FIRST HOUR OF CARE: QUICK REFERENCE MANUAL

NHS East of England Neonatal ODN

Ratification

This manual was first published in 2016 following collaboration between the East of England neonatal ODN and the region's neonatal units.

This recent update takes into account the latest available evidence and national guidance.

For use in: EOE Neonatal Units
Guidance specific to the care of neonatal patients
Used by: For use in neonatal units in the East of England
Date of ratification: **June 2026**
Review due: **June 2029**(or earlier in the Light of new evidence)
Registration Number: **NEO-ODN-2026-13**
Approved by: **Neonatal Clinical Oversight Group – Meeting 25/06/26**
ODN Clinical Lead: Dr Sajeev Job

East of England Neonatal Operational Delivery Network

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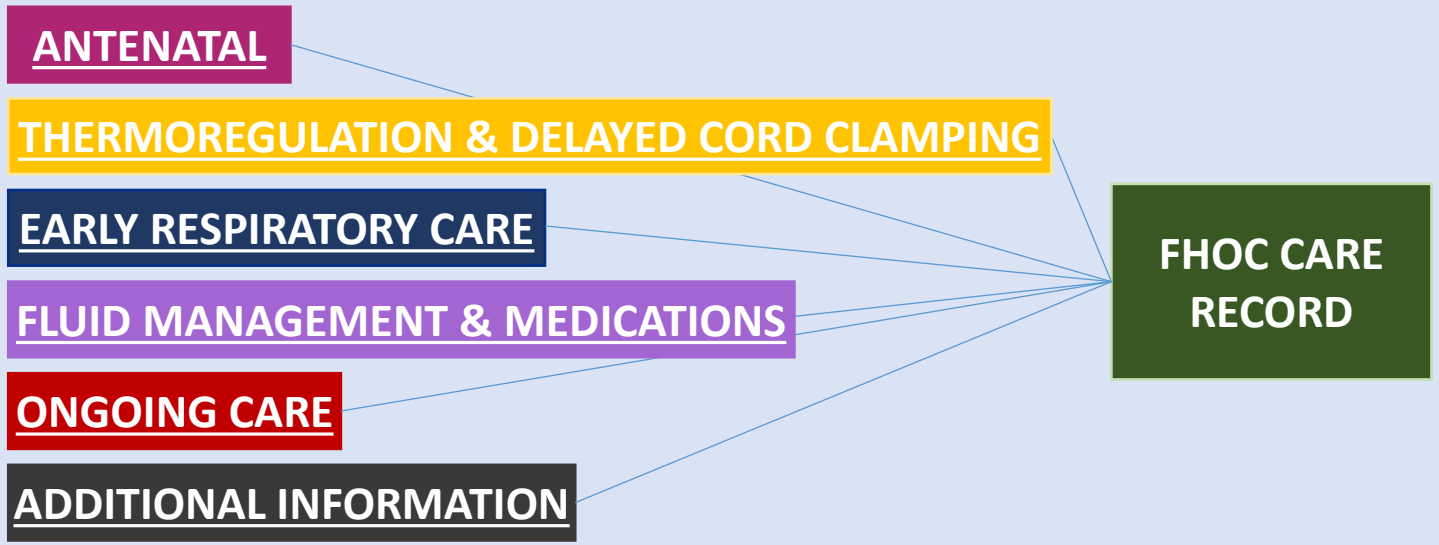
How to use this manual

This manual is made up of 6 parts with an additional FHOC record. These can be found on our website and downloaded as required.



East of England Neonatal Operational Delivery Network

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Antenatal Care

East of England Neonatal Operational Delivery Network

Team Organisation:

	Thermoregulation	Nursing team	Medical team
BEFORE BIRTH:	○ Pre-warm incubator ○ Pre-warm resuscitaire & towels ○ For < 32 weeks, consider the use of additional measures during delayed cord clamping to ensure thermal stability (e.g., increasing room temperature, warm blankets, and a thermal mattress) ○ Set room temperature to 23^0-25^0 C at least 26^0 C if ≤28/40) ○ Agree a plan for thermoregulation during deferred cord clamping e.g., Neohelp, use of humidified gases if using rPAP / CPAP on bedside resuscitation units (LifeStart, Concord or adaptations to standard resuscitaire)	○ Allocate admission nurse ○ Prepare and check respiratory equipment ○ Check: Monitors Infusion Devices Scales Procedure trolley/ emergency medication Alarm settings Resuscitaire	○ Identify medical team ○ Inform consultant (Attendance required in extreme prematurity) ○ Check resuscitaire, airway equipment, Videolaryngoscope ○ Set blender to appropriate FiO_2 ○ Discuss with obstetric & midwifery team: ○ Antenatal Steroids ○ $MgSO_4$ ○ Pertinent history: ○ Fetal Anomalies ○ Antenatal scans ○ Anticipated delivery complications ○ Agree plan for delayed cord clamping ○ Complete preterm optimization passport (paper or electronic)* ○ Counsel parents ○ Contact PaNDR as appropriate
AT DELIVERY:	○ Apply Hat ○ Dry/wrap in warm towels OR use plastic bag/suit/wrap without drying if ≤32 weeks ○ Be aware of risk of hypo & hyperthermia, use continuous skin temperature monitoring where possible ○ Facilitate parental cuddle prior to transfer to NICU ensuring normothermia and stable airway and breathing	○ Apply SaO_2 (Right Hand) ○ Management according to NLS principles ○ Apply labels ○ Secure ETT prior to transfer ○ Take axillary temperature prior to transfers to NICU, take action if the temperature is outside the normal range (36.5 – 37.5)	○ Management according to NLS principles ○ Surfactant – selective prophylaxis or LISA based on infant condition and place of birth. Give rescue surfactant early if clear indication ○ Speak with parents ○ Make all efforts possible to allow 1st parental Cuddle ○ Check cord gases ○ Consider placenta for pathology

Ref: RCUK NLS Manual 6th edition, November 2025 | EoE Intubation, Surfactant & LISA guideline
- https://www.bapm.org/pages/perinatal-optimisation-pathway-resources
- https://www.healthinnowest.net/our-work/transforming-services-and-systems/periprem/ *

Team Organisation:

