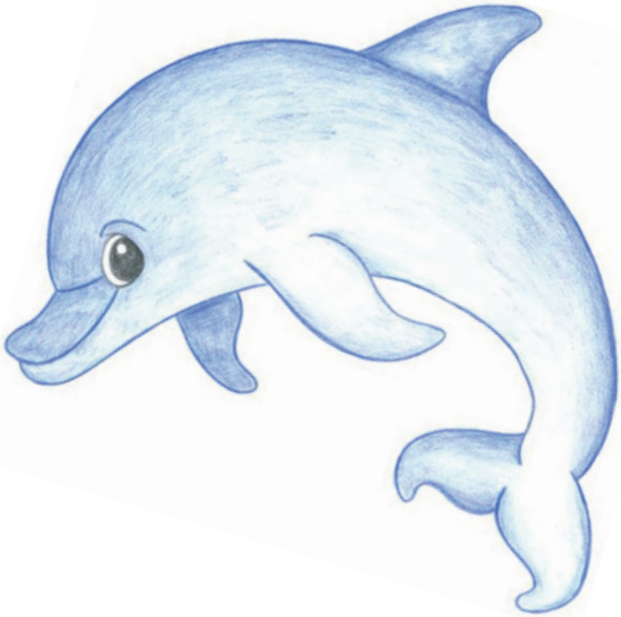
Great Ormond Street Hospital for Children
NHS Foundation Trust



NEONATAL UNIT Staff Handbook

1st Edition 2016

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Contents

Admission to the NICU

- Search for patient details on PIMS. If patient is unknown then admit patient and create a new set of medical notes. If patient has been an inpatient before, retrieve medical notes from security.
- Once on PIMS, create admission forms:
  - FBC, U+E's(+Bili), CRP, Clotting, MRSA screen, Faeces for M,C+S, and Group and save (if patient is going to theatre then also complete a cross match)
- Prior to the arrival of your patient, please ensure the bed space is ready:
  - Emergency equipment, including face masks, guedel airways, working suction and bagging circuit, Babytherm/Giraffe, stethoscope, appropriate ventilator, all necessary monitor cables, fluids/infusions prescribed, drawn up and ready and admission tray is set up.
- Admission trays should contain the following equipment:
  - Blood gas syringe, Blood bottles (FBC (pink) U+E's (orange) Group and save (blue)), swabs for MRSA screen (axilla, groin, hairline, nose and throat and any broken down areas), ECG dots, saturation probe, peripheral temp probe, BP cuff, tape measure, a tempadot & stool pot.
- On arrival of patient, ensure they have:
  - Full assessment: A,B,C,D, skin check for pressure areas, check and flush IV lines for patency
  - Weight, head circumference
  - Ensure all appropriate medications are prescribed/given
- Once patient has arrived, ensure they are admitted on:
  - ICIP, PIMS, PICANET and the admission book
- Once arrived, ensure relevant speciality team are informed (i.e surgical, ENT, neurology, cardiothoracic)

Discharge from the NICU

Internal:

- Await confirmation following bed meeting that bed is available.
- Ensure patient is >34/40 and >1.8kg and fits ward criteria
- Ensure four hours worth of observations are transferred onto Nerve centre
- Discuss with ward an appropriate transfer time
- Ensure doctors have handed over to ward doctors
- Ensure parents are aware of transfer
- Ensure MRSA swabs are done on discharge
- Ensure you have appropriate transfer equipment:
  - Emergency bag, suction, monitor, oxygen cylinder, bagging circuit and medical notes
- Once patient has gone, discharge them from:
  - PIMS, PICANET, ICIP and admission book
- Ensure bedspace is cleaned and set up ready for next patient

External:

- Confirm bed with NIC
- Ensure nursing discharge letter is completed
- Ensure doctors handover is completed and printed
- Ensure all appropriate medical paperwork is printed/ photocopied:
  - Drug chart, fluid chart, Operation notes if applicable
- Ensure a 50ml syringe of current fluid running is drawn up and ready for transport team
- Ensure MRSA swabs are done on discharge
- Ensure parents are aware of transfer
- Ensure accepting hospital are informed once patient has left
- Once patient has gone, discharge them from:
  - PIMS, PICANET, ICIP and admission book
- Ensure bedspace is cleaned and set up ready for next patient

Pre-operative and Post-operative checks

Pre-op:

- Ensure bloods are taken and results are documented (bloods include FBC, U+E's, CRP, Clotting, Cross match)
- Ensure patient has two name bands on
- Ensure consent has been completed
- Ensure pre-op checklist is completed
- Ensure all transfer equipment is working and ready
- Check if babypac is required and set up if so
- Unsure all pumps/ equipment is secured to babytherm/shuttle if using giraffe
- Ensure parents are kept up to date

Post-op:

- Full head to toe and A,B,C,D assessment on return from theatre
- Ensure pink 'operational sheet' is present, with instructions from the surgeons for post op care
- Ensure bloods are checked again (FBC, U+E's and Clotting)
- Ensure parents are updated by surgical team

Nursing weekly task checklist

Monday	Monday night cleaning duties
Tuesday	Weigh and plot your patient, document head circumference
Wednesday	ROP screening (ensure pupils dilated ready for 07:00)
Thursday	Weigh and plot your patient
Sunday	Weigh and plot your patient, weekly MRSA swabs
	Sunday checks – see checklist on intubation trolley

Pain assessment

(For full assessment criteria please see bedside folders)

	0	1	2
Posture/tone	Relaxed	Extended	Flexed and/or tense
Sleep pattern	Relaxed		Agitated or withdrawn
Expression	Relaxed	Frown	Grimace
Colour	Well perfused Pink		Pale/dusky/flushed Palmar sweating
Cry	No		Yes
Respirations	Normal	Tachypnoea	Apnoea
Heart rate	Normal	Tachypnoea	Fluctuation
Oxygen saturations	Normal		Desaturation
Blood pressure (MAP)	Normal		Hypo/hypertension at rest
Nurse's perception	No pain perceived to me		I think the baby is in pain

(Pain Assessment Tool (PAT) created by Hodgkinson, 1994)

- Minimum 4 hourly assessment, post operatively – hourly for first 4 hours, then 2 hourly until 24hours post op
- Scores between 0-20, influence frequency of assessment and indicate management needed.

Score 0-4: Do 4 hourly assessment and continue with current management/consider weaning analgesia

Score 5-9: Do 2 hourly assessment and commence nursing comfort measures

Score ≥10: Do 1 hourly assessments and commence nursing comfort measures and review of analgesia

DO NOT USE PAT SCORE IF PATIENT IS MUSCLE RELAXED

Pain management

Infusions:	
Morphine	0 - 40 micrograms/kg/hr
Fentanyl	0 - 1.5 micrograms/kg/hr
Other pharmacological pain management:	
Paracetamol	10-15mg/kg depending on age, works well combined with morphine
Morphine	Opioid (100mcgs/kg)
Fentanyl	Opioid (1-4mcgs/kg)
Ketamine	Anaesthetic (1mg/kg)
Non-pharmacological pain management:	
Non-nutritive sucking	Consider providing your patient with a dummy as sucking is said to produce endogenous opioids
Positioning/swaddling	
Cuddles	

Sedation

Infusions:	
Clonidine	0.1 – 2 micrograms/kg/hr
Midazolam (over 1 month only)	0 – 4 micrograms/kg/min
Chloral hydrate	Oral/rectal sedation for painless procedures
	Neonate 30mg/kg – SV patient
	Neonate 50mg/kg – Intubated patient
Alimemazine Tartrate	Oral Sedative
	Neonate 1mg/kg

Resuscitation Drugs

Drug	Dose
Adrenaline (1 in 10,000)	10mcg/kg (0.1ml/kg)
Atropine	20mcg/kg (Minimum dose 100mcgs)
Sodium Bicarbonate 8.4%	1mmol/kg (1ml/kg)
Calcium Chloride 10%	0.2ml/kg
Amiodarone	5mg/kg (Dilute in 5% Glucose)
Fluid bolus	10ml/kg
10% Glucose bolus	2.5ml/kg
Shockable rhythms (VF & VT)	4 joules/kg

(Paediatric Immediate Life Support, Resuscitation Council (UK) 2011)

Common Intubation Drugs

Drug	Dose
Fentanyl	2-4mcg/kg bolus
Morphine	100mcg/kg bolus
Atracurium	0.5-1mg/kg bolus
Ketamine	1-2mg/kg bolus

(PICU/NICU Rough guide April 2014)

Blood gases

Normal Neonatal Arterial Blood Gas Values

	Dose
pH	7.35 – 7.45
$paCO_2$ (Kpa)	4.5 – 6.5
paO_2 (Kpa)	8 – 13
HCO3	22 – 26
BE	-2 – +2

Preterm neonates – Lower pH's (>7.25) and higher C02's (5.5-9.0) may be acceptable due to immature lung development. This may help prevent excess trauma to the lungs from over ventilation.

