NEONATAL FORMULARY

8TH Edition 2025

THIS DOCUMENT MUST NOT BE PHOTOCOPIED

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Please contact the Lead Pharmacist for Neonatal at WRH

on Bleep 143

DRUGS FOR NEONATAL INTUBATION

Be careful not to confuse micrograms (not abbreviated) and milligrams (abbreviated to mg)

DRUG NAME	DILUTION	DOSE	ONSET OF ACTION
Fentanyl	Draw up 2mL of a 50microgram/mL solution (100microgram) and further dilute to 10mL with N/S to give a 10microgram/ml solution	**For ETT intubation** or **InSurE:** Administer 0.2mL/kg of the 10 microgram/mL solution to give 2 microgram/kg dose. **For LISA as half dose**: Administer 0.1mL/kg of the 10microgram/mL solution to give 1microgram/kg/dose. (No Suxamethonium or Atropine). If <34 weeks, load with caffeine citrate first if possible. See L.I.S.A guideline	2 minutes
Suxamethonium	Draw up 2mL of a 50 mg/mL solution (100mg) and further dilute to 10ml with N/S to 10mg/mL solution	**Used for ETT intubation or InSurE**: Administer 0.2mL/kg of the 10mg/mL dose to give 2mg/kg dose	0.5-1 minute
Atropine	**Only give Atropine if a second dose of Suxamethonium is required.** Draw up 1ml (600microgram) of a 600microgram/mL solution and further dilute to 6mL with N/S to give a 100microgram/mL solution.	Administer 0.2mL/kg of the 100microgram/mL solution to give 20microgram/kg dose **S.A.L.S.A:** have Atropine ready to give if required (0.2mL/kg). No other drugs required.	30 seconds

DRUGS FOR NEONATAL RESUSCITATION

ALL EMERGENCY DRUGS CAN BE FOUND IN BLUE DRUG BOX

ALL EMERGENCY DRUGS IN DRUG BOX ARE ALREADY CONSTITUTED FOR IMMEDIATE USE

DRUG	DOSE	ROUTE	ADMINISTRATION	COMMENTS
Adrenaline (epinephrine)	IV: 20 micrograms/kg (0.2ml/kg of 1:10,000) ETT: 100 micrograms/kg (1mL/kg) of 1:10,000 adrenaline	IV or UVC preferred route IO is an alternative if these are not available	Slow IV bolus	If tracheal adrenaline is given IV or Umbilical access should still be sought
Sodium Bicarbonate 4.2%	1–2 mmol/kg sodium bicarbonate (2–4 mL/kg of 4.2% solution)	IV or UVC preferred route IO is an alternative if these are not available	Slow IV bolus	In an emergency, 4.2% may be given peripherally into a large vein with extreme caution due to risk of extravasation.
Glucose 10%	2.5 mL/kg^{-1} of 10% glucose	IV or UVC preferred route IO is an alternative if these are not available	Slow IV bolus	
Sodium Chloride 0.9%	10mL/kg	IV or UVC preferred route IO is an alternative if these are not available	Slow IV bolus	

***Use of IO is very rare in neonates. This should only be used if all other access routes failed.**

Resuscitation Council Guidelines 2021 (most recent addition as of January 2025)

DRUG NAME	DOSE	ROUTE	RECONSTITUTION	ADMINISTRATION	COMMENTS
Aciclovir	20mg/kg TDS	IV Infusion	Baxter brand is already diluted. **Displacement values may differ between brands. Please refer to manufacturer specific information. e.g. leaflet inside of box.**	Further dilute with N/S to a maximum concentration of 5mg/mL and infuse over 60 minutes	Incompatible with dopamine & dobutamine. Extravasation may cause tissue damage.
Adrenaline (epinephrine)	INFUSION 0.1 to 1 micrograms/kg/min Doses of up to 2microgram/kg/minute can be considered in consultation with Tertiary Neonatal Unit	Infusion via central line	Dilute **3mg/kg** of 1mg/mL (1:1000) adrenaline to 50mL using G10% (N/S or G5% are alternative diluents) **Example calculation of dose:** For a 3.6kg baby Calculate 3mg x 3.6kg = 10.8mg For this baby, you would add 10.8mg of Adrenaline (1:1000) into 50mls diluent.	**Examples of infusion rates** 0.1micrograms/kg/min = 0.1mL/hr 0.5microgram/kg/min = 0.5mL/hr 1microgram/kg/min = 1mL/hr Infuse via central line. In emergencies can be run peripherally for a short time while gaining central access.	Monitor ECG, HR and BP by arterial line or cuff DO NOT bolus flush t-piece/lumen after use. Infuse 0.5mL N/S over 30-60min Volume required to prime lines: UVC lumen 0.2mL Long line: 0.2mL PVL t-piece: 0.3mL
Amoxicillin	50mg/kg <7days: BD 7-28 days: TDS	PO/IV	Wockhardt brand: Add 1.5mL WFI to 250mg vial (1.7mL total volume). **Displacement values may differ between brands. Please refer to manufacturer specific information. e.g. leaflet inside of box.**	Slow IV bolus over 3-5min	Dose can be doubled in suspected meningitis. Incompatible with Gentamicin. Flush well.
Atracurium	300-500micrograms/kg followed by 300-400micrograms/kg/hr	IV bolus stat then continuous infusion	Dilute 5mL (50mg) to 50mL with G10% (producing a 1000 micrograms/1mL)	Infuse at 0.3mL-0.5mL/kg/hour. Adjust according to response.	Onset time is 2-3minutes plus IV line clearance. Compatible with dopamine, gentamicin, heparin, midazolam, morphine & potassium chloride.
Benzylpenicillin	25mg/kg BD age up to 6 days (can increase to 8hrly). Age over 6 days 25-50mg 8 hrly.	IV (not for IM)	Sandoz brand: Add 4.6mL WFI to 600mg vial (5mL total volume). **Displacement values may differ between brands. Please refer to manufacturer specific information. e.g. leaflet inside of box.**	Slow IV bolus not exceeding 300mg/min	Incompatible with Gentamicin and Flucloxacillin. Flush line well between doses.