	Thermoregulation	Nursing team	Medical team
TRANSFER TO NNU:	➢ Consider use of heated infant transport mattress ➢ Cover with pre-wared towels ➢ Check temperature before transfer and on arrival in NNU	➢ Ensure appropriate portable medical gas supply to transfer device ➢ Monitor work of breathing & SpO_2 on transfer	➢ Ensure secure airway ➢ Check emergency airway equipment available ➢ Accompany infant during transfer
1st HOUR WITHIN NNU	➢ If ≤32 weeks: keep in plastic bag/suit until incubator at correct temperature/ humidity & lines inserted ➢ Check infant admission temperature & initiate skin temperature monitoring as appropriate ➢ Humidification as per EoE guideline	➢ Weigh baby ➢ Attach to monitoring as appropriate ➢ Baseline observation ➢ Blood Pressure ➢ Administer Vit K (if not done in delivery suite) ➢ Commence IV fluids as appropriate ➢ Administer antibiotics as required ➢ Measure head circumference ➢ Insert naso-/oro- gastric tube (BEFORE x-rays) ➢ Skin integrity score ➢ Admission Swabs ➢ Blood spot screening ➢ Admission documentation	➢ Divide workload appropriately between team members. **Ensure all medications and infusions are prescribed as a priority** – so nursing staff can prepare medications whilst procedures undertaken **1st Doctor/ANNP** ➢ Re-assess on admission: ➢ Airway/Breathing/Circulation ➢ Establish IV access (PVL/UVC/UAC) ➢ Administer surfactant as required ➢ Send bloods: U&E, FBC, BC, Group & DCT, CRP (Clotting) ➢ Admission Documentation **2nd Doctor/ANNP** ➢ Prescribe: IV Fluids/ PN/ Vit K Antibiotics/ Caffeine (<34wks)/ Oxygen limits ➢ Inotropes ➢ Request X-Ray ➢ Update: Consultant/Parents/PaNDR

WHEN COMPLETE - STOP - HANDS OFF

ONGOING CARE: ➢ Physical examination | Consent for Blood transfusion | Photograph for parents | Discuss expressing milk with mother & midwife | Consider 2nd Dose Surfactant | Commence PN (as indicated) | Complete Badgernet | Debrief | BLISS Handbook

FHOC Ref: EoE guideline: Management of a baby <30 weeks gestation requiring Humidity, Sept 2025

Right Place of Birth

- Extreme preterm infants born in centres with on-site neonatal intensive care (Level 3 NICU) have significantly lower rates of mortality, severe brain injury and major morbidity compared to those born in units without NICU capability
- In utero transfer (IUT) is safer than postnatal (ex utero) transfer, the womb is the best transport incubator. Neonatal transport carries additional risks of hypothermia, hypoglycaemia, and physiological instability

CRITERIA FOR IN UTERO TRANSFER (IUT): (Transfer decision is the joint responsibility of the Obstetric and Neonatal Teams)

- Pregnant person who is suspected to be in preterm labour **< 27 weeks OR < 28 weeks if multiples OR Estimated foetal weight < 800 grams**, presenting to a maternity unit without co-located NICU, should be offered in-utero transfer to a maternity unit with co-located NICU unless delivery is imminent or there are clinical contraindications
- Pregnant mothers between 28+0 and 31+6 weeks at risk of preterm birth to a SCU should be offered IUT to a Local Neonatal Unit (LNU) or Level 3 if NICU if complexity warrants, unless delivery is imminent or there are clinical contraindications
- A joint obstetric and neonatal senior review must be documented before transfer. Contact the Neonatal Network transport coordinator early to facilitate cot identification and transfer logistics

TRANSFER PROCESS: KEY STEPS

Contact neonatal network transport coordinator early – confirm cot availability and accept at receiving unit before departure

Ensure antenatal steroids and magnesium sulphate (if <30 weeks) are given before or during transfer if not already administered

- Maternal condition must be stable for transfer, obtain senior obstetric sign-off and document decision with rationale
- Brief the neonatal team at the receiving unit before arrival. Provide a full clinical summary including gestation, investigations, treatments given and current maternal condition
- Pregnant person and her family must be informed of the reasons for transfer, the receiving unit, and the plan of care. Offer psychological support and document consent
- Record declined transfers if a pregnant person or their family decline IUT or transfer is not offered when indicated, this must be documented with the clinical rationale and escalated to the network if appropriate

FHOC Reference:

BAPM Practice Guide 2025 : https://www.bapm.org/resources/in-utero-transfer
https://www.england.nhs.uk/publication/service-specification-neonatal-critical-care/
https://www.healthinnowest.net/our-work/transforming-services-and-systems/periprem/

Antenatal Corticosteroids

- Antenatal steroids are associated with a significant reduction in rates of neonatal death, RDS and intraventricular haemorrhage
- Cochrane review also suggests a reduction in systemic infection in the first 48 hours and a reduction in Necrotising Enterocolitis

INDICATIONS FOR ANTENATAL CORTICOSTEROIDS: (Ultimately to give or with-hold is responsibility of the Obstetric Team)

- From viable gestation to 34+6 weeks
- Pregnant people between 24^{+0} and 33^{+6} (NICE), 34+6 (RCOG)weeks of gestation who are at risk of preterm birth
- Antenatal corticosteroids can be considered for pregnant people <23^{+6} weeks of gestation who are at risk of preterm birth and there is an agreed survival focused care and active plan for resuscitation at birth
- Consider maternal corticosteroids after balancing risks and benefits between 35+0 and 36+6 weeks of pregnancy in whom imminent preterm birth is anticipated

SUGGESTED DOSAGE & TIMING:

Dexamethasone 12 mg X 2 doses intramuscular 24 hours apart

OR

Betamethasone sodium phosphate/acetate mix 12 mg X 2 doses intramuscular 24 hours apart

- Antenatal corticosteroids are most effective in reducing RDS in pregnancies that deliver 24 hours after, and up to 7 days after, administration of the second dose of antenatal corticosteroids
- Antenatal corticosteroid use reduces neonatal death within the first 24 hours and therefore should still be given even if delivery is expected within this time
- There is currently limited evidence to recommend repeat courses of antenatal corticosteroids if a pregnant person remains at imminent risk of preterm birth seven days after administration of antenatal corticosteroids. However, a further course may reduce the need for neonatal respiratory
- The maximum number of corticosteroid courses given in any one pregnancy should not exceed three

- Pregnant mothers may be advised that the use of a single course of antenatal corticosteroids does not appear to be associated with any significant short-term maternal or fetal adverse effects. Evidence on the longer-term benefits and risks of a single course of antenatal corticosteroids shows no clear difference in adverse neurological or cognitive effects.
- ***There is still insufficient evidence on the longer-term benefits and risks of multiple courses of antenatal corticosteroids***

FHOC Reference:

NICE Quality Standards QS135; Quality Statement 5 (2019)
https://www.nice.org.uk/guidance/qs135
RCOG Green-top guideline – Antenatal Corticosteroids to reduce neonatal morbidity and mortality (2022) https://obgyn.onlinelibrary.wiley.com/doi/epdf/10.1111/1471-0528.17027

Antenatal Magnesium Sulphate ($MgSO_4$) – NEUROPROTECTION REGIME

Cochrane review published in 2024* included 6 RCTs(total of 5917 pregnant mothers and 6759 fetuses) showed that up to two years' corrected age, magnesium sulphate compared with placebo reduced cerebral palsy (RR 0.71, 95% CI 0.57 to 0.89; 6 RCTs, 6107 children; number needed to treat for additional beneficial outcome (NNTB) 60, 95% CI 41 to 158) and death or cerebral palsy (RR 0.87, 95% CI 0.77 to 0.98; 6 RCTs, 6481 children; NNTB 56, 95% CI 32 to 363) (both high-certainty evidence).