PPHN acceptable blood gas values – please see protocol

All neonates are different and the above values will not be appropriate in all cases, please seek advice from the NIC and doctors.

Normal Observation Values

	Gestation		
	Preterm	**Term**	**Infant**
Heart rate	100-200	100-180	100-160
Blood pressure	Mean BP = patients gestation	Mean BP = patients gestation	Mean BP = patients gestation
Oxygen saturations	>92%	>94%	>94%
Respiratory rate	40-70	35-65	30-60
Temperature	36.7-37.3	36.7-37.3	36.7-37.3

The above values are not appropriate for all neonates.
Some patients, for example cardiac patients and patients with PPHN, will require different limits.
Please seek advice from the NIC and doctors.

Neonatal blood spot

Newborn blood spot screening identifies babies who may have rare but serious conditions. The sample tests for 9 conditions:

- Phenylketonuria (PKU)
- Congenital hypothyroidism (CHT)
- Sickle cell disease (SCD)
- Cystic fibrosis (CF)
- Medium-chain acyl-CoA dehydrogenase deficiency (MCADD)
- Homocystinuria (HCU)
- Maple syrup urine disease (MSUD)
- Glutaric Acidemia Type 1 (GA1)
- Isovaleric Acidemia (IVA)

When to screen:

Day 0

- 1 spot
- Keep at bedside and send with day 5-8 sample
- This sample is taken in case the baby receives red cells prior to the day 5-8 sample as this will effect the test for SCD

Day 5-8

- Day of birth is classed as day 0
- 4 spots on a new card
- Send to labs with day 0 card (pod 051/011)
- **All** babies must have a sample sent by day **8** (see 72 hours below if tx)

Taking the sample by day 8 even if the baby has been transfused allows the labs to identify and follow up the baby and also some conditions may be able to be tested for

72 hours

If the day 5-8 sample was taken less than 72 hours post transfusion a repeat sample will need to be taken the next time the baby is 72 hours post transfusion. Please write the time the sample was taken and the time the last transfusion ended on the screening card

Day 28

- Only babies born at less than 32 weeks gestation
- 2 spots
- Sample must be 3 clear days post transfusion

In practice:

- Babies **NHS number** must be on the card
- **Don't** use GOSH patient stickers of request forms
- Sample can be taken from **arterial/venous lines** or **capillary heel prick**
- Allow blood to fill each circle completely, do not add layers of small blood spots
- **Send** – via pod 051/011 or via porters
- **Document** when you have taken samples: **ITU's/Bear** – Carevue Wards – Birth history form
- **Unsure?** Ask Neonatal CNS, bleep 0256 or screening labs 8383

Neonatal Jaundice Key Points

Babies have been **seriously harmed** due to poor management of high bilirubin levels in the newborn period

Measure bilirubin levels on admission for all babies < 7 days old

Plot bilirubin level on a ***gestation appropriate*** NICE threshold chart

Commence treatment promptly as per NICE guidelines

Seek advice if unsure about any aspect of neonatal jaundice

What is Jaundice?

- Neonatal Jaundice (hyperbilirubinaemia) refers to yellow colouration of the skin and the sclerae caused by a raised bilirubin levels.
- Approximately 60% of term and 80% of preterm babies develop jaundice in the first week of life.
- High levels of bilirubin can be toxic resulting in devastating brain damage and hearing loss.

Who to Monitor?

Every neonate can become jaundiced

- Observe sclerae, gums and blanched skin in natural light for signs of jaundice
- Measure bilirubin levels on admission for all babies <7 days old
- HIGH RISK
- Jaundiced <24 hours (discuss with consultant immediately)
- Maternal: Blood type ABO and/or rhesus negative
- <38 weeks gestation
- Previous sibling treated for jaundice
- Family history of G6PD deficiency or congenital spherocytosis

Where to document?

- On Carevue/nursing and medical notes
- Plot serum bilirubin on gestation appropriate NICE threshold chart to determine if treatment required
- Threshold charts are available via the Forms page on the intranet or on PC desktops

Treatment?

- Phototherapy (Single or Multiple – see NICE/trust guidance)
  - Phototherapy lights can be obtained via CARPS and tracked on asset tracker
  - Extra fluids should NOT be given routinely
  - Babies should wear only eye shields and a nappy
- Exchange transfusion: see NICU/ trust guidance if high or rapidly rising bilirubin levels (Discuss with Consultant immediately)

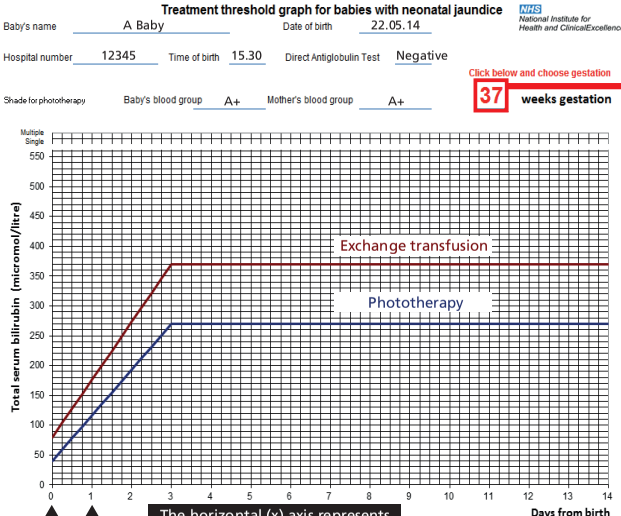
Advice?

- Neonatal Nurse Advisors 09:00-17:00hrs Mon to Fri Bleep 0256 Ext 6724
- General Paediatricians (bleep 0012)
- Out of hours: On call medical team or CSPs

Additional Resources

- For more information please refer to the online teaching on Gold
  - Gold> Online Learning> Other Courses> Caring for Neonates> Jaundice
- Or the GOSH policy: Managing jaundice in Neonates
  - GOSHweb>Policies>Managing Jaundice in Neonates

Charts for all gestations can be found on the GOSH web



There is a different treatment threshold chart for every week of gestation (23 - 38 weeks).

When printing out a chart use the scroll down menu to select the appropriate chart for the babies' gestational age in weeks at birth.

0 on the graph represents the baby's date and time of birth

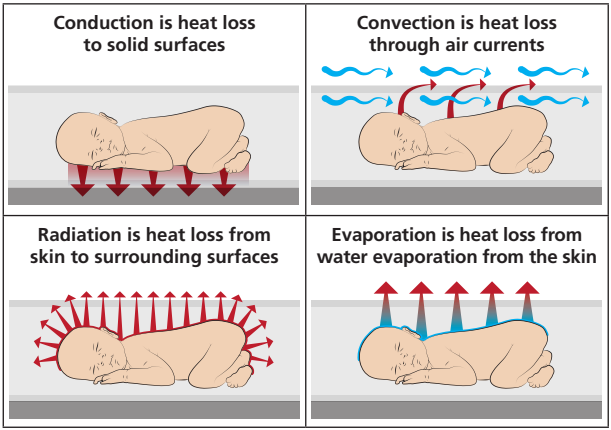
22.05.14 15.30

23.05.14 15.30

The horizontal (x) axis represents the baby's age in hours from birth: day 1 = 24 hours old, day 2 = 48 hours old.

Thermoregulation

Neonate's are susceptible to temperature instability, they can loose or gain heat through the following mechanisms:



Humidification: Any neonate less than 30 weeks gestation in the first 14 days of life should be nursed in a closed incubator with added humidity. The use of humidity maintains temperature, assists fluid and electrolyte management, decreases insensible water loss and maintains skin integrity – Please see the useful link for guidance on use.

In practice:

- Ensure neonates temp is checked at least 4hrly
- Change the babytherm/giraffe temperature in 0.5 degree increments according to their temperature
- Dress neonates where possible, or use hats and gloves (not whilst in humidity!)

Useful link: www.gosh.nhs.uk/health-professionals/clinical-guidelines/thermoregulation-neonates

Retinopathy of prematurity (ROP)

Retinopathy of prematurity (ROP) is a disease of the eye affecting premature babies. It is thought to be caused by disorganised growth of retinal blood vessels which results in scarring and retinal detachment. ROP can be minor resolving spontaneously, but in serious cases it may lead to blindness. Oxygen toxicity and relative hypoxia are thought to contribute to the development of ROP. All preterm babies are at risk of developing ROP and thus need screening so appropriate treatment can be given. Severe forms of ROP may require treatment. Treatments include laser and surgery.