DRUG NAME	DOSE	ROUTE	RECONSTITUTION	ADMINISTRATION	COMMENTS
Caffeine Citrate **Prescribe as caffeine citrate not base**	**Loading dose** 20mg/kg Ampoule 10mg/1mL	IV	Draw up required dose and dilute with N/S to a minimum of 2mL total volume (greater if dose exceeds 20mg) accommodate the IV line and cannula t-piece.	Pre-set IV pump VTBI to 2mL (greater if dose exceeds 20mg) & infuse over 30min. Pump will alarm once syringe is empty. Disconnect the empty syringe and connect a syringe containing a 2mL N/S flush. Infuse 2mL through the same IV line to ensure all dose is given and line is flushed.	Bolus doses may cause sudden changes in blood pressure Caffeine base 1mg = Caffeine citrate 2mg Document on Periprem paperwork for <34/40
	Maintenance dose 5-10mg/kg daily (start on 5mg/kg and increase to 10mg/kg if necessary)	IV or Oral	Draw up required dose and dilute with N/S to a minimum of 2mL total volume (greater if dose exceeds 20mg) accommodate the IV line and cannula t-piece.	Infuse over 10 minutes Pre-set IV pump VTBI & infuse over 10min. Pump will alarm once syringe is empty. Disconnect the empty syringe and connect a syringe containing a 2mL N/S flush. Infuse 2mL through the same IV line to ensure all dose is given and line is flushed.	Start maintenance dose 24 hours after loading dose.
Calcium gluconate 10%	0.3ml/kg (0.07mmol/kg) (urgent correction hypocalcaemia) 0.5-1.0 mmol/kg/day over 24 hours according to laboratory measurement	IV infusion	Ready diluted (but can be diluted further with N/S or G5% or G10% to enable recommended rate of administration) Add to maintenance fluid Compatible with G10%, sodium chloride & potassium chloride	Slow IV Bolus over 5-10 minutes (max.0.1ml/minute) <u>EXAMPLE CALCULATION:</u> Weight x mmol/day required=A Total volume of bag = B Total IV fluid volume required in 24hrs = C e.g. AxB÷C = amount of mmols to be added to bag	1ml of 10% injection contains 0.22mmol calcium Extravasation may cause tissue damage therefore use oral route as soon as possible Not compatible with sodium bicarbonate or phosphate
Calcium (Calvive 1000) 25mmol/tablet	1mmol/kg/day in 2-4 divided doses	Oral	Dissolve each 25mmol tablet in 20mL water. Displacement 5mL. Final concentration 1mmol/mL	Should not be given with milk feeds or phosphate supplements as affects absorption. Give minimum one hour after milk feed	See Network Nutritional Management of Metabolic Bone Disease Pathway

DRUG NAME	DOSE	ROUTE	RECONSTITUTION	ADMINISTRATION	COMMENTS
Cefotaxime	25-50mg/kg Age up to 6 days: BD 7-20 days: TDS >21 days: TDS-QDS Intramuscular route only to be used in babies >36weeks gestation **AND** only when reasonable attempts at cannulation have failed	IV	Bowmed brand: Add 2mL WFI to 500mg vial (2.2mL total volume). **Displacement values may differ between brands. Please refer to manufacturer specific information. e.g. leaflet inside of box.** NB: the solution is straw coloured.	Slow IV bolus over 3-5minutes	Incompatible with gentamicin & sodium bicarbonate. Flush post dose
		IM >36weeks gestation only See Pathway Appendix 1		Inject into the thickest part of the vastus lateralis in the anterolateral thigh. Maximum of 0.5mL volume per site (<4.5kg weight with a 25mg/kg dose)	**SEE IM PATHWAY APPENDIX 1 - Once prescribed Cefotaxime stay on Cefotaxime regardless of route change IM to IV** Document IM site/thigh with each dose and alternate site/thigh with every injection.
Chloral Hydrate	20-30mg/kg QDS for continuous sedation (for management of withdrawal follow local policy)	Oral/Rectal	Oral solution available in various strengths	Can mix with milk to reduce gastric irritation For rectal administration, use oral solution	Doses up to 50mg/kg can be used but drug accumulation may occur
Chlorothiazide	10-20mg/kg BD	Oral	250mg/5mL	oral	Monitor U&E's
Co-Amoxiclav	0.25mL/kg of 125/31 suspension TDS	Oral			IV - Complete infusion within 4 hours of reconstitution A transient pink colour may occur during reconstitution Incompatible with gentamicin. Flush well.
	30mg/kg BD	IV	Non-stock item. When dispensed from pharmacy, please refer to manufacturer specific information (e.g. leaflet or medusa on intranet) as displacement values may differ between brands.	Further dilute to a volume of 3ml/kg (10mg/ml) with N/S Give over 30-40 min	

DRUG NAME	DOSE	ROUTE	RECONSTITUTION	ADMINISTRATION	COMMENTS
Dexamethasone Before prescribing DART protocol, consider patient review from BWH Consultant and parental consent. Comprehensive review should be undertaken (including immunisation schedule and ROP status) before commencing DART.	Post intubation laryngeal oedema 3 doses 200micrograms/kg over 24hours D.A.R.T protocol see Neonatal Formulary Textbook for full information Day 1-3 BD 60 micrograms/kg/dose Day 4-6 BD 40 micrograms/kg/dose Day 7-8 BD 20 micrograms/kg/dose Day 9-10 BD 8 micrograms/kg/dose	IV/Oral	IV 3.3mg/1mL as Dexamethasone **base** Oral Solution – 2mg/5mL as Dexamethasone Phosphate	Over 3-5minutes Recommend starting 4-12 hours before extubation Over 3-5minutes	For IV dosing: prescribe as **base**. Conversion to **base** not necessary for oral solution. May cause hypertension and/or hyperglycaemia. Monitor BP at least BD and OD blood glucose D.A.R.T (Dexamethasone A Randomised Trial) findings for babies <28weeks may have some adverse neurological side effects.
Digoxin	**CAUTION:** dosing varies dependent current body weight **CAUTION:** dosing varies dependent on **IV** or **oral** route See BNFc for dosing and regime				
DOButamine	5-10 micrograms/kg/min. Increase after a minimum of 20 min up to a maximum of 20micrograms/kg/min	IV: Infuse via central access. Use peripheral access only if central access is not available	Dilute 30mg to 50mL with G10%, G5% or N/S (results in 600micrograms/mL)	5microgram/kg/min dose-infusion rate **mL/hour** = 0.5 x baby wt (kg) 10microgram/kg/min dose-infusion rate **mL/hour** = 1 x baby wt (kg) 15microgram/kg/min dose-infusion rate **mL/hour** = 1.5 x baby wt (kg) 20microgram/kg/min dose-infusion rate **mL/hour** = 2 x baby wt (kg)	Monitor ECG, HR and BP by arterial line if possible or cuff. Y-Site compatible with dopamine, magnesium sulphate, pancuronium and potassium chloride. Do not mix with sodium bicarbonate DO NOT bolus flush t-piece/lumen after use. Infuse 0.5mL N/S over 30-60mins Volume required to prime lines: UVC lumen: 0.2mL Long line: 0.2mL PVL t-piece: 0.3mL