INDICATIONS FOR ANTENATAL MAGNESIUM SULPHATE:

Decision to give or with-hold Magnesium Sulphate, and the relevant fetal and maternal monitoring, is the responsibility of the Obstetric Team. The neonatal team should ensure antenatal administration of Magnesium has been considered where appropriate.

- Based on number needed to treat (NNT) to prevent cerebral palsy or severe motor dysfunction, NICE[$]/RCOG recognise <$30^{+0}$ weeks gestation as a pragmatic cut-off for antenatal magnesium as a neuroprotection regime. It may be considered for gestations ≤34 weeks
- NNT: 29 at <28^{+0} weeks gestation | NNT: 46 at 30 weeks gestation | NNT: 56 at 32 to 34 weeks gestation

SUGGESTED DOSAGE & TIMING:

➢ **Magnesium sulphate for neuroprotection should be offered to pregnant mothers at 29^{+6} weeks gestation or less, where a viable outcome is anticipated and where delivery is planned or definitely expected within 24 hours.**

- The effect of Magnesium Sulphate is greatest if given more than 4 hours prior to delivery
- If delivery is anticipated to occur *earlier than* 4 hours, there continues to be some advantage from administration of Magnesium and therefore it should be given if it does not distract from other areas of urgent care of the mother/fetus
- If urgent delivery is required for maternal/fetal compromise then delivery should not be delayed to administer Magnesium Sulphate

Loading Dose: *4g Magnesium Sulphate IV over 15 minutes*
Maintenance Infusion: *1g/hour Magnesium Sulphate IV - Continue regimen until birth or 24 hours, whichever comes first*

NEONATAL ADVERSE EFFECTS & REPEAT DOSAGE:

➢ Neonatal hypermagnesaemia may produce hyporeflexia leading to poor sucking and rarely respiratory depression. This effect lasts for up to 24 hours following birth

➢ If Magnesium Sulphate has been given and preterm birth does not occur but at a later time appears imminent then repeat doses of Magnesium Sulphate should be considered by the Obstetric Consultant

FHOC Reference:

*Shepherd ES et al. Magnesium sulphate for women at risk of preterm birth for neuroprotection of the fetus. Cochrane Database of Systematic Reviews 2024 | [$] https://www.nice.org.uk/guidance/qs135

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Thermoregulation Care Bundle

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Summary of Thermoregulation at Delivery:

Optimise Delivery Room Environment for Delivery:

Room Temp 25°C (Aim ≥26°C if ≤ 28 weeks gestation)

Limit drafts (Close doors/windows & avoid fans directed at infant)

Prepare Lifestart or any other bedside resuscitaire if available

Delivery Room:			Neonatal Unit:
Well Infant ≥34^{+0} weeks	Delay cord clamping for at least 60 seconds unless contra-indication *Cord milking (intact or cut cord) is an option if DCC not possible*		Well infants at 34^{+0} – 36^{+6} weeks may require heated mattress **Unwell infants:** double walled incubator incubator or servo-controlled radiant warmer
	Dry baby in towel, remove wet towels & apply wool hat	Encourage skin-to-skin with mother & cover with pre-warmed towels	
Well infant 32 - 33^{+6} weeks **&** >1.25kg	Delay cord clamping unless contra-indication *Cord milking (intact or cut cord) is an option if DCC not possible*	Encourage skin-to-skin with mother & cover with pre-warmed towels *Risk of hypothermia, RDS & hypoglycaemia – monitor closely; timing of removal from mother's skin in delivery room is dependent on infant condition*	Pre-warmed (35°C) double walled incubator incubator
	Dry baby in towel, remove wet towels & apply wool hat		
Infant <32^{+0} weeks Or <1.25kg	Place infant in plastic bag (feet first) or suit, and apply wool hat ±heated mattress	Continuous temp monitor if available. Maintain under radiant heater. Transwarmers should not routinely be used if overhead heat is in use *Delivery room cuddle if stable & monitored with skin-to-skin then incubator if respiratory support needed*	Pre-warmed (35 to 37°C) double walled incubator Humidify incubator if <30 weeks Keep in plastic bag/suit for weighing and line insertions
	Delay cord clamping if no contra-indication. Use measures to optimize baby's temperature. *Cord milking contraindicated < 28 weeks because of risk of IVH*		

FHOC Ref: RCUK NLS Guidelines November 2025

East of England Neonatal Benchmarking Group. Benchmark: Thermal Management – Dec 2025

Enhanced Feto-Placental Transfusion Optimal Cord Management)

The process of allowing fetal blood within the placenta to return to the newborn is inhibited by immediate cord clamping (ICC). A number of systematic reviews demonstrate the benefits of delayed cord clamping in preterm infants. Ideally, physiological-based cord clamping (PBCC) should be practiced, allowing aeration of the lungs prior to cord clamping. At least 60 seconds of DCC is recommended for all preterm infants unless contraindications.

	Term Infant	Preterm Infant
Timing of Delayed Cord Clamping:	• At least 60 seconds, longer until cord pulsation ceases in an otherwise well infant • *Cord milking (intact or cut cord) is an option if DCC not possible*	• For at least 60 seconds, ideally following successful inflation of the lungs • *Cord milking (intact or cut cord) is an option if DCC not possible* ***EXCEPT*** **infants < 28 weeks** because of increased risk of IVH
Infant position during placental transfusion:	• Place on mother's chest or abdomen to encourage skin to skin following vaginal delivery • Hold level with introitus if cord too short • Position level with abdomen or placenta following c-section • Ensure airway open	• Position level with introitus for vaginal birth • Position level with or below placenta following c-section or across maternal thighs • Ensure airway is in neutral position, gentle stimulation
Thermoregulatory considerations:	• Dry & stimulate • Skin to skin and cover with pre-warmed towels and a hat if vaginal delivery. • Use sterile towel if C-Section	• Place in plastic bag/suit if <32/40 • Consider use of heated infant transport mattress in <32/40 and very low birth weight infants. • Dry, wrap & stimulate in pre-warmed towels if >32/40. Use hat.

Contraindications

- The need for maternal resuscitation in the face of massive, acute haemorrhage, maternal seizures, cardiac arrest, placental abruption, vasa praevia, cord avulsion or rupture

Special Circumstances

- Multiple pregnancies - DCC is not prohibited in multiple births but require individual case discussion with an experienced perinatal team.
- Cord milking is not recommended in babies < 28 weeks (NLS 2025).
- Consider clamping cord early if the baby born in poor condition i.e. with a slow/ undetectable heart rate and your equipment does not allow you to appropriately support/resuscitation during DCC. In the absence of major haemorrhage, compromised babies are likely to benefit from DCC.