ROP screening

Who: Infants <32 weeks gestation and/or <1500g birth weight

When: Babies born before 27 weeks gestation: 1st screening is due between 30 and 31 weeks postmenstrual age

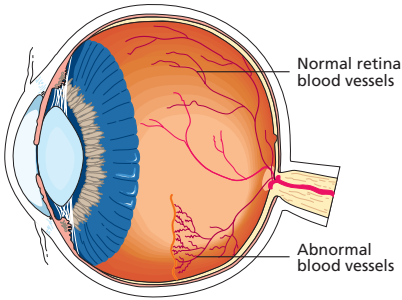
Babies born between 27 and 32 weeks gestation or weighing less than 1501grams at birth: 1st screening due between 4-5 weeks postnatal age

How: Screening on the unit is every Wednesday morning

Place a patient sticker in the screening book on NICU and record the patients location (update if transferred)

Ensure eye drops should be prescribed and given at 06:00 as per ophthalmology book

(Check the ophthalmology book behind the desk on NICU for more screening information)



There are five different recognised stages of ROP:

Stage 1 - Mildly abnormal blood vessel growth

Stage 2 - Vessel growth is moderately abnormal

Stage 3 - Blood vessel growth is severely abnormal

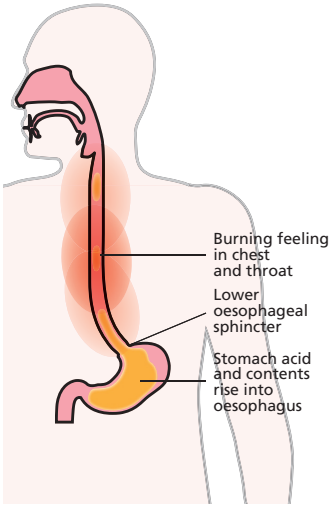
Stage 4 - Partial retinal detachment

Stage 5 - Total retinal detachment

In addition, the ophthalmologist may describe pre-plus or plus disease

Gastro-oesophageal reflux disease (GORD)

GORD is the flow of gastric contents back up the oesophagus from the stomach. It increases in incidence with increasing prematurity. The gastric contents, a mixture of food and acid, irritate the lining of the oesophagus, causing pain. GORD can also cause aspiration, where some of the gastric contents spill into the trachea, irritating the lungs and causing repeated chest infections. GORD is clinically recognisable by repetitive vomiting, irritability with feeds, and apnoea's, bradycardia's and desaturations. The gold standard of diagnosis is with a pH study where a probe is inserted into the oesophagus and a machine records reflux episodes over a 24hr period. GORD occurs due to small gastric capacity with delayed emptying times. It is usually resolved by one year of age.



In practice:

- Consider nursing the patient at a 30° angle, on their right or prone
- Ensure the patient is on appropriate anti-reflux drugs
- Review feeds, consider decreasing volumes and increase frequency
- Ensure patient is receiving appropriate pain relief if distressed
- Monitor weight gain
- Monitor respiratory effort and assess for signs of aspiration
- In serious cases, discuss surgery.

Useful link: www.gosh.nhs.uk/medical-conditions/search-for-medical-conditions/gastro-oesophageal-reflux/gastro-oesophageal-reflux-information

Blood glucose monitoring

Blood glucose monitoring uses a small drop of blood to test the concentration of glucose in the blood, allowing us to assess our patients for hypoglycaemia (low blood sugar) and hyperglycaemia (high blood sugar). Normal blood glucose levels are between 4-7mmols/L, however on the neonatal unit babies levels can drop to 2.6mmols/L and increase up to 12mmols/L before we initiate treatment.

Hyperglycaemia	
Causes: ■ Infection ■ Pain ■ Drugs (steroids) ■ Stress (post operatively) ■ Neonatal diabetes mellitus ■ Extreme prematurity ■ IUGR /preterm babies given excess glucose load *Hyperglycaemia can cause osmotic diuresis leading to intravascular dehydration, weight loss and hypotension.*	**Management:** ■ Send blood to lab to confirm blood sugar level ■ Test urine for glycosuria ■ Inform NIC immediately ■ Commence Insulin (as per pharmacy folder protocol) when levels read >12mmols/L on two consecutive tests ■ Check blood sugar levels regularly ■ Screen for underlying causes (sepsis) ■ Optimise pain control ■ Minimise stress causes, i.e. optimise blood gases

Hypoglycaemia	
Symptoms: ■ Irritability ■ Jitteriness ■ Sleepiness ■ Poor feeding ■ Seizures/ reduction in conscious level	**Management:** ■ Inform NIC immediately ■ Give glucose 10% bolus of 2.5mls/kg ■ Consider increasing fluid allowance ■ Recheck blood sugar levels regularly

Useful link: www.gosh.nhs.uk/health-professionals/clinical-guidelines/blood-sampling-neonatal-capillary

Inotropes

Inotropes are used when there is persistent cardiovascular instability, e.g. hypotension, poor tissue perfusion or poor urine output, despite fluid resuscitation. Inotropes are used to:

- Increase cardiac output
- Increase tissue perfusion
- Increase urine output

Common inotropes used on NICU include:

- Dopamine (DA receptors, low doses β1, high doses α1)
- Noradrenaline (mainly α receptive)
- Adrenaline (α and β receptive)
- Milrinone (increase the hearts contractility, decrease pulmonary vascular resistance and peripheral vasodilation)

In practice:

- Monitoring observations is essential
- Arterial line monitoring if possible
- Follow guideline when swapping over inotrope – always have a senior nurse present when swapping over the syringes
- ALWAYS ask if unsure when using inotropes

Pharmacology of inotropes

Receptor	Cardiac effect	Extra-cardiac effect	Main clinical effect
α1	----------	Arterial and venous vasoconstriction	Increase systemic vascular resistance Increase venous return
β1	Increase heart rate Increase contractility Increase AV conduction	----------	Increased cardiac output
β2	Increase heart rate	Arterial vasodilation Bronchodilation Mast cell stabilisation	Decreased systemic vascular resistance Decreased bronchospasm Decreased acute allergic reaction
DA	----------	Renal and mesenteric vasodilation	Increase renal and mesenteric blood flow

Side effects of inotropes:

- Increased HR
- Ectopics
- Peripheral vasoconstriction/ischemic damage
- Renal vasoconstriction
- Extravasation injuries

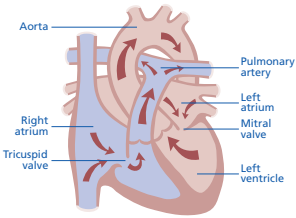
Patent Ductus Arteriosus (PDA)

The ductus arteriosus is a blood vessel, present in all babies in the womb, that connects the pulmonary artery to the aorta. This vessel should close shortly after birth, however in some babies, especially preterm babies, this vessel stays open meaning the mixing of oxygenated and deoxygenated blood. This is then called a patent ductus arteriosus (PDA). The PDA increases blood flow to the lungs, making it harder for the baby to breathe and the heart has to work harder to pump the blood around the body. The baby may have been given non-steriodal medication to try and close the duct, if unsuccessful the baby may need surgical closure.

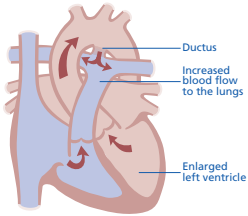
In practice:

- Ensure the baby is fluid restricted and on diuretics if necessary to try and reduce fluid overload
- Ensure the baby is prepared for theatre (blood tests checked including cross match, name bands in situ and consent obtained)
- Ensure ECHO is done to confirm duct is open
- Complete the PDA pathway – found in the PDA folder by the desk
- Ensure there is flying squad blood in the fridge on the unit prior to commencing the procedure
- Ensure pre + post op analgesia/ sedation is optimised
- Prepare for possible chest drain post operatively
- Discuss IVAB with cardiothoracic team

Normal Heart Anatomy



Patent Ductus Arteriosus

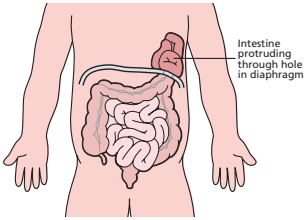


Useful link: www.gosh.nhs.uk/medical-conditions/search-for-medical-conditions/patent-ductus-arteriosus/patent-ductus-arteriosus-information

Congenital Diaphragmatic Hernia (CDH)

A congenital diaphragmatic hernia (CDH) is a birth defect which occurs when the diaphragm, a curved muscle which separates the contents of the chest from the abdomen, does not form properly and leaves a hole. This allows the intestines to herniate into and then grow in the chest cavity, meaning the lung on the herniated side will be hypoplastic. CDH's happen in early pregnancy, between 6-8 weeks, and are very rare occurring in around one in 2500 births. The hernia can form on either side, but is usually on the left and is more common in boys than girls.