DRUG NAME	DOSE	ROUTE	RECONSTITUTION	ADMINISTRATION	COMMENTS
DOPamine	5-10 micrograms/kg/min. Increase after a minimum of 20 min up to a maximum of 20micrograms/kg/min	IV: Infuse via central access. Use peripheral access only if central access is not available	Dilute 30mg to 50mL with G10%, G5% or N/S (results in 600micrograms/mL)	5microgram/kg/min dose-infusion rate **mL/hour** = 0.5 x baby wt (kg) 10microgram/kg/min dose-infusion rate **mL/hour** = 1 x baby wt (kg) 15microgram/kg/min dose-infusion rate **mL/hour** = 1.5 x baby wt (kg) 20microgram/kg/min dose-infusion rate **mL/hour** = 2 x baby wt (kg)	Monitor ECG,HR and BP by arterial line if possible or cuff. Y-Site compatible with dobutamine, heparin, insulin and potassium chloride. DO NOT bolus flush t-piece/lumen after use. Infuse 0.5mL N/S over 30-60mins Volume required to prime lines: UVC lumen: 0.2mL Long line: 0.2mL PVL t-piece: 0.3mL
Epinephrine (see adrenaline)					
Erythromycin	12.5mg/kg QDS	Oral/IV infusion	Displacement values may differ between brands. Please refer to manufacturer specific information. e.g. leaflet inside of box.	Infuse over 60 min	Once reconstituted, solution is stable for 8 hours at room temperature. Infusion may cause phlebitis. Check infusion site regularly. Rapid administration may cause arrhythmias.
Flucloxacillin	25-50mg/kg <7days: BD 7-20days: TDS 21-28days: QDS Increase to 100mg/kg for staphylococcal meningitis, osteomyelitis, cerebral abcess	Oral/IV	Fresenius Kabi brand: Add 5mL WFI to 250mg vial (5mL total volume – no displacement). Displacement values may differ between brands. Please refer to manufacturer specific information. e.g. leaflet inside of box.	Slow IV bolus over 3-5min	Reconstituted injection must be used within 24hours. Incompatible with gentamicin, benzylpenicillin & morphine

DRUG NAME	DOSE	ROUTE	RECONSTITUTION	ADMINISTRATION	COMMENTS
Fluconazole	**Systemic candidal infections:** Dose: 6-12mg/kg <14 days: 72 hourly 14-28 days: 48 hourly >28 days: 24 hourly	Oral/IV	Non-stock item. When dispensed from pharmacy, please refer to manufacturer specific information (e.g. leaflet or medusa on intranet) as displacement values may differ between brands.	Infuse over 30min (maximum rate 20mg/min)	Y-site compatible with heparin, metronidazole, vancomycin, sodium bicarbonate & potassium chloride in glucose Consider antifungals in post gut surgery babies at any gestation
	Mucosal candidal infections: Dose: 3mg/kg <14 days: 72 hourly 14-28 days: 48 hourly >28 days: 24 hourly	Oral/IV			
Folic Acid	For anaemia of prematurity: 50micrograms OD	Oral	Syrup 2.5mg/5mL		Prescribe for signs of anaemia during first 3 months of life and continue for 3 months.
	For haemolytic disease: 1mg OD	Oral	Syrup 2.5mg/5mL		Network jaundice guideline awaiting local editing (2025)
Furosemide	500micrograms-2mg/kg OD <31weeks CGA BD >31weeks CGA	Oral/IV	Oral suspension = 1mg/ml IV = 10mg/mL	IV injection give over 5-10min. Can be diluted further with N/S to a convenient volume to infuse at 100micrograms/kg/min. Rapid administration may affect hearing. Do not infuse >4000micrograms/minute.	Monitor U&Es & creatinine Extravasation may cause tissue damage due to high pH. Administer via large peripheral vein (or centrally if available) and monitor for infusion site. Incompatible with dobutamine, fluconazole, gentamicin, midazolam, morphine and glucose solutions.

Gaviscon Infant	**<u>To make paste</u>:** Add one sachet to 5mL of water to form a smooth paste. **<u>Bottle/NG tube feeding</u>:** Feed volumes of <100mL need 1mL of Gaviscon paste to every 20mL of milk feed. To avoid wasting breast milk, use the below calculation to obtain the exact Gaviscon dose to add per each feed volume. **Calculation:** 1÷20 (0.05) x volume of feed = amount of Gaviscon paste to add to each feed. **Example:** for 59mL feed 1÷20 (0.05) x 59 = 3mL Add 3mL of Gaviscon paste to 59mL of milk feed. **<u>Breastfeeding</u>:** Babies <4.5kg, estimate each breastfeed volume using 150mL/kg/day (3 hourly) to calculate Gaviscon dose per breastfeed. Administer required dose approximately half-way through each breastfeed. Do not interrupt effective latch. Offer maternal choice on timing of administration.	Oral	Open sachet immediately before use and discard any remaining paste after dose is given. Gaviscon infant can be added to feeds with BMF. Do not use with other thickening agents as this may lead to over-thickening of stomach contents and may block NG tubes.	If feed volume is ≥100mL, add one sachet (no need to make a 5mL paste) to the milk feed and mix well. E.g. Required feed volume is 120mL = mix one sachet to milk feed. Maximum 6 whole sachets in 24 hours. Note: 6 whole sachets = 30mL of paste in 24hours. Note: It would be very rare for any baby to require more than 6 whole sachets in 24 hours. For babies >4.5kg: see BNFc	1.04mmol of sodium per one whole sachet Please be aware that each sachet is packaged as a pair. Cut apart two sachets and use ‘One Sachet’ per dose

DRUG NAME	DOSE	ROUTE	RECONSTITUTION	ADMINISTRATION	COMMENTS
Gentamicin	5mg/kg at 36hour intervals UNLESS CGA > = 32/40 **AND** age > or = 7days then prescribe at 24hour intervals	IV	Already in solution. May be further diluted with N/S	Slow bolus over 3-5minutes	Gentamicin levels; trough just before the 2nd dose and then before every subsequent third dose. Aim for < 2mg/L if up to 3 doses given or < 1mg/L for further doses. Incompatible with amoxicillin, cephalosporins, erythromycin, flucloxacillin, heparin & teicoplanin.
Glucose Gel	200mg/kg (0.5mL/kg)	Buccal PO/NG	40% gel already in solution	Administer orally/enterally	See hypoglycaemia guideline
Heparin	0.5units per hour	Umbilical Artery Catheter (UAC) or Peripheral Arterial Line (PAL)	Dilute 50units to 50mL 0.45% Sodium Chloride	Infuse at 0.5mL/hr	Incompatible with morphine
Hydrocortisone	**BPD Protection** Babies <28 weeks Day 1-7 0.5mg/kg BD Day 8-10 0.5mg/kg OD TERTIARY CENTRE continue	IV	2mL WFI into 100mg vial. No displacement.	Slow IV bolus over 3-5min	May cause hyperglycaemia Monitor blood sugar OD May cause hypertension Monitor BP
	Hypotension 1st dose: 2.5 mg/kg 2nd dose in 4 hrs: 2.5mg/kg Then 6hrly/QDS for 48 hours 2.5mg/kg	IV	2mL WFI into 100mg vial. No displacement.	Slow IV bolus over 3-5min	Taken from BNFc: If repeat 2.5mg/kg 6hrly/QDS for 48 hours then dose be reduced gradually over at least 48 hours.