FHOC Ref: **BAPM Optimal Cord Management Toolkit Dec 2020** https://www.bapm.org/pages/197-optimal-cord-management-toolkit
NLS 6th Edition November 2025

Delayed Cord Clamping: Team Protocol

Prior to Delivery

Neonatal, obstetric & midwifery teams to agree if delayed cord clamping is appropriate and, if so, duration of delayed cord clamping

Clear communication between the MDT team regarding positioning of infant and specialised equipment (Lifestart) if required during DCC, agree criteria for when to consider cutting the cord earlier than 60 seconds

Allocate member of team as time-keeper from delivery of baby

Prepare pre-warmed towels / hat / Sterile Plastic suit / Plastic Bag as appropriate

Optimise environment, room temperature, fans off. Pre-warm transport mattress and incubator. Thermal care must be optimised throughout DCC.

Obstetrician/ Midwife to call clearly once baby delivered

Post-natal

Time-Keeper: Call out 15 second intervals

Dry & Stimulate OR Plastic Bag / transwarmer as appropriate.

Hat on, position airway & gentle stimulation

(Support breathing as required if equipment available)

Obstetrician/ Midwife to call clearly once cord is clamped

Record duration of delayed clamping in notes

Enhanced Feto-Placental Transfusion (Optimal Cord Management) – Evidence

	Term Infant	Preterm Infant
Benefits	➢ Increased haemoglobin and haematocrit concentrations in neonates after 60 seconds DCC.[1] ➢ Significant increase in ferritin levels at 4-6 months with associated increased myelin content.[2] ➢ Optimised neurodevelopment and increased myelin content in developing brain up to 12 months.[3]	➢ Trend toward improved initial oxygenation.[6] ➢ Decreased mortality by 30% in the NICU and to 2 years of age.[5] ➢ Reduced incidence in all grades of IVH.[7] ➢ Fewer gastrointestinal issues incl NEC.[4, 8] ➢ Lower transfusion requirements.[4]
Safety Profile	➢ No increase in hyperbilirubinaemia requiring phototherapy or symptomatic polycythaemia up to 48hrs of age.[4] ➢ No difference in APGARS at 5 minutes. [6]	➢ No difference in APGAR at 5 minutes.[6] ➢ Small increase in mild hypothermia (mean −0.13°C); mortality benefit significantly outweighs this risk.[6] ➢ Increased peak Haematocrit by 2.73%.[7] ➢ Increased risk of jaundice.[7]

Some uncertainties persist with respect to delayed cord clamping:

- *Few infants at the extreme of viability have been studied*
- *Optimal DCC duration: 60s minimum recommended; recent evidence suggests longer delays (≥120s) reduce mortality further. Physiological cord clamping (waiting for cessation of pulsation after lung aeration) may be preferable.*
- *Long term neurodevelopment outcomes have not been reported in preterm infants*
- *Umbilical cord milking has not been studied as widely as DCC but is recommended as option for babies > 28 weeks when DCC is not possible, however, this should not delay resuscitative interventions*
- *Currently not recommended in infants < 28 weeks as associated with increased rates of IVH*

References

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4. Rabe H, Mercer J, Erickson-Owens D. What does the evidence tell us? Revisiting Optimal cord management at the time of birth. Eur J Paediatrics. 2022
5. Rabe H, Gyte GM, Diaz-Rossello JL & Duley L. Effect of umbilical cord clamping and other strategies to influence placental transfusion at preterm birth on maternal and infant outcome. Cochrane Database Syst Rev. 2019
6. Major GS, Unger V, Nagy R et al. Umbilical cord management in newborn resuscitation: a systematic review and meta-analysis. Pediatric Research. 2025
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8. Garg BD, Kabra NS & Bansal A. Role of delayed cord clamping in prevention of necrotising enterocolitis in pre term neonates: a systematic review. Journal of Maternal Fetal and Neonatal Medicine. 2019

Optimal Cord Management (OCM): Recommendations by national and international institutions

Organisation	Preterm	Term
WHO (2023)	Delayed umbilical cord clamping (not earlier than 1 min after birth) is recommended for improved maternal and infant health and nutrition outcomes.	
ILCOR (2025)	Delay umbilical cord clamping for at least 1 min for newborn infants not requiring resuscitation. Evidence does not support or refute delayed cord clamping when resuscitation is needed. If deferred cord clamping is not feasible, umbilical cord milking may be considered for preterm infants ≥28 weeks' gestation. Cord milking is not recommended for infants <28 weeks' gestation because of potential harm.	
NLS (2025)	For uncompromised term and preterm infants, where immediate resuscitation or stabilisation is not required, aim to delay clamping the cord for at least 60 seconds. A longer period may be more beneficial. Clamping should ideally take place after lungs are aerated. Where DCC is not possible consider intact or cut cord milking in > 28 weeks. In newborn infants needing resuscitation, if the cord is intact, resuscitation is impractical; clamp the cord for < 30 s to minimise delay to necessary interventions.	
BAPM (2020)	Optimal Cord Management in all preterm babies less than 34 weeks gestation by waiting at least 60 seconds before clamping the umbilical cord. OCM reduces death in preterm babies by nearly a third. The number of babies needing to receive OCM to prevent a death is around 30-50 overall and may be as low as 20 in the least mature babies.	
ERC (2025)	Delay clamping the umbilical cord for at least 60s, especially in stable preterm infants.	Term birth not covered.
NICE (2022)	Wait at least 60 seconds before clamping the cord of preterm babies unless there are specific maternal or fetal conditions that need earlier clamping.	The cord should not be clamped in the first 60 seconds, except where there are concerns about the cord's integrity or the baby's heart rate. Cord should be clamped before 5 minutes, although pregnant mothers should be supported if they wish this to be delayed further.
ACOG 2025	For babies <37 weeks who do *not* need immediate resuscitation: wait at least 60 seconds, and data suggest benefit of clamping at 120s or more.	Vigorous term & preterm: delay at least 30-60s. (ACOG 2020)

Abbreviations: WHO World Health Organization, ILCOR International Liaison Committee on Resuscitation, NLS Newborn Life Support (UK Resus Council), BAPM British Association of Perinatal Medicine, ERC European Resuscitation Council, NICE National Institute for Health & Clinical Excellent. ACOG American College of Obstetricians and Gynaecologists

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Achieving Target Temperatures:

- Apply pulse oximetry and then continuous temperature monitoring if available
  - Ensure probe is secure (can dislodge easily)
  - Consider skin surface temperature servo-control where prolonged resuscitation or observation occurs on the delivery room resuscitaire
- Ensure plastic wrap/bag is properly secured (<32/40)
- Low threshold for Transwarmer use in preterms, especially if temp <36.5 °C.
- Regular axillary temperatures should be taken as a minimum at the following time points:
  - After DCC, perform the first axillary temperature on the resuscitaire (confirms continuous skin temperature probe accuracy)
  - Before delivery room cuddle
  - After delivery room cuddle, prior to transfer to NICU
  - On admission to NICU, prior to transfer out of transport incubator
- If temperature is ever outside the target range, corrective action should be taken and continuous monitoring reviewed; if continuous monitoring is not available, repeat axillary temperatures every 15 minutes until normothermia is achieved.
- Minimise handling and heat loss; maintain continuous monitoring throughout.
- Keep infant in plastic wrap until incubator is at set temp/humidity and lines are inserted.

