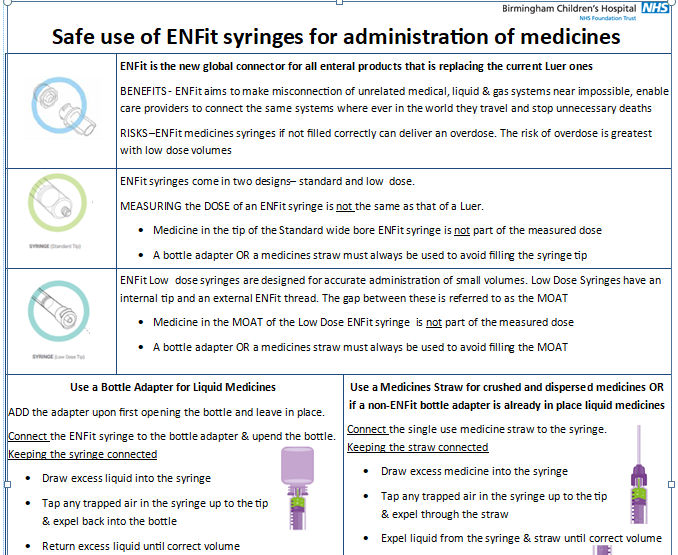
Flush the line with 0.6mls sodium chloride 0.9%

Wait for 2 minutes for the onset of Fentanyl action

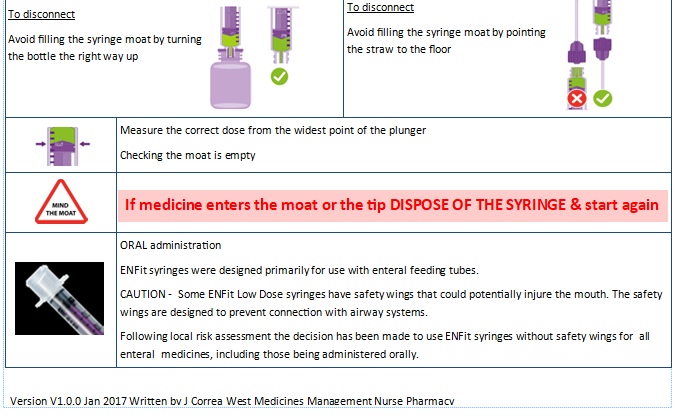
Attempt intubation

If intubation attempts are not successful, further doses of Fentanyl and Atropine are not appropriate due to duration of action





**ADDENDUM 8: SAFE USE OF ENFIT SYRINGES**



**ADDENDUM 9: Methicillin-Resistant Staphylococcus Aureus (MRSA) Decolonisation treatment**

Decolonisation treatment is prescribed in an attempt to reduce or eliminate colonisation with MRSA. Reduction in the degree of colonisation with MRSA may decrease the risks of transmission of MRSA, and of colonisation progressing to invasive infection.

Routine decolonisation treatment involves both nasal and skin decolonisation. The basic regimen is a five-day course of treatment, but in some high-risk situations it may be appropriate to prescribe skin decolonisation for longer (Table 1). The Infection Control Team will advise on a case-by-case basis whether or not to prescribe on-going skin decolonisation.

**Table 1: Circumstances where prolonged decolonisation treatment may be required**

|  |  |  |
| --- | --- | --- |
| **Patient group** | **Possible regimen** | **Rationale** |
| Neonates receiving intensive care | Skin decolonisation continued throughout intensive care. | To reduce the high risk of progression to invasive infection |
| |  |  |  | | --- | --- | --- | | Any patient with MRSA who is being bed space isolated because a single room cannot be identified | Skin  nasal decolonisation continued during period of bed space isolation | Decolonisation will reduce the risk of transmission | | Skin + nasal decolonisation continued during period of bed space isolation | Decolonisation will reduce the risk of transmission |

**Nasal decolonisation**

* Mupirocin 2% nasal ointment (paraffin base – Bactroban® nasal) applied to the anterior nares three times daily for five days.

**Skin decolonisation**

* Daily bathing with Octenisan® for at least five days. Cx powder® (chlorhexidine acetate 1% antiseptic dusting powder) is a suitable alternative for use in neonates.

**Failure of decolonisation treatment**

Where a single five-day course of nasal and skin decolonisation treatment has failed, a second course of treatment may be prescribed. Where that also fails, and eradication of MRSA is still considered to be of benefit, the ICT will advise on an alternative regimen (usually involving use of systemic antibiotics) on a case-by-case basis.