DRUG NAME	DOSE	ROUTE	RECONSTITUTION	ADMINISTRATION	COMMENTS
Ibuprofen WRH: 1st line Paracetamol WRH: 2nd line Ibuprofen	Patent Duct (PDA) Loading dose of 10mg/kg Then 5mg/kg 24 & 48 hours later	IV	Already in solution. Further dilute with N/S or G5% as necessary	Infuse each dose over 15min	Three doses comprise treatment course. See guideline for treatment of PDA for further information
Insulin (Actrapid)	Start infusion at 0.05units/kg/hour Refer to Network Hyperglycaemia guideline for dose titration	IV infusion	Dilute 5 units (0.05mL) to 50mL with N/S(producing a 0.1unit/ml solution) Prime line with 5mL of the reconstituted solution. Leave for 10min then flush line with 10mL of reconstituted solution before connecting to patient.	Initial rate 0.05units/kg/hour = 0.5mL/kg/hour	Insulin adheres to plastic (infusion lines and syringes) reducing efficacy. Change syringe every 24 hours. Incompatible with dopamine, noradrenaline
Labinic Live Bio-Flora (probiotic)	<32 weeks gestation and/or <1.5kg BW (once receiving trophic enteral feeds of 20mL/kg/day) **0.2mL once daily** To continue until baby reaches 34 weeks corrected gestational age.	Oral	Not applicable	A milk feed should be given straight afterwards to 'flush' it through the NG tube to avoid blockage.	Does NOT mix with other medications but can be mixed with milk. Document on Periprem paperwork Stop if baby is nil-by-mouth
Levetiracetam	IV loading dose 40mg/kg then Maintenance dose 10-20mg/kg BD	Loading dose: IV Maintenance dose: IV or oral	IV concentrate for solution for infusion 500mg/5mL **IV infusion:** Dilute the required dose to a final concentration of 15mg in 1mL with NS. Oral solution 100mg/mL	Infuse IV loading dose and IV maintenance over 15 minutes NGT/Oral give as bolus	IV and oral doses are equivalent therefore do not require dose adjustments.

DRUG NAME	DOSE	ROUTE	RECONSTITUTION	ADMINISTRATION	COMMENTS
Magnesium Sulphate 50%	For Hypocalcaemia or Hypomagnesaemia 100mg/kg repeated after 12hours if necessary	IV infusion	For peripheral access – 5% solution. To prepare 5% solution, dilute 1mL (500mg) to 10mL total volume For Central Access – 10% solution. To prepare 10% solution, dilute 2mL (1g) to total volume 10ml using G10%	No loading dose required. IV bolus over 10 min Rapid administration may cause flushing and hypotension10% solution contains 0.4mmol Mg^{2+} / ml	Extravasation may cause tissue damage Y-site incompatible with dobutamine, sodium bicarbonate, calcium, phosphate Monitor plasma levels every 24 hours.
Meropenem	<7days = 20mg/kg BD >7days = 20mg/kg TDS Increase to 40mg/kg for severe infection (same frequency)	IV	Non-stock item. When dispensed from pharmacy, please refer to manufacturer specific information (e.g. leaflet or medusa on intranet) as displacement values may differ between brands.	Slow bolus over 5min	NOT compatible with Aciclovir, Amphotericin, calcium gluconate.
Metronidazole	15mg/kg loading dose then 2nd dose 7.5mg/kg/dose CGA <26/40 OD CGA 26-34/40 BD CGA >34/40 TDS	IV infusion	Pre-made solution: 500mg/100mL bag (5mg/mL)	Infuse over 30 min	Y-site compatible with gentamicin, dopamine, magnesium sulphate, morphine & potassium chloride
Midazolam	Status Epilepticus: 150-200 micrograms/kg	IV bolus	Can be given undiluted	Slow bolus over 3-5minutes	Rapid IV administration (<2 minutes) can cause seizure-like myoclonus in pre-term babies Monitor BP, RR & O2 saturations. Incompatible with furosemide, hydrocortisone, sodium bicarbonate, aciclovir, phenobarbitone, phenytoin
	Starting rate: 60 micrograms/kg/ hour Increase by 60micrograms/kg/hr every 15minutes to maximum of 300micrograms/kg/ hr	IV infusion	For continuous infusion, Dilute 3mg to 50mL with G10% or N/S (producing a 60 micrograms/mL solution)	Infuse at 1mL/kg/hour (60micrograms/kg/hr). Adjust according to response Continuous sedation (<32/40 reduce to 30 micrograms/kg/hour after 24 hrs	