- Antenatal diagnosis is typical
- These patients are often very sick
- Surgery is essential to remove the abdominal contents from the chest cavity and to repair the diaphragm – this will not take place until pulmonary hypertension has settled and patient is stable



- Persistent Pulmonary Hypertension (PPHN *Please see separate section) is common in these patients
- Extra Corporeal Membrane Oxygenation (ECMO) may be required

In practice:

- The patient should remain NBM, with NGT aspirated and on free drainage until directed by the surgical team
- IV fluid/TPN should be commenced
- Patient should be prepared for theatre ASAP (all bloods checked, name bands in-situ and consent obtained from parents)
- Ensure patient is intubated and ventilated appropriately
- Optimise pain relief/sedation and paralyse if necessary
- Ensure patient has appropriate IV access
- Manage PPHN (see separate section) appropriately if evident

Useful link: www.gosh.nhs.uk/medical-conditions/search-for-medical-conditions/diaphragmatic-hernia/diaphragmiatic-hernia-information

Necrotising Enterocolitis (NEC)

Necrotising Enterocolitis (NEC) is the most common surgical emergency in preterm babies. It is a serious condition in which tissues in the intestine become inflamed and start to die. This can lead to a perforation developing in the intestines, allowing their contents to leak into the abdomen. NEC can often be treated without surgery, resting the bowel and by treating the infection with antibiotics (this is called conservative treatment). If the baby develops a perforation or does not respond to the 'conservative' treatment, then the surgical team will have to operate to remove the dead bowel and repair the perforation.

Signs and symptoms include:

- Bilious aspirates/vomiting
- Distended abdomen
- Discoloured abdomen
- Frank blood PR/NG
- Patient instability – poor handling, temperature insability, apneoa and bradycardia, hypotension

In practice:

- Patient needs to be NBM and have a large bore NGT placed, aspirated and left on free drainage
- Patient should have abdominal X-RAYS on admission and immediate review by surgical team
- Appropriate IV access should be obtained
- IV fluids should be commenced
- IVAB should be prescribed and given
- Adequate analgesia should be given and pain scores regularly checked
- Check all bloods (FBC, Clotting, U+E's, CRP + cross match) and prepare for possible theatre
- **Avoid nasal CPAP due to blowing up of the abdomen**

Useful link: www.gosh.nhs.uk/medical-conditions/search-for-medical-conditions/necrotising-enterocolitis/necrotising-enterocolitis-information

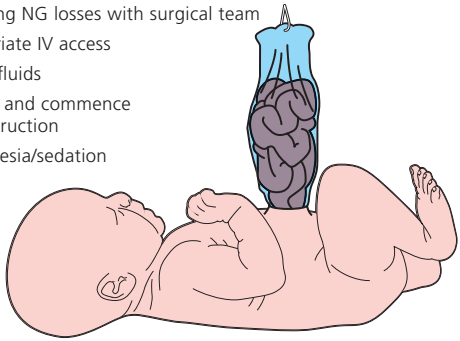
Gastroschisis

In gastroschisis, the abdominal wall does not form completely during development, meaning the intestines develop outside the patient and are thus open to the air when the child is born.

Gastroschisis is usually antenatally diagnosed, but is quite rare occurring in around 1 in 3000 births. Causes of this condition are unknown, however it is becoming more common, particularly in younger mothers under the age of 20 years. Gastroschisis can be associated with other problems, meaning the baby will need a full examination for other conditions. It is a serious condition and needs immediate surgical review. The baby will either have a primary closure – where the defect is small and the surgeons can easily replace the bowel into the abdominal cavity and close the defect, or the patient will have the intestines placed in a silo bag (see picture below) and the intestines will be 'tucked' back into the abdominal cavity over several days.

In practice:

- Prior to theatre, ensure the babies intestines are wrapped in cling film (reduces fluid and heat loss) and avoid unnecessary handling of exposed bowel
- Ensure surgical team are informed of patients arrival
- Ensure the patient is prepared for theatre (bloods checked including cross match, name bands in situ and consent obtained)
- Ensure patient is NBM. Pass an NGT, aspirate and leave on free drainage.
- Discuss replacing NG losses with surgical team
- Ensure appropriate IV access
- Commence IV fluids
- Consider IVAB, and commence on surgical instruction
- Optimise analgesia/sedation if appropriate



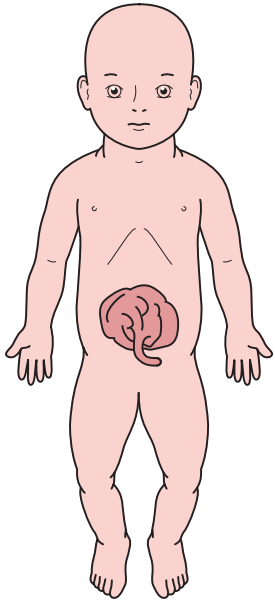
Useful link: www.gosh.nhs.uk/medical-conditions/search-for-medical-conditions/gastroschisis/gastroschisis-information

Exomphalous

An exomphalous is a weakness of the baby's abdominal wall where the umbilical cord joins it. This weakness allows the abdominal contents, mainly the bowel and the liver, to protrude outside the abdominal cavity where they are contained in a loose sac that surrounds the umbilical cord. As the contents are lying outside it, the abdominal cavity often does not develop properly and remains small in size. The cause of this condition is unknown but occurs in around 1:5000 pregnancies. Around half of these babies will have complications with other organs, most commonly the heart, lungs and kidneys, and they have an increased risk of chromosomal abnormalities. Surgery is essential to repair the defect, this may occur in a primary repair if the defect is small or a staged repair if the defect is large.

In practice:

- Ensure the sac is wrapped in cling film (reduces heat and fluid loss)
- Ensure surgical team are aware of the patients arrival
- Ensure appropriate IV access is obtained
- Commence IV fluids
- Ensure patient is prepared for theatre (see separate section)
- Ensure the patient is NBM. Pass an NGT, aspirate and leave on free drainage
- Optimise analgesia/sedation if appropriate
- Ensure baby has full examination to identify any other abnormalities



Useful link: www.uhs.nhs.uk/OurServices/Childhealth/Neonatalsurgery/Conditionswetreat/Exomphalos.aspx

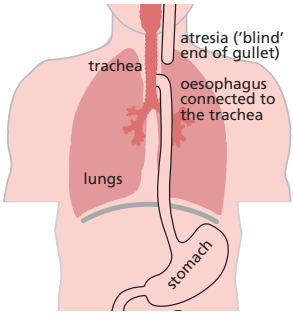
Tracheo-Oesophageal Fistula (TOF) & Oesophageal Atresia (OA)

Tracheo-oesophageal fistula (TOF) is a rare condition, where part of the oesophagus is joined to the trachea, this tends to occur alongside oesophageal atresia. Oesophageal atresia (OA) is another rare condition where a short section at the top of the oesophagus has not formed properly and it is not connected to the stomach, meaning nothing can pass from the oesophagous to the stomach. Surgery is essential to repair the defect.

TOF and OA can develop in many different forms, Image 1 is the most common form accounting for about 85% of all cases.

In practice:

- Pass a replogle tube (a double lumen, radio-opaque tube, used to give continuous suction and irrigation to a blind ending pouch.)
- Position baby slightly head up tilt
- Check nose for sores from replogle tube regularly
- Ensure IV fluids running
- Prepare for theatre (please see separate section)



Replogle tube care:

- Flush with 0.5mls of 0.9% sodium chloride every 15mins to prevent blocking
- Check pressure on suction is between 3.5-4kpa.

If appears blocked, try the following until you see fluid coming back up the tube:

- Flush with another 0.5mls 0.9% sodium chloride
- Flush with 1ml of air
- Briefly increase the suction to 7-10 kpa
- Gently move tube around in nostril
- If unable to unblock - replace tube

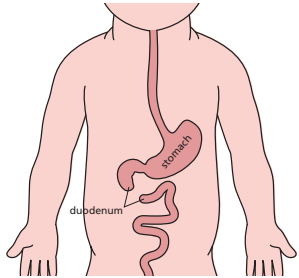
Useful links: www.gosh.nhs.uk/health-professionals/clinical-guidelines/replogle-tube-care-of or www.gosh.nhs.uk/medical-conditions/search-for-medical-conditions/oesophageal-atresia-with-tracheo-oesophageal-fistula

Duodenal atresia

Duodenal atresia occurs when the duodenum (the first part of the intestine following the stomach) is closed, meaning that food and fluids cannot pass through to the rest of the intestines. Duodenal atresia can sometimes, but not always, be diagnosed on antenatal scans. These babies usually appear well at birth, but once fed will be sick with bile green colouring. Duodenal atresia is confirmed on X-RAY with the classic 'double bubble'. Duodenal atresia is rare, occurring in roughly around one in 6000 births and can be associated with other problems, including down's syndrome, and thus the baby will need a full assessment.