Gold Standard Admission Temperature (Axillary or Core): *36.5 – 37.5°C*

Normal Neonatal Axillary Temperature Range: *36.5 – 37.5°C*

Skin Temperature Ranges: *Term Infant 36 – 36.5°C | Preterm Infant 36.2 – 37.2°C*

FHOC Ref: East of England Neonatal Benchmarking Group. Clinical Guideline: Thermoregulation

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Collaborative working to deliver high quality care to our babies and their families

Incubator Humidification:

Infants <23^{+6} Weeks Gestation		Infants 24 to 27^{+6} Weeks Gestation		Infants 28 to 29^{+6} Weeks Gestation	
Age (Days)	*Humidity (%)*	*Age (Days)*	*Humidity (%)*	*Age (Days)*	*Humidity (%)*
0	95	0	80	0	80
1	85	1	80	1	80
2	85	2	80	2	75
3	85	3	80	3	70
4	80	4	80	4	65
5	80	5	80	5	60
6	80	6	80	6	55
7	75	7	75	7	50
8	70	8	70	8	45
9	65	9	65	9	40
10	60	10	60	10	Discontinued
11	55	11	55	11	-
12	50	12	50	12	-
13	45	13	45	13	-
14	40	14	40	14	-
15	Discontinued	15	Discontinued	15	-

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FHOC Reference: East of England guideline: Management of a baby <30 weeks gestation requiring humidity (2025)

NOTE: No consensus exists on optimal humidity levels/weaning duration. Consider using humidity for babies up to 32/40. This guidance represents current local practice.

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Respiratory Care Bundle & Saturation Targeting

Comprehensive evidence-based review:
Sweet et al. European Consensus Guidelines on the Management of Respiratory Distress Syndrome – 2025 Update. Neonatology 2026; https://doi.org/10.1159/000551062

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Early Management of Respiratory Distress Syndrome (RDS):

Early administration of CPAP/PEEP *within delivery room*

The newborn resuscitation and support of transition of infants at birth algorithm (RCUK NLS 2025) should be followed with a focus on non-invasive methods of respiratory support where possible.
Application of early PEEP/CPAP of at least 6cmH_2O maximises the infant's functional residual capacity, enhances endogenous surfactant production, & reduces the need for rescue surfactant and mechanical ventilation. Initiate early PEEP in the delivery room in infants at significant risk of RDS. Infants <32^{+0} weeks gestation are likely to require continuous PEEP ***even if*** they appear vigorous and initially maintain pulse-oximeter saturations in 21% O_2.

Optimal Non-Invasive Respiratory Support

CPAP (Continuous Positive Airway Pressure)

- Delivers a mixture of heated & humidified medical gases to provide a continuous & controlled positive pressure & percentage of O_2
- If delivery room CPAP is not available, a continuous positive pressure and Peak End Expiratory Pressure (PEEP) can be administered temporarily using a controlled T-Piece device via a face-mask ***or*** a short ETT placed within the naso-pharynx

Modes of Action:
- PEEP optimises functional residual capacity, oxygenation, prevents alveoli collapse & enhances endogenous surfactant production
- Distending pressure augments venous return and thus improves cardiac output
- Humidified gases improve lung compliance

Risk of:
- Nasal obstruction & trauma: regularly assess area & rotate ***correctly*** sized mask/prongs, Abdominal distention: gastric tube is required for decompression

Settings:
➢ CPAP should be delivered at **6-8 cmH_2O** using a total gas flow of **6 – 10 L/min** via short binasal prongs OR nasal mask

Caution *using CPAP >7 cmH_2O if the preterm infant has* ***not*** *received surfactant – increased risk of air leak observed in COIN trial using 8 cmH_2O prior to surfactant dosage*

Adequate seal is paramount.

HHHFNC (Heated Humidified High-Flow Nasal Cannulae)

➢ Delivers a mixture of heated & humidified medical gases to a defined 'high' flow and percentage of O_2

Modes of Action:
- High flow flushes CO_2 from the upper airways dead-space
- Humidified gases Improve lung compliance
- Continuous positive distending pressure may prevent alveoli collapse (uncontrolled & flow dependent)

➢ ***Role in primary therapy of RDS in extreme prematurity is debated***
➢ ***It is broadly equivalent post extubation infants >28 weeks gestation***

Benefits:
- Reduced abdominal distention
- Reduced nasal trauma
- Improved access to the infant's cranium

Settings:
Nasal cannulae **must be ≤50%** of the diameter of the infant's nares

➢ Infants **≥1 Kg**: Start flow at **6 L/min**
➢ Infants **<1 Kg**: Start flow at **4 L/min**
- Increase flow by 0.5 to 1 L/min according to response
- *Maximum flow is 8 L/min* (***Caution: >6 L/min if infant <1kg***)

If intubated, utilise ventilatory strategies which minimise volutrauma & extubate to non-invasive ventilation as soon as is safe & possible

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Early Management of RDS: *Surfactant Therapy, LISA & Optimal Ventilation*

WHEN TO TREAT WITH SURFACTANT? PRACTICAL GUIDE

If intubation required (any GA where surfactant deficiency RDS is suspected)	Administer Surfactant regardless of FiO2 threshold
< 28 weeks	Early signs of RDS after stabilisation (selective prophylaxis) and/or Lung Ultrasound RDS score > 8
28 – 31+6 weeks	FiO2 ≥ 30 % or increased work of breathing on non-invasive respiratory support and/or Lung Ultrasound RDS score > 12
32 – 36+6 weeks	FiO2 ≥ 40 % or increased work of breathing on CPAP
≥ 37 weeks	FiO2 ≥ 40 % or increased work of breathing on CPAP (Consider other diagnoses other than Surfactant deficiency RDS)

- Surfactant administration by thin catheter is the preferred method unless clinical indication for Intubation
- Intubation, Surfactant and Extubate (INSURE) is inferior to LISA. It is an alternative where LISA cannot be safely performed and a documented local risk assessment exists