DRUG NAME	DOSE	ROUTE	RECONSTITUTION	ADMINISTRATION	COMMENTS
Morphine Sulphate Pain Relief	100micrograms/ kg loading dose THEN Start at 10micrograms /kg/hour . Adjust according to response by 5micrograms/kg/hr up to maximum of 30micrograms/kg/hr	IV infusion	Dilute 2.5mg to 50mL with G10% (producing a 50 microgram/mL or 5microgram/0.1mL solution)	Loading dose infused over 30 minutes then continuous For 5 micrograms/kg/hour infuse at 0.1ml/kg/hour For 10 micrograms/kg/hour infuse at 0.2ml/kg/hour For 20 micrograms/kg/hour infuse at 0.4mL/kg/hour For 30 micrograms/kg/hour infuse at 0.6mL/kg/hour	Incompatible with aciclovir, furosemide, phenobarbitone, phenytoin Very variable half life in preterm 6-12hours. For NAS treatment refer to Trust guideline
Mulitvitamins (Abidec)	Refer to Local Nutrition Guidelines. For babies on Parenteral Nutrition, refer to Local PN Guideline.	Oral/ NGT	Oral drops		Dosage will change according to birth and current weight/gestational age.
Naloxone For reversal of respiratory and CNS depression (see separate maternal and neonatal causes)	**Maternal opioid administration during labour:** **IV** 10micrograms/kg **IM** 60micrograms/kg **Neonatal opioid overdose:** **IV** 100micrograms/kg No IM dose	IV/IM	Ready diluted 400microgram/1mL May be diluted with N/S to an injectable volume	Given by rapid injection **Maternal opioid:** Repeat at **2-3 minute** intervals as required due to short half life **Neonatal opioid overdose:** Repeat at **1 minute** intervals as required due to short half-life. Maximum total 2mg.	Monitor BP, HR. May precipitate acute withdrawal. Y-site compatible with heparin. Stored in NNU IV cupboard and adult cardiac arrest box (same ampoule concentration for adults and children)
Noradrenaline (Norepinephrine)	INFUSION 0.1 to 1 micrograms/kg/min Dose >1microgram/kg/min should be discussed with Tertiary Neonatal Unit	Infusion via central line	Dilute **3mg/kg** of 1mg/mL noradrenaline to 50mL using G10% (N/S or G5% are alternative diluents) **Example calculation of dose:** For a 3.6kg baby Calculate 3mg x 3.6kg = 10.8mg For this baby, you would add 10.8mg of noradrenaline into 50mls diluent.	**Examples of infusion rates** 0.1micrograms/kg/min = 0.1mL/hr 0.5microgram/kg/min = 0.5mL/hr 1microgram/kg/min = 1mL/hr Infuse via central line. In emergencies can be run peripherally for a short time while gaining central access	Monitor ECG, HR and BP by arterial line if possible or cuff DO NOT bolus flush t-piece/lumen after use. Infuse 0.5mL N/S over 30-60min Volume required to prime lines: UVC lumen 0.2mL Long line: 0.2mL PVL t-piece: 0.3mL

DRUG NAME	DOSE	ROUTE	RECONSTITUTION	ADMINISTRATION	COMMENTS
Nystatin	1mL QDS Continue minimum 7days and stop 48hours after lesions resolved	Topical (to mouth)	1mL contains 100,000 units	Give after feeds	Check lesions daily Consider prophylactic nystatin for babies treated for suspected late onset bacterial infection if BW < 1.5kg or birth GA <30weeks (NICE 2021)
Omeprazole	Start 700micrograms/kg OD After 7-14days increase if necessary to 1.4-2.8mg/kg OD	Oral	10mg in 5mL solution		Reduces gastric acidity therefore NGT pH will be higher (more alkalotic).
Palivizumab	15mg/kg/monthly during RSV season – usually October to February (5 doses).	IM	Add 0.6mL WFI to 50mg vial and 1mL to the 100mg vial. DO NOT SHAKE. Roll gently for 30seconds. Allow to clarify for 20 minutes after reconstitution	Give first dose as close to discharge as possible Subsequent doses to be given monthly in children's outpatients department during RSV season	Must meet criteria and have Consultant Paediatrician approval on Blueteq. See JCVI guidelines who issue the schedule of when to start Palivizumab.
Paracetamol WRH: 1st line for treatment of PDA	Currently Scotland Guidance is being adopted by WRH		For dosing and drug level monitoring please refer to the Scotland guideline		Discuss echocardiogram findings with Dr Van der Velde or Dr Gregory
Paracetamol Pain	See BNFc	Oral	Suspensions available as 120mg/5mL & 250mg/5mL		Check BNFc as doses, dose intervals and maximum daily doses depend on CGA & route of administration
	See BNFc	Rectal	Suppositories available as 30mg & 60mg		
	See BNFc	IV	Already in solution as 10mg/mL	Infuse over 15min	
Phenobarbital	20mg/kg loading dose Then 2.5-5mg/kg every 24 hours (increasing to BD after 14 days treatment of required)	IV loading IV or Oral	Dilute with appropriate volume of WFI to produce a 15mg/mL solution.	Maximum rate is 1mg/kg/min Levels 15-40mg/L after ~14 days for toxicity and tolerance Sample can be taken at any time of day due to long half life	Monitor BP, RR and HR. Compatible with fentanyl, meropenem, morphine sulfate, glucose solutions and NS

DRUG NAME	DOSE	ROUTE	RECONSTITUTION	ADMINISTRATION	COMMENTS
Phenytoin	20mg/kg loading dose THEN 2.5-5mg/kg every 12 hours 100 mg of phenytoin sodium (IV) is approximately equivalent to 92 mg of phenytoin base (oral suspension). Therefore requires conversion calculation when switching from IV to oral.	IV Oral	Dilute 1mL (50mg) to 5mL with N/S (producing a 10mg/mL solution) Oral suspension available as 30mg/5mL	Administer loading dose at maximum rate is 1mg/kg/min Trough plasma levels 6-15mg/L. Take 2-4 hours after loading dose & after 7 days of therapy. Maximum rate is 1mg/kg/min Infuse via 0.22 inline filter. Slow flush with N/S before and after doses as precipitation / crystals may occur on contact with glucose solutions	Highly irritant. If central venous access is unavailable, administer via large peripheral vein and observe IV site closely during infusion. Flush well with NS before and after administration. Incompatible with other medications and glucose solutions (crystallisation can occur).
Phosphate solution (Joulies Phosphate)	Refer to Metabolic Bone Disease Pathway from Neonatal Network Guidelines on Intranet	Oral	Joulies phosphate Huddersfield Pharmacy Specials brand contains (sodium phosphate) each ml = PO_4^{2-} 0.98mmol Na 0.76mmol Therefore 1mmol per ml of phosphate		
Potassium Chloride	1-2mmol/kg/day according to electrolyte levels	Oral	Available as 1mmol/mL liquid	Give with or after feeds	Split daily dose to minimise gastric irritation
		IV	Pre-diluted 500mL bags containing fixed concentrations of potassium should be used in preference whenever practicable. Dilute the required amount of potassium chloride injection 20mmol/10mL with at least 50 times its volume with G10% or NS. MIX THOROUGHLY Maximum conc. equivalent to 40mmol/litre for peripheral use.	Maximum rate is usually 0.2mmol/kg/hour. (But can be increased to 0.5mmol/kg/hour in severe depletion if necessary but must be central if >0.04mmol/mL conc.) <u>EXAMPLE CALCULATION:</u> Weight x mmol/day required=A Total volume of bag = B Total IV fluid volume required in 24hrs = C e.g. AxB÷C = amount of mmols to be added to bag	Incompatible with phenytoin, methylprednisolone Daily lab electrolytes required. Adjust prescription accordingly