In practice:

- Surgery is essential to repair duodenum
- Patient must be NBM, NGT passed, aspirated and left on free drainage to ensure decompression of stomach
- Patient must be prepared for theatre on arrival (all bloods done including cross match, consent obtained, name bands insitu)
- X-rays must be completed on surgical instructions
- IV fluids commenced
- IVAB commenced on surgical instructions
- Pain relief/sedation must be optimised



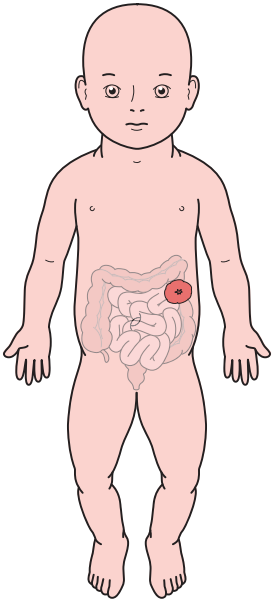
Useful link: www.gosh.nhs.uk/medical-conditions/search-for-medical-conditions/duodenal-atresia/duodenal-atresia-information

Stoma's

A stoma is an opening made on the abdomen which allows waste to pass out the body. This will be formed by the surgeons during bowel surgery, and can be temporary to allow the bowel to heal or more permanent if necessary. There are different types of stoma depending on its location within your bowel; an Ileostomy and a Colostomy. An Ileostomy is where the ileum (small bowel) has been brought out to form the stoma, the waste products from an ileostomy are usually quite liquid. A Colostomy is formed further down your bowel with your colon (large bowel). The waste from a colostomy is usually more formed as it has had liquid removed on its way through the bowel.

In practice:

- Check the stoma looks pink and healthy
- Check the stoma for any bleeding
- Check the bag for any leakages
- Monitor the stoma output and observe fluid balance carefully
- Contact the surgeons or stoma nurse with any concerns



Useful link: www.gosh.nhs.uk/health-professionals/clinical-guidelines/stoma-care

Bladder Exstrophy

Bladder exstrophy is a rare congenital abnormality, occuring in around one in 10,000 to 50,000 births, in which part of the urinary bladder is present outside the body. It has been found to be more prevalent in boys than girls with a 2:1 male:female ratio and occurs due to the failure of the abdominal wall closure in utero. The condition involves a range of anomalies which include the lower abdominal wall, bladder, pelvis, and external genitalia. Surgery is essential to repair the defect, however typically these patients have long term problems with UTI's and urinary incontinence.

In practice:

- Ensure the bladder is wrapped in cling film (reduces heat and fluid loss)
- Ensure surgical/urology team are aware of the patients arrival
- Ensure appropriate IV access is obtained
- Commence IV fluids
- Optimise analgesia/sedation if appropriate
- Ensure baby has full examination to identify any other abnormalities
- Complete a full set of bloods

Useful link: www.gosh.nhs.uk/medical-information-0/search-medical-conditions/bladder-exstrophy-and-epispadias

Persistent Pulmonary Hypertension of the Newborn (PPHN)

Foetal circulation works differently from that of born babies. During foetal circulation, the foetus receives oxygen and nutrients through the placenta and umbilical cord and thus the lungs are not in use. Once a baby is born, a number of changes occur and the baby makes the transition from foetal circulation to adult circulation. Central to this change is a drop in pulmonary vascular resistance. When a baby takes their first breath, their lungs inflate, dramatically dropping the pulmonary vascular resistance and allowing blood to flow to the lungs to be oxygenated, allowing normal circulation to commence. If this dramatic drop in pulmonary vascular resistance does not occur however, then the blood cannot flow easily to the lungs and thus will shunt through the PDA (please see separate section) and flow to the rest of the body unoxygenated; PPHN. Possible causes of PPHN include:

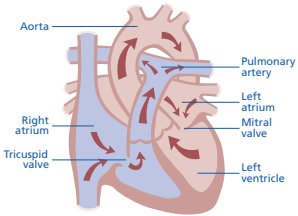
- Lung hypoplasia (e.g. diaphragmatic hernia) (please see separate section)
- Meconium aspiration syndrome (please see separate section)
- Surfactant deficiency
- Pneumonia/sepsis

In practice:

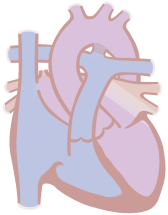
- Optimise ventilation, use oscillator if necessary, oxygenate in 100% initially (causes vasodilation)
- Ensure ECHO is completed to confirm presence of PPHN
- Optimise sedation and paralyse if necessary
- Aim for pH >7.4 (this may help reduce pulmonary vascular resistance)
- Aim to maintain PCO2 in a normal to low range 4-4.5
- Ensure pre (right hand) and post ductal oxygen saturations are monitored.
- Correct hypoglycaemia, hypocalcaemia and hypomagnesemia
- Consider inhaled Nitric Oxide*
- Optimise cardiac output – give fluid/ commence inotropes * if needed
- Be aware ECMO may be needed

*Please see separate section for explanation

Normal Heart Anatomy



PPHN



Useful link: www.netsvic.org.au/nets/handbook/index.cfm?doc_id=890

Meconium Aspiration Syndrome (MAS)

Meconium Aspiration Syndrome (MAS) is a condition which affects newborn babies when they inhale meconium during labour. Meconium is usually stored within the babies intestines until they are born and then it will be the first stool they pass. This said however, sometimes the baby passes meconium early, usually in response to fetal distress, into the amniotic fluid which they then may inhale. This sticky, irritating substance can inflame or block the airways leading to breathing difficulties.

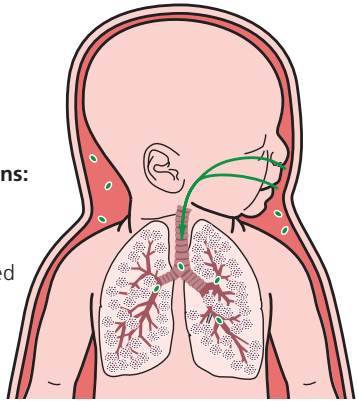
In practice:

- Consider oscillation* early to prevent using high pressures
- On admission ensure they are placed with head to the left (ECMO cannulation may be needed in RIJ)
- Ensure adequate IV access is gained and IV fluids have been commenced
- Optimise analgesia and sedation
- Consider paralysis if necessary
- Ensure antibiotics are commenced
- Treat as per PPHN protocol

Remember complications:

- PPHN*
- Pneumothorax
- ECMO may be required

*Please see separate section for details



Optiflow

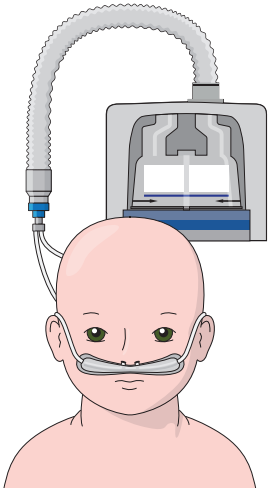
Optiflow is a non-invasive method of ventilation which warms and humidifies high flow nasal cannula. Using positive airway pressure, it offers the ability to titrate the flow and oxygen concentrations. Optiflow may improve patient comfort and tolerance (instead of CPAP), improve lung volumes, decrease respiratory rates and improve oxygenation.

Indications for use:

- Respiratory Distress Syndrome (RDS)
- Recurrent apnoea's
- Weaning from ventilation/post extubation

In practice:

- Place NGT on free drainage or aspirate regularly to prevent swollen abdomen
- Monitor blood gases regularly to ensure the Optiflow is effective
- Regularly check nose
- Ensure circuit is changed every seven days
- Ensure circuit is humidified



Continuous Positive Airway Pressure (CPAP)

Continuous Positive Airway Pressure (CPAP) is the application of positive pressure to the airways of the spontaneously breathing child throughout the respiratory cycle. It maintains a constant pressure, resulting in an increase in functional residual capacity, improves lung compliance and decreases airway resistance. CPAP can be used invasively through an endotracheal tube or non-invasively via nasal prongs or mask.