Note : ensure screening swabs are collected not less than 48 hours after completion of decolonisation eradication treatment

**Refer to the MRSA Control policy for:**

* Additional treatments suitable for infection or colonisation of cutaneous sites
* Swabs to Delineate the Extent of Colonisation in Individuals Found to Have MRSA
* Confirmation of permanent eradication of MRSA
* Transfer & Discharge of Colonised or Infected Patients
* Surgery on MRSA-positive patients

Reference: Methicillin-Resistant Staphylococcus Aureus (MRSA) Control Policy, v7 issued 11/11/2015

**Appendix 10:**

**Standardised CHO Addition (Maxijul) to Feeds for persistent hypoglycaemia in newborns on NNU (taken from West Midlands Perinatal Network guideline)**

Super Soluble Maxijul Powder should be measured using **small purple** Nutricia scoops. Each **level** small purple scoop of Maxijul Powder contains 1.3g Maxijul = 1.2g carbohydrate.

To fill the scoop:

1. Dip scoop into the powder.

2. Lift heaped scoop from the tin without compressing powder against the wall of the tin, level the scoop off with a flat implement such as the back of a knife or handle of a second scoop. (in the same way infant formula powder should be measured)

ALL INFANTS STARTED ON A REGIMEN OF ADDITIONAL CHO MUST BE REFERED TO THE DIETITIAN FOR REVIEW.

Table 1: **CHO per 100ml of Milks With Added CHO**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | CHO (g) per 100ml | | | | |
| FEED | No added Maxijul | 1 purple scoop maxijul per 100ml **(1.3%)** | 2 purple scoop maxijul per 100ml **(2.6%)** | 3 purple scoop maxijul per 100ml **(3.9%)** | 4 purple scoop maxijul per 100ml **(5.2%)** |
| MEBM | 7 | 8.3 | 9.6 | 10.9 | 12.2 |
| DEBM | 6.6 | 7.9 | 9.2 | 10.5 | 11.8 |
| MEBM & HMF | 8.5 | 9.8 | 11.1 | 12.4 | Under dietetic supervision |
| NP1 | 8.4 | 9.7 | 11 | 12.3 | Under dietetic supervision |
| NP2 | 7.5 | 8.8 | 10.1 | 11.4 | Under dietetic supervision |
| SMA Pro Gold Prem 1 | 8.1 | 9.4 | 10.6 | 12 | Under dietetic supervision |
| Standard Infant Formula | 7.3 | 8.6 | 9.9 | 11.2 | 12.5 |
| Peptijunior | 6.8 | 8.1 | 9.4 | 10.7 | 12 |
| Infatrini /SMA HE/ Similac HE | 10.3 | 11.6 | Under dietetic supervision | Under dietetic supervision | Under dietetic supervision |

Table 2: **CHO Intake (mg/kg/min) at a Range of Volume Intakes**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| FEED  (% of added CHO) | g CHO per 100ml | CHO intake mg/kg/min **(aim 10-12)** | | |
| @150ml/kg/d | @165ml/kg/d | @180ml/kg/d |
| MEBM (2.6%) | 9.6 | 10 | 11 | 12 |
| MEBM (3.9%) | 10.9 | 11.4 | 12.5 | 13.6 |
| MEBM (5.2%) | 12.2 | 12.7 | 14 | 15.3 |
| MEBM & HMF (1.3%) | 9.8 | 10.2 | 11.2 | 12.2 |
| MEBM & HMF (2.6%) | 11.1 | 11.6 | 12.7 | 13.9 |
| NP1(1.3%) | 9.7 | 10.1 | 11.1 | 12.1 |
| NP1 (2.6%) | 11 | 11.4 | 12.6 | 13.8 |
| NP2 (1.3%) | 8.8 | 9.1 | 10.1 | 11 |
| NP2 (2.6%) | 10.1 | 10.5 | 11.6 | 12.6 |
| NP2 (3.9%) | 11.4 | 11.9 | 13 | 14.3 |
| Standard infant formula (2.6%) | 9.9 | 10.3 | 11.3 | 12.4 |
| Standard infant formula (3.9%) | 11.2 | 11.6 | 12.8 | 14 |
| Standard infant formula (5.2%) | 12.5 | 13 | 14.3 | 15.6 |
| Infatrini (1.3%) | 11.6 | 12 | 13.3 | 14.5 |

Reference: West Midlands Perinatal Network guideline, Standardised CHO additions to feeds for persistent hypoglycaemia in newborns on NNU. Produced by Sara Clarke Lead Neonatal dietitian March 23

**Appendix 11:**

Please refer to full network guidelines for further information and guidance

A diagram of a flowchart

Description automatically generated

A blue and black box with black text

Description automatically generated

Reference

West Midlands Perinatal Network guideline, Nutritional Management of Metabolic Bone Disease (Enteral Feeding Only)

Developed by Katie Hay, Lead Dietitian, EMNODN & Sara Clarke, Lead Dietitian, WMNODN Jan 2023

Appendix 12:

Extravasation Risk Rating

For these warning triangles, please refer to Extravasation Risk Rating for Intravenous Drugs and Fluids- for advice regarding care.

A red triangle with white text

Description automatically generatedA red triangle with white text

Description automatically generatedA yellow triangle with black text

Description automatically generatedA green triangle with white text

Description automatically generated

A close-up of a warning sign

Description automatically generated