DRUG NAME	DOSE	ROUTE	RECONSTITUTION	ADMINISTRATION	COMMENTS
Prostin (Prostaglandin E2) Dinoprostone To maintain patency of ductus arteriosus Seek tertiary centre or BCH cardiology advice for babies requiring Prostin	5-10 nanogram/kg/min Increase by 5 nanogram/kg/ minute to maximum of 20 nanogram/kg/minute Doses of up to 100nanograms/kg/minute can be considered in consultation with BCH cardiology until dose effective	IV	Add 0.5ml (500micrograms) to 500ml G10%, G5% or N/S The resulting solution is 1000nanograms/mL (Or 1microgram/ml)	0.3mL/kg/hour = 5 nanogram/kg/minute 0.6mL/kg/hour = 10 nanogram/ kg/minute 0.9mLl/kg/hour= 15 nanogram/kg/minute 1.2mL/kg/hour= 20 nanogram/kg/minute	Please note, dispose in purple lidded cytotoxic bin – refer to Trust Waste Management policy.
Pyridoxine	50-100mg test dose (for pyridoxine dependent seizures)	IV	Ready diluted with 50mg/2mL ampoule	Very slow bolus over at least 5 min	May cause transient hypotonia and hyposensitivity reactions
	50-100mg daily maintenance dose	Oral	Contact pharmacist to acquire -		
Retinopathy of Prematurity (ROP) eye drops	Cyclopentolate 0.5% One drop each eye	eyes	Ready diluted	One drop each eye 30min prior to examination	
	Phenylephrine 2.5% One drop each eye	eyes	Ready diluted	One drop each eye 30min prior to examination	
Rocuronium	Stat dose: 600micrograms/kg slow bolus over 3-5min Continuous infusion: 300micrograms - 600micrograms/kg/hr	IV	Stat dose: Dilute 10mg to 10mL 0.9% N/S (1mg/1mL) Continuous infusion: Dilute 40mg to 40mL N/S (1mg/mL)	Stat Dose: over 3-5min Continuous Infusion: For 300microgram/kg/hr infuse at 0.3mL/kg/hr For 600microgram/kg/hr infuse at 0.6mL/kg/hr	Onset of action 1-2minutes plus IV line clearance time Incompatible with amoxicillin, dexamethasone, furosemide, hydrocortisone, vancomycin
Salbutamol	For hyperkalaemia 4micrograms/kg stat but may be repeated after 2 hours	IV	Dilute to concentration of 50micrograms/mL using glucose 5%. If glucose 5% not available, use NS	Administer as IV bolus over minimum of 5 minutes	Monitor HR, ECG and BP Extravasation may cause tissue damage.

DRUG NAME	DOSE	ROUTE	RECONSTITUTION	ADMINISTRATION	COMMENTS
Sildenafil	250-500 micrograms/ kg every 6 hours adjust according to response. To maximum of 4hourly if required. Max: 30mg/day	Oral	Tablets can be crushed and dispersed in water to administer orally or via the NG tube. Suspension available from 'specials' manufacturer		Reduce dose and frequency if used with other vasodilators Avoid abrupt withdrawal. Discuss weaning with cardiology BCH
Sodium Bicarbonate **Start with half correction then reassess**	**Full correction**: Base deficit (mmol/L) x weight (kg) x F* = mmol of bicarb required **Half correction:** Above calculation ÷ 2 = mmol of bicarb required *F represents the extracellular fluid:weight ratio. F is different to account for amount of extracellular fluid in these age groups as per below: <37 weeks = 0.5 ≥ 37 weeks= 0.4	UVC/LL infusion	**For Central Access (UVC/LL) (producing a 0.5mmol/mL concentration):** 4.2% solution: give undiluted 8.4% solution: 10ml of 8.4% sodium bicarbonate with 10ml NS= total volume is 20mL	For Central Access: Infuse over 30-60minutes Half Correction Example: BE -14. Gest: 37+4 weeks Weight 3.4kg BE 14 x 3.4kg x 0.4 (F*) = 19.04 mmol divided by 2 = 9.5mmol for ½ correction Central volume: 19mL of 0.5mmol/mL solution	In an emergency (e.g. resuscitation), undiluted 4.2% may be given peripherally (over 60 minutes) into a large vein with extreme caution due to risk of extravasation. Do not mix with any other drugs
Sodium Chloride 30%	1-3mmol/kg/day according to electrolyte levels	IV infusion	Add required amount to infusion fluid, usually G10% Each mL of 30% solution contains 5mmol Na.	<u>EXAMPLE CALCULATION:</u> Weight x mmol/day required=A Total volume of bag = B Total IV fluid volume required in 24hrs = C e.g. AxB÷C = amount of mmols to be added to bag	Daily lab electrolytes required. Adjust prescription accordingly
Sodium Feredetate (Sytron ™)	Iron Supplementation: Dosage will change according to birth and current weight/gestational age – refer to current Enteral Feeding Guideline.	Oral	Pre-made solution: 27.5mg in 5mL	PO/NGT	Not required if milk feed is a pre-term formula or on SMA human milk fortifier Continue until weaned: approx. 6 months of age
Spironolactone	1-2mg/kg BD	Oral	Oral suspensions available as 25mg/5mL or 50mg/5mL	Oral/ NGT	Monitor U&E's and fluid balance

DRUG NAME	DOSE	ROUTE	RECONSTITUTION	ADMINISTRATION	COMMENTS
Sucrose 24%	1 drop (approximately equivalent to 0.05mL) prior to procedural pain Maximum 8 doses per 24 hours.	Topical application to tongue or inside cheek	Already in solution 24%	Administer sucrose solution onto anterior aspect of tongue or inside of cheek. Not suitable for ventilated babies	A record of administration should be made by nursing/medical staff in patient notes alongside procedure
Surfactant) (Curosurf)	200mg/kg rescue (1 dose) 100mg/kg prophylactic (2 doses maximum)	ETT or L.I.S.A catheter or i-gel	Solution is 80mg/mL 240mg/3mL vial OR 120mg/1.5mL	Less Invasive Surfactant Administration (L.I.S.A) Intubate SURfactant Extubate (InSURE) Surfactant via a Supraglottic Laryngeal Airway (SALSA)	Baby to be on CPAP for LISA or SALSA. If more than 50% dose aspirated from NGT, repeat using InSURE
Suxamethonium	see intubation drugs at beginning of formulary				
Trimethoprim	UTI - 3mg/kg for 1 dose then 2mg/kg BD Renal Pelvic Dilatation Prophylaxis - 2mg/kg Nocte	Oral	Suspension available as 50mg/5mL		Duration of prophylactic course to be determined by paediatric renal consultant at WRH
Ursodeoxycholic Acid	10mg/kg BD (Refer to Liver Dysfunction Network guidelines)	Oral	Suspension 250mg/5mL		Discuss with Tertiary or BCH Liver Team prior to starting treatment
Vaccines (Routine)					
DTaP/IPV/Hib/Hep B (Infanrix Hexa)	One dose (0.5mL) at 8, 12 and 16weeks	IM	Already in solution	Preferred site of administration is the anterolateral aspect of the thigh in young children. Vaccines can be administered simultaneously (in different sites) or consecutively.	Refer to UK immunisation schedule: the green book, Chapter 11. Local reactions are common. Monitor for signs of anaphylaxis. Three doses of paracetamol are recommended when Meningococcal B vaccine is given. 1st dose 20mg/kg, 2nd and 3rd dose 10mg/kg, 6-8 hourly.
Pneumococcal conjugated vaccine Prevenar 13	One dose (0.5mL) at 12 weeks	IM			
Meningococcal B (Bexsero)	One dose (0.5mL) at 8 and 16weeks	IM			
Rotavirus (Rotarix)	One dose (1.5mL) at 8 and 12 weeks	Oral		Rotavirus vaccine can be sucked through a bottle teat	