Indications for use:

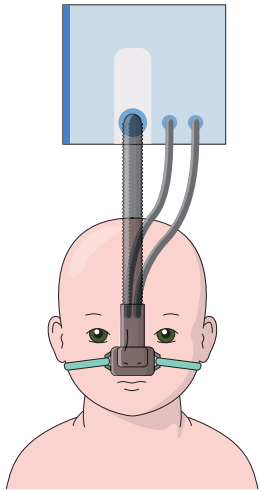
- Respiratory Distress Syndrome (RDS)
- Recurrent apnoea's
- Weaning from ventilation/post extubation
- Tracheomalacia

Potential complications with non-invasive CPAP:

- Patient discomfort/intolerance of prong/mask
- Facial sores from mask/prong
- Reduced ability to feed
- Stomach inflation with air
- Barotrauma leading to potential pneumothoraces

In practice:

- Place NGT on free drainage or aspirate regularly to prevent swollen abdomen
- Monitor blood gases regularly to ensure the CPAP is effective
- Regularly check nose for pressure sores, consider alternating between nasal prongs and mask
- Measure head to ensure appropriate sized hat is in use
- Ensure circuit is changed every seven days
- Ensure circuit is humidified
- Dummy's often help to create a better seal for the CPAP and comfort the patient



Conventional Ventilation

Invasive ventilation can be used in any condition in which respiratory gas exchange is inadequate. On NICU we now usually use the Drager® Babylog VN500 (see picture below).

Possible modes to be used are:

- PC-AC (Pressure control – Assist control)
- PC-SIMV (Pressure control – Synchronised intermittent mandatory ventilation)
- PC-BIPAP (Pressure control – Biphasic positive airway pressure)
- PC-PSV (Pressure control – Pressure support ventilation)
- Volume guarantee – ensures that for all mandatory breathes the set tidal volume is applied with the necessary minimum pressure

Modifications to ventilator settings

To improve oxygenation:

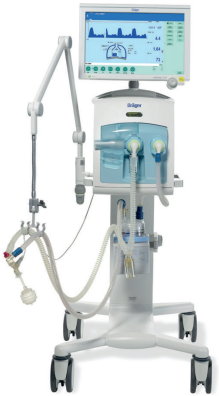
- Increase Fio2,
- Increase PEEP,
- Increase PIP,
- Increase iT

To increase CO2 clearance:

- Suction ETT
- Increase ventilator rate
- Decrease PEEP
- Increase PIP

In practice:

- Sedate/paralyse your patient if necessary
- Ensure ETT is patent and secure
- Suction as required to keep ETT patent
- Cut ETT if it is long to reduce dead space
- Ensure continuous monitoring
- Check end tidal CO_2 if appropriate
- Check blood gases regularly, after 30 minutes when a ventilator change is made
- If problems with ventilation, remember to check **DOPE** – **D**isplacement of ETT, **O**bstruction of ETT, **P**neumothorax, **E**quipment failure (ventilation detachment)

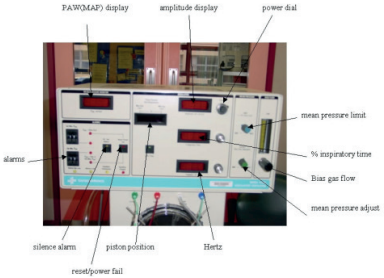


High Frequency Oscillation (HFO)

High frequency oscillation (HFO) is a type of mechanical ventilation which utilises a very high respiratory rate (>150 breaths per minute) and very small tidal volumes. HFO is thought to reduce ventilator acquired lung injury, prevent alveolar collapse and improve oxygenation and CO2 clearance.

Consider HFO when:

- Severe lung disease
- Persistent Pulmonary Hypertension of Newborn (see separate section)
- Meconium Aspiration Syndrome
- Pulmonary Haemorrhage
- Poor blood gases



In practice:

- Consider turning patient before going onto HFO
- Give good suctioning/physio before going onto HFO
- Check X-RAY 30 minutes after going onto HFO to avoid hyperinflation
- Ensure bilateral chest bounce
- Regularly check blood gases
- Observe closely for hypotension when going onto HFO
- Ensure patient is appropriately sedated
- Avoid disconnection from HFO, consider inline suction if appropriate.

To improve oxygenation:

- Increase Fio2
- Increase/decrease MAP depending on chest expansion on X-Ray

To increase CO2 clearance:

- Decrease frequency
- Increase Amplitude

Nitric oxide Inhalation

When inhaled, nitric oxide dilates the pulmonary vasculature. Inhaled nitric oxide appears to increase the partial pressure of arterial oxygen by dilating pulmonary vessels in better ventilated areas of the lung, moving pulmonary blood flow away from lung segments with low ventilation/perfusion (V/Q) ratios toward segments with normal or better ratios.

Nitric oxide is:

- Licensed for medical use
- Clear, odourless gas
- Delivered directly into the ventilator circuit
- Starting dose 20ppm
- Inactivated in 0.1-0.5s in the pulmonary vasculature
- Provides selective pulmonary dilation
- Increases oxygenation
- Must be prescribed by a doctor
- Use of Nitric Oxide can cause Methaemaglobin
- Very expensive

In practice:

- No periods of disconnection
- Ensure iNO on re-breathe circuit
- Check cylinders hourly and ensure spare cylinder is full
- Do regular blood gases
- Check Met HB once/shift
- Following weaning protocol

Hypoxic-Ischaemic Encephalopathy (HIE)

Hypoxic Ischaemic Encephalopathy (HIE), is a type of damage to the brain caused by oxygen deprivation; Hypoxic (not enough oxygen), Ischemic (not enough blood flow), Encephalopathy (abnormal brain function).

A lack of blood flow and/or oxygen causes damage to areas of the brain. If the blood or oxygen supply to the brain is interrupted, the rest of their body may have also been "starved" of oxygen causing damage to other organs e.g. kidneys, gut.

There are three different stages of the disease:

- Mild – Grade 1
- Moderate – Grade 2
- Severe – Grade 3

In practice:

- Neurological protection as requested by consultant e.g. paralysis, head midline, sodium levels maintained, C02 within set parameters
- Use the cooling mattress if patient fits the 'TOBY' criteria www.nejm.org/doi/pdf/10.1056/NEJMoa1315788
- Cool to 33.5 degrees for 72 hours (within 6hours of injury)
- Ensure adequate ventilation
- Perfusion and blood pressure management – inotropes may be needed
- Careful fluid management – do not give multiple bolus'
- Treatment of seizures
- If cooled, patient may experience: Sinus bradicardia, mottling, be peripherally shut down and the metabolic rate reduced, thus co2 production reduced
- Assist with neurological imaging as requested by consultants
- When warming patient after 72 hours, warm no faster than 0.5degrees/hr

Intra-ventricular haemorrhage (IVH)

An intra-ventricular haemorrhage, also described as a germinal matrix haemorrhage, is bleeding into the brains ventricular system. This type of haemorrhage is usually in infants and more especially premature infants with a very low birth weight. It is thought to result as a consequence of bleeding from the very vascular but immature germinal layer. Bleeding occurs mainly because of unstable perfusion.

Aetiology: Hypoxia, acidosis, hypothermia, hypotension (unstable bp) coagulopathy

Most IVH's occur within the first 72hrs of life

IVH's are graded to assess their severity:

- Grade 1: Bleeding just in the germinal matrix
- Grade 2: Bleeding also occurs inside the ventricles
- Grade 3: Ventricles are enlarged by the blood
- Grade 4: There is bleeding in the brain tissues surrounding the ventricles

In practice:

- Maintain stability of physiological parameters (blood pressure, blood gases, clotting)
- Minimal/gentle handling
- Treat hypotension, hypervolemia, acidemia and anaemia as appropriate
- Correct clotting as necessary
- Monitor regular CUSS to assess for ventricular dilatation/further bleeds
  - All preterms within 24hrs of life
  - If no IVH, repeat after 1 week and at 6 weeks
  - If there is an IVH or ventriculomegaly, repeat at least weekly
- Treat seizures if present
- Monitor head circumference – all children with hydrocephalous or those who are at risk of having hydrocephalous should have this closely monitored

Hydrocephalous

Hydrocephalous is a build up of fluid in the brain. This will most commonly be seen in the NICU due to post haemorrhagic bleeding from an IVH in a neonatal brain. The blood can clot and block the normal flow of CSF out of the brain causing the ventricles to swell and dilate (Figure 1&2). This can cause an enlarged head and splayed sutures. Hydrocephalous can also be caused by meningitis, brain tumours or could be a congenital condition e.g. spina bifida.

Hydrocephalous can be treated in multiple ways. Sometimes you will see your patient having a 'tap' – this is where they aspirate fluid from the fontanelle using a needle and syringe. This is a temporary solution.

Permanent solutions involve the insertion of a subgaleal shunt (Figure 3) or Ventriculoperitoneal (VP) shunt (Figure 4). The type of shunt inserted is dependant on the patient weight and is a decision which is made by the neurosurgical team.