LISA: *L*ess *I*nvasive *S*urfactant *A*dministration

- Administration of intra-tracheal surfactant via a fine catheter placed under laryngoscopic guidance
- Infants must be spontaneously breathing
- Surfactant is administered slowly with non-invasive respiratory support ongoing throughout the LISA procedure
- Clinicians should be trained and experienced in this technique
- Pre-optimise with caffeine (if possible)
- Local LISA comfort / sedation protocol should be followed
- Infants must be monitored throughout and the team ready to convert to intubation if required (e.g apnoea)

Cautions / Contra-indications:

- Personnel with adequate experience and advanced airway skills not available
- More mature grades of prematurity where alternative diagnoses other than RDS may be contributory
- Requires intubation & ventilation for stabilisation or transport
- Difficult Airway

Repeat Dosage

- Consider repeat doses of surfactant (up to a total of 3 doses) if persistently high oxygen requirement or significant ongoing ventilatory requirements

FHOC Reference: European Consensus Guidelines for management of RDS in preterm infants – 2025 update https://pubmed.ncbi.nlm.nih.gov/41802129/
Capasso et al. Lung ultrasound score to accurately predict surfactant replacement. 2023 https://doi.org/10.1002/ppul.26337

Use of Surfactant:

Medication	Preparation	Dose	Administration	Onset, Peak and duration of action	Side effect
PORACTANT ALFA (CUROSURF®) ('Surfactant' – Porcine lung phospholipid fraction)	80 mg/mL Suspension **in fridge** 1.5-mL vial = 120mg 3-mL vial = 240mg Gentle inversion may be required; Do not shake	Round doses to nearest whole vial First dose: 200 mg/kg Repeat doses of 100 mg/kg may be administered under senior advice. Timing of doses dependent on infant condition; max. total dose 300–400 mg/kg	Warm to room temperature Administer via Endotracheal Tube Flush ET administration set with 1ml of air after delivery of surfactant Deliver 5x breaths with inflation time of 2 to 3 seconds following administration of surfactant Continue IPPV until the surfactant is no longer visibly refluxing within the ETT	Rapid onset Observe closely and adjust ventilatory settings according to infant response – this is essential to prevent hyperoxia, hypocarbia and prevent use of excessively high peak inspiratory pressures	Obstruction of ETT by mucous sectretions. Uncommon/rare: intracranial haemorrhage, bradycardia, pulmonary haemorrhage, desaturation, hypotension

Pre-medication for Non-Emergency (Elective) Intubation:

Analgesic-Sedative-Hypnotic (Opiate)*

Fentanyl

*There are some concerns regarding chest wall rigidity with synthetic opioid use – however this can be reversed by naloxone use or more appropriately minimised by **slow administration**, and co-administration of a rapid acting muscle relaxant*

Intravenous access, continuous heart rate and oxygen saturation monitoring are pre-requisites for elective intubation

Use an Intubation checklist (BAPM Airway Safety Framework 2024 Appendices), copy in EoE Neonatal Intubation and Premedication Guideline [Sept 2025]

Use Neonatal Infant Pain Score during procedure

Vagolytic

Atropine

To prevent bradycardia during intubation and decrease airway secretions

Muscle Relaxant

Suxamethonium

Muscle relaxation to facilitate intubation minimises the rise in intracranial pressure that occurs during awake intubation.

The infant's airway must be maintainable prior to giving any muscle relaxant – Exercise extreme caution if anatomical airway malformation

Medication**	Dose
FENTANYL (Controlled Drug)	**2 micrograms/kg** (Range 1 – 4 micrograms/kg) IV **slowly over 1-2 minutes** followed by a **slow** 0.9% sodium chloride flush Repeat dose of 3 micrograms/kg can be given if required
ATROPINE	**20 micrograms/kg** stat rapid IV bolus
SUXAMETHONIUM	**2 mg/kg** stat IV bolus

FHOC Reference: Clinical Guideline: Premedication and Intubation Guideline

Pre-medication for Non-Emergency Intubation: (Page 1 of 2)

Medication	Preparation	Dose	Administration	Onset, peak and duration of action	Side effect
FENTANYL (Analgesic, Controlled Drug)	50 micrograms/ml 2ml size Diluent: 0.9% sodium chloride or 5% glucose	**2 micrograms/kg** (Range 1 – 4 micrograms/kg)[6] IV **slowly over 1-2 minutes** followed by a slow 0.9% sodium chloride flush Repeat dose of 3 micrograms/kg can be given if required	Draw 0.2mls (10micrograms) and dilute to 1ml with glucose 5% in a 1ml syringe = 10micrograms/ml, then give 0.1- 0.4 mls for each Kg of baby's weight	Onset of action: IV- almost immediate Peak effect: 5- 15 minutes Duration of analgesic effect: 30 – 60 minutes	Chest wall rigidity (can be reversed with naloxone or muscle relaxant), seizure-like activity, respiratory depression, bradycardia
ATROPINE (Vagolytic)	600 micrograms/ml 1ml size Dilution not recommended	**20 micrograms/kg** stat rapid IV bolus[6,7]	Draw up 0.033mls (20 micrograms) for each kg of baby's weight Alternatively, dilute to 60 micrograms/ml solution (0.1 ml from 600 micrograms/ml solution to 0.9 ml of 0.9% sodium chloride to make up a final volume of 1 ml) & draw up 0.33 ml for each Kg of baby's weight	Onset of action: Immediate Peak effects: 12-16 min, Duration of action: 4-6 hrs	Tachycardia (self resolving)

FHOC Reference: Clinical Guideline: Premedication and Intubation Guideline

Pre-medication for Non-Emergency Intubation: (Page 2 of 2)

Medication	Preparation	Dose	Administration	Onset, peak and duration of action	Side effect
SUXAMETHONIUM (Muscle Relaxant)	50 mg/ml 2ml size **in fridge** 0.9% Sodium chloride or 5% glucose	**2 mg/kg** stat IV bolus	Draw 0.2ml (10mg) and dilute to 1ml with 5% glucose in a 1ml syringe = 10 mg/ml then draw up 0.2ml (2 mg of diluted solution) for each Kg of baby's weight	Onset of action: 1-2 minutes Duration of action: 5-10 minutes	Bradycardia especially after second dose of suxamethonium, transient hyperkalaemia, malignant hyperthermia
NALOXONE (Opioid Antagonist – to reverse Fentanyl related respiratory depression or chest wall rigidity)	400 micrograms/ml solution for injection OR Available as 400 micrograms/ml Minijets	**10 micrograms/kg** IV bolus Can be repeated every 2-3 minutes to a cumulative dose of 100 micrograms/kg if necessary BUT risks complete reversion of opioid analgesia	Draw 0.1 ml (40 micrograms) and dilute to 1 ml with 0.9% sodium chloride = 40 micrograms/ml then draw up 0.25 ml for each Kg of baby's weight	Onset of action: 1-2 minutes Duration 3-4 hours	Arrhythmias Hypertension Hypotension (rare)