DRUG NAME	DOSE	ROUTE	RECONSTITUTION	ADMINISTRATION	COMMENTS
Vancomycin	Intermittent dose: 15mg/kg <29weeks CGA: OD 29-35weeks CGA: 12hourly >35weeks CGA: 8hourly	IV infusion	Demo & Hikma brands: Add 10mL WFI to 500mg vial (no displacement). Displacement values may differ between brands. Please refer to manufacturer specific information. e.g. leaflet inside of box or Medusa Paediatric Intravenous Medicines. Take 1mL (50mg) and dilute to 10ml with N/S (producing a 5mg/1mL concentration)	Infuse over 60 minutes. Maximum rate 10mg/min	Incompatible with cephalosporins

Therapeutic Drug Monitoring

- Therapeutic levels: 10-15mg/L (Trough levels of 15-20mg may be recommended by microbiology for severe infections).
- Approx. time to steady state 1-2 days
- Take 1st trough level immediately before the 3rd dose. If levels are within the therapeutic range, repeat every 3 days. If level is sub-therapeutic or is above the therapeutic range adjust the dose as per the tables below and repeat the level within 24hours.
- Take the next trough blood sample level immediately prior to next (adjusted) dose and administer dose without waiting for level results. The result obtained will determine what to do for next dose.

Level mg/L	Interpretation of pre-dose level and recommended dose adjustment
<5mg/L	Confirm all doses have been given. If so, increase each dose by 50%
5-10 mg/L	Confirm all doses have been given. If so, increase each dose by 20%
10-15mg/L	Continue current dose. Repeat level in 3 days.
15-20mg/L	Confirm sample taken appropriately. If so, leave or decrease each dose by 10%.
20-25mg/L	Confirm sample taken appropriately. If so, decrease each dose by 20%
>25mg/L	Confirm sample taken appropriately. If so, withhold next dose. Repeat level 8hours from last level and consultant review

DRUG NAME	DOSE	ROUTE	RECONSTITUTION	ADMINISTRATION	COMMENTS
Vitamin A for cholestatic liver disease	1000 units/kg OD round to nearest 1000units Refer to Network Guidelines	Oral	Solution (Abvit™) available as 10,000 units/mL		Do not prescribe alongside Abidec. Monitor total bilirubin and stop when <50
Vitamin D (colecalciferol) for cholestatic liver disease	700 units/kg/day (max 1000 units/day) Refer to Network Guidelines	Oral	Solution (One-alpha™) available 2 micrograms/mL (100 nanograms per drop)	It is not possible to measure a smaller dose than one drop = 100nanograms	Do not prescribe alongside Abidec for cholestatic liver disease
Vitamin D (colecalciferol) for Metabolic Bone Disease (MBD)	500 units/kg/day additional Vitamin D supplement. See Nutritional Management of MBD enteral feeding pathway	Oral	Solution (One-alpha™) available 2 micrograms/mL (100 nanograms per drop)	It is not possible to measure a smaller dose than one drop = 100nanograms	If Vitamin D prescribed for MBD, Abidec should be prescribed.
Vitamin E for cholestatic liver disease	10mg/kg OD Refer to Network Guidelines	Oral	Vedrop suspension available as 50mg/mL		Do not prescribe alongside Abidec Monitor total bilirubin and stop when <50
Vitamin K (Phytomenadione) **for cholestatic liver disease**	300micrograms/kg OD Refer to Network Guidelines	Oral	Use Konakion MM orally Available as 2mg in 0.2mL		Do not prescribe alongside Abidec Monitor total bilirubin and stop when <50 Monitoring of PT and APTT at Paediatric Consultant's discretion
Vitamin K (Phytomenadione) **after delivery**	All babies born ≥ 2.5kg	IM	1 mg IM at birth or soon after	Right or left thigh	If parents do not consent for IM Vitamin K, see BNFc for oral Vitamin K regime Prescribe on front of drug chart as once only. Document on Neonatal Badgernet Admission
	All babies born < 2.5kg	IM	400 microgram/kg (0.04 mL/kg) IM shortly after birth (maximum dose 1 mg)		
Zidovudine (HIV)	See Network Human Immunodeficiency Virus (HIV) guideline for dosing	Oral / IV	Liquid and Infusion available as 10mg/mL	Dilute with G5% to a concentration of 2mg/mL Infuse over 60min	Monitoring if IV treatment >24hours duration: Renal function LFTs weekly, Hb, Neutrophils at least weekly. Monitor lactate, viral load and CD4 count.

Additional Information

This guide covers a range of medicines commonly used at Worcestershire Acute Hospitals NHS Trust. It is intended to provide basic information to assist clinical staff to administer medicines to babies on the Neonatal Unit, Transitional Care Unit, Delivery suite, Postnatal Ward, Meadow Birth Centre and A&E department.

The monographs do not give detailed medicine information and should be read in conjunction with any administration information provided with the medicine and the 'Medusa' Injection Guide, available on the Trust Intranet.

Displacement volumes

Powders that require reconstitution before use may have a displacement volume which should be taken into account when part of a vial is given. The reconstitution instructions in this guideline include displacement volume where relevant but always check the manufacturer's information as the volumes vary depending on brand.

Mixing Drugs in the same IV line

The guidelines provide limited information on incompatibilities as this is a complex subject and whilst a few recommendations are made these are not exhaustive. Medusa Injection guide, available on the Trust Intranet should be consulted to check for incompatibilities. The lead pharmacist for paediatrics (bleep 143) or the on-call pharmacist out-of-hours can confirm whether drugs can be given together via the same line at the same time.

It is better not to mix drugs in the same line but to give one after the other with a flush.

If it is absolutely necessary to give drugs down the same line due to limited IV access or time constraints then check compatibilities beforehand and watch lines closely for problems, particularly precipitation in the line.