In practice:

- Observe for signs of infection – temperatures, irritability, changes in fontanelle
- Check head circumference regularly
- Observe for changes in consciousness
- Observe insertion site closely for leaking or signs of infection

Figure 1

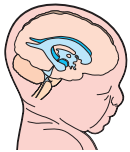


Figure 2

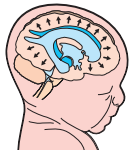


Figure 3

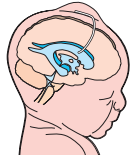
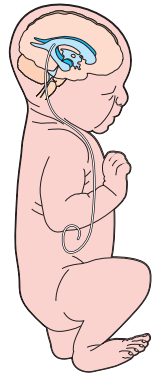


Figure 4



Vein of Galen Malformation (VGAM)

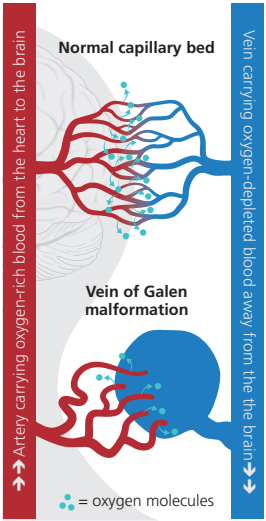
A vein of Galen malformation is an abnormal connection between a vein near the vein of Galen and arteries supplying the brain with blood. This connection allows blood to flow rapidly from these arteries into the vein of Galen malformation. The blood flows faster and at a higher pressure than usual. To ensure that good blood supply to the brain is maintained, the heart needs to work harder to account for this additional blood flow through the vein of Galen malformation. (GOSH) Interventional neuro-radiologists treat the condition by performing an embolisation. This process involves threading a catheter up from the groin to the brain and using special 'glue' to block off blood vessels to reduce the blood flow.

In practice:

- Prepare patient for theatre
- Ensure VGAM pathway is completed
- Ensure all necessary imaging is completed
- Complete neuro-observations every hour
- Prepare drugs as per pathway

Post op:

- Ensure pink sheet is received from neuro-radiologist
- Ensure patient is under neuro-protection measures
- Watch for/prevent hypo/hypertension
- Ensure hourly neuro observations are completed
- Ensure patient is nursed at a 30° angle and is midline on a V-bed
- Check head circumference



Useful link: www.gosh.nhs.uk/medical-conditions/search-for-medical-conditions/vein-of-galen-malformation/vein-of-galen-malformation-information

Nutrition & fluid allowance

Fluid volumes and type (maintenance fluid/TPN/milk) should be discussed on each ward round. Fluid volumes will vary for sick/surgical patients.

Rough guide for fluid volumes in the neonate:

Fluid regime in an extremely low birth weight and premature neonate		Fluid regime in a term, uncomplicated neonate	
Day 1	90ml/kg/day	Day 1	60ml/kg/day
Day 2	120ml/kg/day	Day 2	90ml/kg/day
Day 3	150ml/kg/day	Day 3	120ml/kg/day
Once feeds established	Preterm infants may require feed volumes up to 180ml/kg/day for adequate growth	Day 4	150ml/kg/day

- 10% glucose is the standard concentration for neonates
- Maintenance fluid is normally plain ***10% glucose*** for the first 24-48 hours – the decision to introduce additives is based on urine output and U+E's
- Patients on IV fluids or just starting TPN need daily U+E's as a minimum
- ***Blood sugars*** should be checked a minimum of 4 hourly for all neonates on IV fluids
- On NICU, all infusions are made up in 10% glucose (if compatible)

Nutrition & milk choice

All feeds should be discussed with the dietician, however if a patient is admitted overnight who is allowed to feed but we do not stock their normal feed, please see the table below for GOSH alternative feeds.

Feed	GOSH Alternative
■ SMA Gold Prem 2 ■ Nutriprem 2	Aptamil 1, Cow & Gate 1 or SMA 1
■ Aptamil Preterm ■ Nutriprem 1	SMA Gold Prem
■ Infatrini	Similac High Energy

- Measure **weight** three times a **week**: Tuesday/Thursday/Sunday. Plot birth weight on admission, and weekly weights thereafter on centile charts.
- Measure and plot **length** weekly (Tuesdays) until 40 weeks post-conceptional age. Then every two weeks until discharge
- Measure and plot **head circumference** weekly: Tuesday
- **Neonates should aim to grow around 15g/day**
- Use the patient's actual weight when calculating nutrient requirements, unless the actual weight is lower than the birthweight or their highest dry weight, in which case birthweight or highest dry weight should be used

TPN titration

FOR THIS METHOD YOU WILL REQUIRE THE TPN PRESCRIPTION CHART

- How many mls/kg/day does your patient have in ***total***?
- Add up all other ***infusions and feeds*** together which the patient is on and work out that volume in mls/kg/day.
- Minus the ***infusions and feeds*** volume from the ***total*** mls/kg/day = **room left for TPN**
  - E.g. Total fluids = 120mls/kg/day
  - Feeds & infusions = 43mls/kg/day
  - ROOM LEFT FOR TPN = 77mls/kg/day
- Look at TPN prescription chart and find prescribed mls/kg of TPN 'regimen equivalent to' which you will find at the bottom of the prescription page.
- Divide your **'room left for TPN'** volume by your prescribed mls/kg of TPN which will give you a **number <1** for you to times your prescribed vamin and lipid rates by.
- Times your prescribed lipid rate by your answer (**number <1**)
- Times your prescribed vamin rate by your answer (**number <1**)

TA DA!

Vitamins and Minerals

Preterm neonates have missed out on their last trimester and thus they may be lacking in the vitamins and minerals they require.

In all babies less than 34 weeks, please see supplements below:

Feed type	Abidec 0.6 ml od To start once receiving >50 % of fluid requirement as enteral feed. Continue until 1 year of age.	Sytron 1 ml od To start after 2–6 weeks from birth (2–4 weeks if ELBW). Continue until 6 months of age.	Folic acid 50 microgram od To start once receiving 50 % of fluid requirement as enteral feed. Continue until term.	Phosphate See below – individual adjustment.	Sodium See below – individual adjustment	Calcium See below – individual adjustment
Preterm formula 150 ml/kg/day	Not required	Not required	Not required	Monitor serum if <1.5 mol/l then supplement. Start at 1 mmol/kg/day	Monitor serum levels and supplement where necessary. Start at 1 mmol/kg/day.	Monitor serum levels and supplement where necessary
EBM + 2x 2.2 g sachet Nutriprem Breast Milk Fortifier	Not required	1 ml od (Rationale 13)	Not required	Monitor serum if <1.5 mol/l supplement 1 mmol/kg/day	Monitor serum levels and supplement where necessary. Start at 1 mmol/kg/day.	Monitor serum levels and supplement where necessary
Unfortified EBM	0.6 ml od	1 ml od	50 microgram od	Monitor serum if <1.5 mol/l supplement 1 mmol/kg/day	Monitor serum levels and supplement where necessary. Start at 1 mmol/kg/day.	Monitor serum levels and supplement where necessary
Term infant formula (e.g. first milk, EHF or AA)	0.6 ml od	1 ml od	50 microgram od	Monitor serum if <1.5 mol/l supplement 1 mmol/kg/day	May require supplementation. If necessary, start at 1 mmol/kg/day.	Monitor serum levels and supplement where necessary

Breast feeding/expressing

Five top tips for expressing:

1. **Early** – commence as soon as possible after delivery
2. **Frequent** – 8-10 times including at least once at night
3. **Effective** – Ensure mum knows how to use the breast pump
4. **Close** – Express at bedside if possible, give pictures/ blanket
5. **Support** – Manage expectations; small volumes in first few days, effect of stress on supply, nutritional intake for mum

Five top tips for breast feeding:

1. **Body in alignment** – babies head and body midline
2. **Nose to nipple**
3. **Close** – Baby held close
4. **Sustainable** – Comfortable position for mum
5. **Establish** – If mums want to breastfeed please try and offer breastfeeds as first oral feed instead of bottle

Breast milk storage

Fresh EBM

- Can be kept at room temperature for up to 4hrs
- Kept in the fridge for up to 24hrs
- Frozen at/up to 24hrs

Frozen EBM

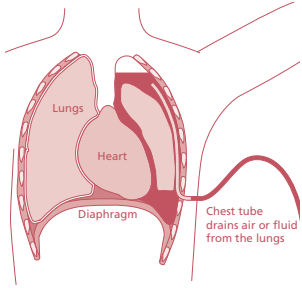
- Should be defrosted in the fridge
- Can be used for up to 24hrs once defrosted
- Attach yellow sticker with date and time when defrosting
- Can be stored for up to 3months in hospital freezer

Other tips

- Please use milk in date order
- Please ensure all milk is transferred with patient

Chest drains

A chest drain is a plastic tube that is inserted through the chest wall and into the pleural space or mediastinum. It is used to remove air (pneumothorax), fluid (pleural effusion, blood or chyle), or pus (empyema) from the intrathoracic space (please see picture).