FHOC Reference: Clinical Guideline: Premedication and Intubation Guideline

Endotracheal Intubation - Suggested Tube Sizes & Lengths:

Tube size and length are dependent on the size of the infant's airway and will thus vary between infants of the same gestations and weights. For this reason, the tables below can ***only be used for guidance****. As a general rule – secure the Endotracheal Tube (ETT) once the tip has passed 2cm beyond the vocal cords (use the black marker on the ETT as a guide).* ***X-Ray should confirm ETT position*** *after intubation (Optimal position is* ***above the carina*** *at* ***T1 – 2****).*

GA (weeks)	Body wt.	ET size	Length at lips
<28	500 – 699	2.5	5.5
	700 – 899	2.5	6.0
	900 – 1000	2.5	6.5
28 – 34	1001 – 1499	2.5 – 3.0	7.0
	1500 – 1899	3.0	7.5
	1900 – 2499	3.0	8.0
> 34	2500 – 3000	3.0 - 3.5	8.5
	3000 – 4200	3.5	9.0
	> 4200	3.5	10

Length by Formula:

Oral Intubation (*cm to lips*) = 6 + weight (**kg**)

Nasal Intubation *(cm to nares)* = 6 + [weight (**kg**) x 1.5]

FHOC Reference: EoE ODN Intubation Guideline

Endotracheal Intubation – Fixation:

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- Ensure endotracheal tube (ETT) is held securely whilst fixation device is applied
  - *For oral fixation, the ETT may be held between the practitioner's finger and infant's hard palate*
  - *For nasal fixation the tube should be held in place with a pincer grip*
- Apply skin protectant (if used) and place a strip of colloid dressing to each cheek
- Attach the tube holder to the colloid dressing *(figures show orientation of tube holder for both oro- and naso- ETT fixation)*
- Wrap Velcro around the ETT to secure
  - *Apply 'lollipop' stickers across the bridge of the fixation device if required*
- Test security of ETT fixation by applying *downwards* pressure – *the ETT should* ***not*** *slip through the fixation device*

Fixation of Oro-Endotracheal Tube

Use of an adjustable tube holder/fixation device facilitates ETT re-positioning with minimal infant handling, avoids the use of irritating tapes and allows for easier access the neonate's cranium (e.g. for CFM probes, scalp cannulae, or infant cares) compared with tape fixation or ribbon/hat systems.

FHOC Reference: Premedication and Intubation Guideline

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Mechanical Ventilation (MV):

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Volume Targeted Ventilation (VTV):

Optimal first-line MV strategy in the majority of infants

Where non-invasive support has failed or intubation required for general stabilization or transfer. Aim is to minimise duration of MV.

VTV: Ventilator parameters (Peak Inspiratory Pressure [PIP] and/or inspiratory time [Ti]) are automatically adjusted to deliver a **pre-set tidal volume (VT) (usually between 4 to 6ml/kg)**

A patient-triggered (synchronised) VTV mode is optimal
- *i.e **least** injurious to the infant's lung, least risk of hypocapnia*
- *All modes of MV induce lung injury and risk air leak*

Commonly available VTV- default modes:

- **Volume Guarantee** (VG): Adjusts PIP in response to previous expired VT (i.e. will auto-wean PIP as lung compliance⇧)
- **Volume Controlled/Volume Limited**: Adjust the inspiratory phase (Ti &/or flow) in accordance with inspired volume
- **Guarantee/Control Hybrid Modes**: E.g. TTV^{plus}

Manufacturer terminology is discordant - know your unit's ventilator

Accuracy of VTV is optimised in ventilator circuits where the flow sensor is positioned at the wye piece

Initial Settings:

*Select a **patient-triggered** mode with back-up rate of **30-50 bpm** (caution; Hypercapnia or the Muscle relaxed infant)*

- ***VT:** 4 to 5 ml/kg | **Ti:** 0.3 to 0.36 seconds*
- ***Flow:** 6 to 8 L/min | **PEEP:** 5 cmH_2O*

***Stay with the infant; adjust settings according to pCO_2, FiO_2 & clinical response.** Term infants may require longer Ti, ELBW infants may not tolerate VT<4.5ml/kg due to dead space of ETT & circuit*

Cautions: ET Leak >40 to 60% *(leads to erroneous VT measurement)* & Lung anomalies at risk of hyper-inflation (monitor for over-distention)

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Early Management of RDS: *Planning for Early Extubation & Use of NIPPV*

All modes of mechanical ventilation (MV) induce lung injury & risk air leak. Infants with RDS on MV should be ventilated as 'gently' as possible, weaned as quickly as possible and extubated off MV as soon as is safe and possible. Maintaining a stable infant on minimal ventilator settings does not increase extubation success; prolonged MV does, however, increase rates of Chronic Lung Disease (CLD). An infant may be extubated to CPAP, HHHFNC, NIPPV, or air, depending on their condition and size. VLBW or very preterm infants are likely to require some form of initial respiratory support post-extubation (to prevent atelectasis and alveolar de-recruitment)

When to extubate?

Exercise caution when considering extubation for infants:

- Requiring definitive airway for transport (Liaise with Transport team)
- With a significant airway abnormality OR known difficult airway
- With recent significant pulmonary haemorrhage
- Who are unstable e.g. significant inotropic requirement

The following tools may inform extubation decisions in preterm infants:

Early Extubation Protocol (infants <30 weeks gestation or <1.5kg):	✓
Percentage inspired O_2 <30%	
Peak Inspiratory Pressure <16 cmH_2O	
Mean Airway Pressure ≤7 cmH_2O	
Ventilator Back-up Rate ≤35-40 bpm (Ensure baby is breathing above rate)	
pH>7.25	
pCO_2 <7.5 kPa	
Ensure appropriate caffeine loading	
Ensure muscle relaxant, sedative and opiate medication infusions have been appropriately weaned/discontinued	

**Hamlin et al. Predicting successful extubation of very low birthweight infants. ADC F&N 2006. 91:F180–F183*

Saturation Targeting at Delivery:

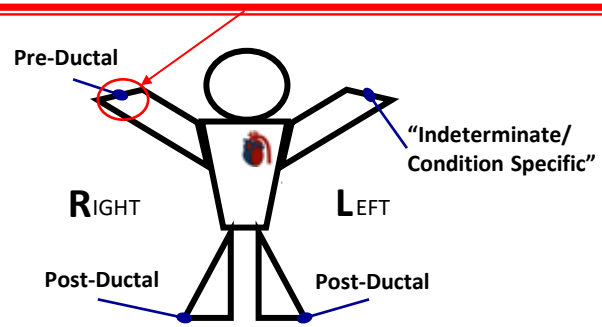
Time from Birth	Acceptable Pre-Ductal Saturation
3 minutes	70 - 75%
5 minutes	80 - 85%
10 minutes	85 - 95%

Resus Council UK (NLS 2025) recommendations for acceptable pulse oximeter saturations at delivery, according to age..