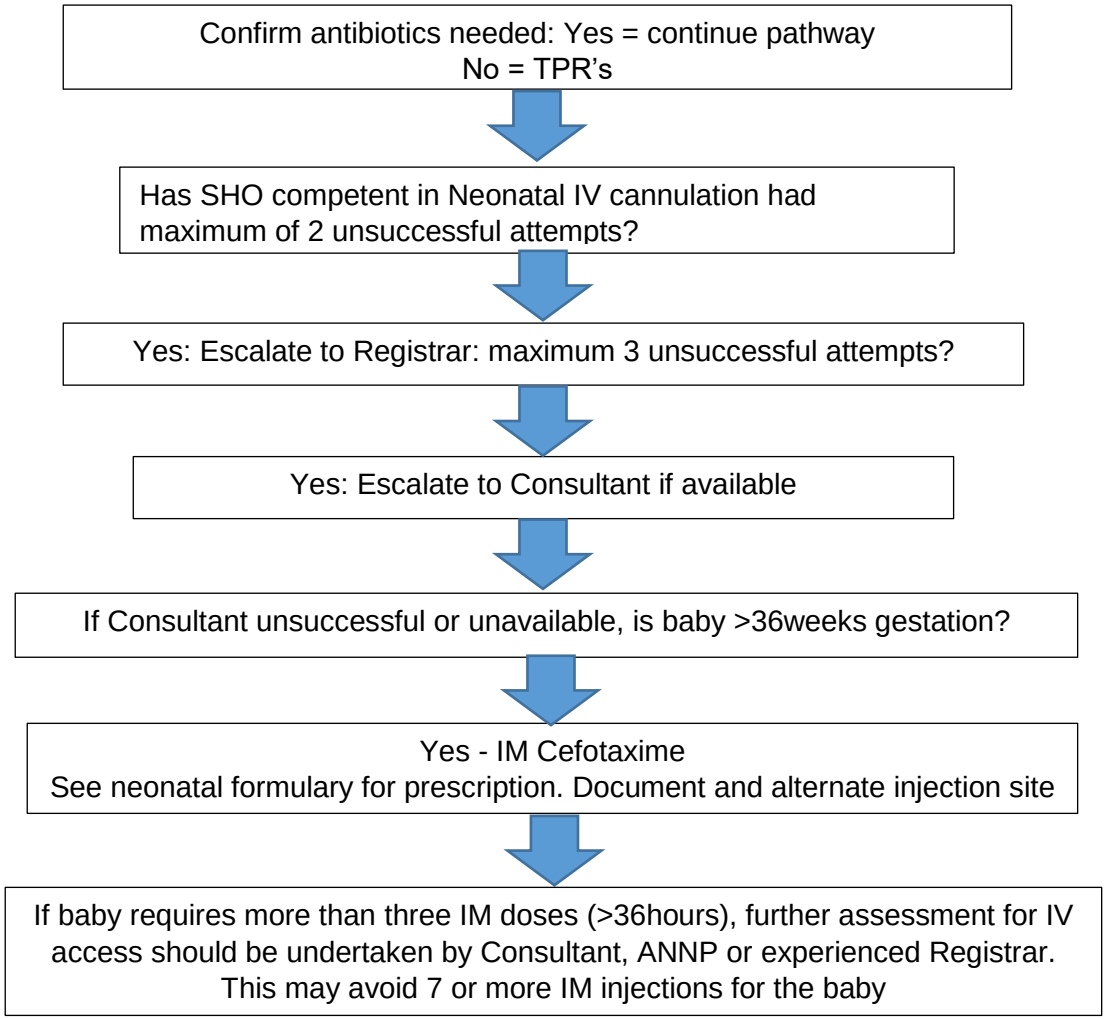
Each lumen of a UVC can be considered as being a separate line as both internal catheters are separate for the length of the line. Each lumen of a long line can be considered a separate line as line contains a maximum of 0.04mLs volume at anyone time and infusion rate will clear line quickly.

References

1. British National Formulary for Children (BNFc). 2021-2022 London: British Medical Association and Royal Pharmaceutical Society of Great Britain
2. Joint Committee on Vaccination and Immunisation (JCVI) Joint Committee on Vaccination and Immunisation - GOV.UK (www.gov.uk)
3. Medusa Injectable Medicines for Paediatrics Guide online resource
4. National Institute for Health and Care Excellence (NICE) https://www.nice.org.uk/guidance
5. Neonatal Formulary: Drug Use in Pregnancy and First Year of Life. 8th ed. Oxford: Oxford University Press 2020
6. Neonatal Guidelines (2020- 2022, Staffordshire, Shropshire & Black Country Neonatal Operational Delivery Network AND Southern West Midlands Neonatal Operational Delivery Network.
7. Newborn resuscitation and support of transition of infants at birth Guidelines | Resuscitation Council UK 2021

This 7th edition of the Neonatal Formulary May 2022 Prepared and Updated by: Louise Williams, Lead Pharmacist, Women and Childrens Division and Linda McDonald Advanced Neonatal Nurse Practitioner. Reviewed and edited with Paediatric Consultant and Neonatal Lead Dr Vivi Weckemann Worcestershire Acute Hospitals Trust.

Appendix 1: IM Cefotaxime Pathway



NB: Maximum of 0.5mL volume per IM site (NB: a 4.5kg weight prescribed a 25mg/kg dose will require approximately a 0.5mL dose). Babies requiring greater than a 0.5mL dose will need to have spilt IM administration over two sites (both thighs). If IV access obtained after starting Cefotaxime, then continue Cefotaxime. Do not change prescription to another antibiotic e.g. Benzylpenicillin, Gentamicin

Appendix 2: Higher Glucose Concentration Preparation

See Worcester Neonatal Hypoglycaemia Guideline for usage

How to Formulate Higher Concentration of Glucose

Equipment required:

500ml 10% Glucose bag

50% glucose solution

Syringes to withdraw and syringes to replace glucose solution

Needles to withdraw and syringes to replace glucose solution

Alcohol wipes

PPE

Please see calculation below using Fresenius Kabi brand bag. Check brand of bag before preparation as different brands may contain overage which would change calculations needed.

Target Glucose Concentration	Volume to **Remove** from 500ml 10% Glucose bag	Volume to **Add** from 50% Glucose vial
12.5%	Withdraw 31.3ml of 10% glucose from 500ml bag	Replace with 31.3ml 50% glucose into same 500ml bag
15% Central Line Only	Withdraw 62.5ml of 10% glucose from 500ml bag	Replace with 62.5ml 50% glucose into same 500ml bag
20% Central Line Only	Withdraw 125ml of 10% glucose from 500ml bag	Replace with 125ml 50% glucose into same 500ml bag

Addendum: 5th March 2024