Things to check when coming on:

- Water in drain (level of water determines amount of suction)
- Chest drain clamps at bedside
- Chest drain secure / clamped to bed
- Check drain dressing for leakage
- Drain attached to tubing securely with no leaks

Useful things to remember:

- Chest drain chamber should always be kept below the level of the patient's chest
- Ensure you clamp drain when moving drain or patient
- Swinging means – the water will be pulled up the tube on inspiration and pushed out on expiration. During positive pressure ventilation the swinging is the opposite way round. It demonstrates that the system is functioning correctly.
- Swinging and bubbling of the water-seal chamber is an indicator of an air leak (pneumothorax)

Useful links:

General information on chest drains: www.gosh.nhs.uk/medical-conditions/procedures-and-treatments/chest-drains/?locale=en

Setting up and management of chest drains: www.gosh.nhs.uk/health-professionals/clinical-guidelines/chest-drain-management/?locale=en

Tracheostomy Care

A tracheostomy is an artificial opening into the trachea, at the 3rd and 4th cartilage ring, that is held open by a tracheostomy tube. It enables a baby to breathe in the event of upper airway obstruction.

Reasons for tracheostomy are cystic hygroma, haemangioma, papillomatosis, sub glottic stenosis, tracheal stenosis, laryngomalacia, tracheomalacia, bronchial malacia, long term respiratory, support and trauma.

The most common tubes used in babies are Bivona uncuffed, Bivona flextend uncuffed and a Shiley (usually used as smaller tube in emergency tracheostomy box because of its rigidity in plastic and also if patient going to MRI as it has no metal in it).

- When the baby goes to theatre for an initial surgical insertion of a tracheostomy, they will need an emergency tracheostomy box prepared for their return. The box contains 1 tracheostomy tube same size and types as in situ, 1 tracheostomy tube size smaller than in situ, 1 pair round ended scissors, 1 lubricating gel, 1 spare tracheostomy tapes, and 1 suction catheter, same size as for routine suctioning.
- On return from theatre check the stay sutures are taped onto chest and DO NOT REMOVE is written on tapes (Fig 1), check tension of tapes(fig2), check stoma site, x-ray to be done within 1 hour , continuous humidification for at least 7 days and regular suctioning is to be done ½ hourly for 12-24 hours, then 1 hourly for 24-48 hours. Following this routine suctioning is required.
- Daily activities are that dressings and tapes to be changed, reviewed by ENT team, parental training to commence. The first tube change is to be done on day 7 and then monthly changes thereafter.

Fig1

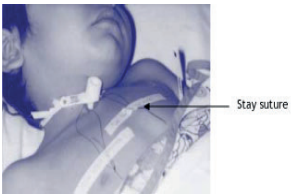
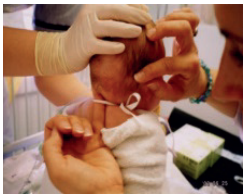


Fig 2



Useful link: www.gosh.nhs.uk/health-professionals/clinical-guidelines/tracheostomy-care-and-management-review

Neonatal Long Lines

Due to the small lumen size of neonatal longlines the care differs to that of other central lines and you should never use the line to:

- Bolus fluids
- Administer blood products
- Attempt to aspirate or bleed the line back

There should always be a infusion of minimum 0.5ml running via the line to prevent occlusion.

The trust use size 1Fr and Size 2Fr catheters and the pressures may run higher than other central lines please contact the NIC for advice if concerned

A clear IV3000 dressing should be used to allow regular observation and the site should be observed for:

- Redness
- Swelling
- Oozing
- Phlebitis
- Tracking

Dressing:

- The Dressing should not be changed routinely and should only be changed on a PRN basis if skin integrity, the line or dressing becomes compromised
- Re dressing the line is a 2 nurse procedure using strict aseptic non-touch teqnuique Note: the line is only secured using steristrips so can easily be displaced.

Dressing the line:

- Secure line insertion site with steri strips
- Loop remaining protruding line ensuring no kinks and secure with additional steri strip
- Ensure skin is protected by using small square of gauze under hub
- Use IV3000 clear dressings to cover whole line including hub
- Ensure IV3000 dressing does not encircle whole limb

Umbilical Venous and Arterial Catheters (UVC/UAC)

Lines are usually sited shortly after delivery but occasionally may be attempted up to 5-7 days post delivery (it will be more difficult at this time)

UAC

Indication: Continuous blood pressure monitoring, frequent blood sampling, exchange transfusion

Observations:

toes, feet, legs and sacrum and document hourly

Usually 0.5ml/hr of heparinised sodium chloride should maintain patency

UVC

Single or double lumen (usually double)

Indication: Venous access, TPN, exchange transfusion, multiple ports for incompatible infusions (double lumen)

Observation: see long line/CVL

Securing line

Most lines will be sited prior to admission but we must check line position and security on admission and line security hourly

- Place duoderm as a base to protect skin
- Use 1 piece of tape to secure sutures and looped line
- Fix using a piece of tape either side

If the line is secure there is no need to re dress, please ensure stump is not covered

If still required at 7 days discuss with consultant in charge of care as plans for alternative access may be needed

Removal of lines should only be performed by medical staff or senior nurses competent in this procedure.

Abbreviations & terminology used on NICU

APGAR	Scoring system for babies condition at birth Activity, Pulse Grimace, Appearance, Respiration
Apneoa	Not breathing for more than 15seconds
ASD	Atrial septal defect
BIPAP	Biphasic intermittent positive airway pressure
Breech	Buttocks first delivery
CCAM	Congenital Cystic Adenomatoid Malformation
CLD	Chronic lung disease
CPAP	Continuous positive airway pressure
DIC	Disseminated intravascular coagulation
Dysmorphic	Abnormal features
EBM	Expressed breast milk
ECMO	Extra-corporeal membrane oxygenation
EDD	Estimated delivery date
ELBW	Extremely low birth weight
ETT	Endotracheal tube
GA	Gestational age/general anaesthesia
GORD	Gastro-oesphageal reflux disease
HAS	Human albumin solution
HFOV	High frequency oscillation ventilation
Hydrocephalous	A build up of fluid on the brain
HYDROPS	A condition in the fetus where there is accumulation of fluid in at least two fetal compartments
IUGR	Intra-uterine growth restriction
LBW	Low birth weight
LP	Lumbar puncture
MAP	Mean airway pressure/Mean arterial pressure
MRSA	Methicillin resistent staphylococcus aureus
MV	Minute volume

Abbreviations & terminology used on NICU

ND	Normal delivery
NEC	Necrotising enterocolitis
NG	Naso-gastric
NJ	Naso-Jejunal
NO	Nitric Oxide
NP	Naso-pharynx
PDA	Patent Ductus Arteriosus
PEEP	Positive end expiratory pressure
PIE	Pulmonary interstitial emphysema
PKU	Phenylketonuria
PROM	Premature rupture of membranes
PVH	Peri-ventricular haemorrhage
PVL	Periventricular leucomalacia
RDS	Respiratory distress syndrome
ROP	Retinopathy of prematurity
RSV	Respiratory syncytial virus
SCBU	Special care baby unit
SIMV	Synchronised intermittent mandatory ventilation
TOF	Tracheo-oesphageal fistula
TORCH	Viruses of congenital infection Toxoplasmosis, rubella, cytomegalovirus, herpes HIV
TPN	Total parenteral nutrition
TTN	Transient tachypneoa of the newborn
UAC	Umbilical arterial catheter
UVC	Umbilical venous catheter
VLBW	Very low birth weight
VSD	Ventricular septal defect

Useful telephone numbers

All emergencies 2222

All consultant telephone numbers located behind the nurses station or through switchboard – 0555

Biochemistry	5009 / Bleep 0589
Biomedical engineering	5369
Blood bank	8527
ICIP	1375 / 1373
CATS	4850
CICU	8828 / 8652
Coffee room	6274
Consultants office	0034
CSP's	Blp 0313
Dietician	Blp 0317
EEG	8471 / 8472
Family services	8151
Front reception	5277 / 6735
Haematology	5388 / Bleep 0590 (OoH Bleep 0596)
Head of nursing	1021
Hot office	7835
HSDU	5142
ICT	5066
ICON	8697
Infection Control	5284
Lead nurse	5106
Milk kitchen	5162
Microbiology	5280 / 8661 / Bleep 0670
Mortuary	7906 / Bleep 0608
Neonatal nurse advisor	6724 / Bleep 0256
NICU / PICU ward office	8855
NICU NIC	6897

NICU SPR	8693
Pharmacy	8680 / Bleep 0714 on call
Physio	5144 / Bleep 0630
PICU	8808 / 5151
Porters	1170
Practice Educator	1129
Resource room	5752
Security	8856
Social workers	5320
Theatres	MSCB – 5181, VCB - 5185
Tissue Viability	5524 / Bleep 2234
Transport	8618
Vent techs	5143
Virology	2401 / 8506
Works	5412 / Bleep 0558
X-Ray	8615

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