Starting FiO_2 in the Delivery Room:
initiation of resuscitation/assisted transition

Gestation	Set FiO_2 (Percentage) to:
< 32 weeks	≥ 30 %
≥ 32 weeks	21% (Air)

Use pre-ductal saturations (right hand/wrist) as preference within the delivery room



Titrate subsequent FiO_2 according to pre-ductal saturations

FHOC Reference: Saturation targeting – EoE guideline

Oxygen & Air Mixtures: Delivered Percentage of Oxygen

Total Flow: 8 Litres/Minute

Oxygen Percentage of Mixture	Air Flow (L/Min)	Oxygen Flow (L/Min)
21 %	8	0
30.9 %	7	1
40.8 %	6	2
50.6 %	5	3
60.5 %	4	4
70.4 %	3	5
80.3 %	2	6
90.1 %	1	7
100 %	0	8

Total Flow: 10 Litres/Minute

Oxygen Percentage of Mixture	Air Flow (L/Min)	Oxygen Flow (L/Min)
21 %	10	0
28.9 %	9	1
36.8 %	8	2
44.7 %	7	3
52.6 %	6	4
60.5 %	5	5
68.4 %	4	6
76.3 %	3	7
84.2 %	2	8
92.1 %	1	9
100 %	0	10

Saturation Targeting on the Neonatal Unit:

Gestation at Birth	Air/Oxygen	Target	Alarm Limits
Preterm <37 weeks Or Birth Weight <1.5kg	Oxygen	91 - 95%	90 - 96%*
	Air	91 - 95%	90 – 100%
Term Infant ≥37 weeks	Oxygen	≥95%	94 - 99%
	Air	≥95%	94 - 100%
Preterm Infant with corrected gestation ≥37 weeks	Oxygen	≥93%	92 - 99%
	Air	≥93%	92 – 100%

***Preterm infants with saturations >95% in oxygen are at significant risk of hyperoxia**

PaO_2 will be significantly elevated ➔ Act with the same urgency as a significant desaturation

FHOC Reference: Saturation targeting – EoE Guideline

Saturation Targeting on the Neonatal Unit

Special Circumstances			
Circumstance	**Air/Oxygen**	**Target**	**Alarm Limits**
Risk of PPHN/ Established PPNH**	Air/Oxygen	>92%	90 - 98%
Suspected or Confirmed Cyanotic Heart Disease	See PaNDR Clinical Guideline: **"Management of a Duct Dependant Congenital Heart Disease"**		
	*Avoid Hyperoxia – Particularly in duct-dependent lesions**** supplemental O2 to achieve SatO2 in the 75-85% range *Liaise with Specialist Cardiac Centre for Advice*		

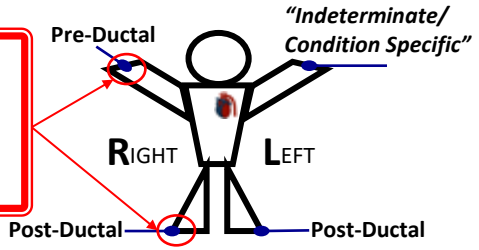
****Risk Factors for PPHN in Term or Near-Term Infant:**

- Maternal Factors- *raised BMI, Smoking, Ill-health through asthma / diabetes mellitus,* antenatal exposure to *Aspirin / Non-Steroidal Anti-Inflammatory Drug (NSAID) / Selective Serotonin Receptor Inhibitor (SSRI), cyclooxygenase inhibitors (COXi)*
- Structural Lung Disease: *Pulmonary hypoplasia, congenital diaphragmatic hernia or congenital pulmonary malformation*
- Severe perinatal Hypoxic Ischaemic Encephalopathy (HIE)
- Meconium-stained amniotic fluid
- Syndrome - Trisomy 21
- Perinatal infection - Chorioamnionitis, GBS sepsis or congenital pneumonia
- Caesarean section
- Others - Hypocalcaemia, acidosis, Polycythaemia
- Male, African or Asian maternal race

*****Limited evidence base for oxygen targeting in Cyanotic Heart Disease**

- Saturations >85% are unlikely to be achievable without significant hyperoxia (↑P_aO_2), due to the physiological effect of shunting/mixing
- Caution in duct dependent lesions: Hyperoxia may risk unintended ductal closure
- Saturations may be less than 75% in certain cyanotic cardiac lesions – liaison with cardiac specialists is imperative to guide optimal targeting

Consider dual pre- & post-ductal saturation monitoring in suspected PPHN or Congenital Cardiac Lesions



Oxygenation Index (**OI**) = [MAP x FiO_2] / [PaO_2 x 7.5]

Given:
MAP: Mean Airway Pressure (**cmH_2O**)
FiO_2: 'Fraction' of Inspired Oxygen ***as a percentage*** **(%)**
PaO_2: Partial Pressure of Oxygen in Arterial Blood (**kPa**)

FHOC Reference: Clinical Guideline: Saturation targeting in the Neonate admitted to the Neonatal Unit

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FIRST HOUR OF CARE: QUICK REFERENCE MANUAL

East of England Neonatal ODN

First Hour Fluid Management & Medications

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UMBILICAL VENOUS AND ARTERIAL ACCESS

Central Access: *(Umbilical Lines well positioned and checked on ultrasound daily can stay in for 1 week)*

Umbilical Venous Catheter (UVC)

Indications:

- Infants requiring, or likely to require, medications prohibited by peripheral access (e.g Inotropes, Hypertonic Solutions/High Strength Dextrose, Parenteral Nutrition)
- Emergency vascular access for resuscitation of infants at birth
- Exchange transfusion
- Low birth weight infants to avoid multiple peripheral cannulation

Contra-indications:

- Abdominal wall abnormality, necrotising enterocolitis, peritonitis

Complications:

- Sepsis, haemorrhage, embolism/thrombosis, pericardial effusion, pleural effusion, portal hypertension, ***Malpositioned catheter****
  - *Catheters placed in the **heart** can cause pericardial effusion, cardiac tamponade, endocarditis, arrhythmia, and death*
  - *Catheters placed in the **portal system** are associated with necrotising enterocolitis, colonic perforation & hepatic necrosis*
  - Catheters in a low position (pre-hepatic) may be at increased risk of hepatic necrosis and intra-abdominal extravasation

Length to insert: (Right shoulder to Umbilicus length x 0.66 cm) or weight-based formulas = (Weight (kg) x 2) + 5 + stump length (cm)

Position – can be confirmed by real time Point of Care Ultrasound (if expertise available) **or X-ray**

- *The catheter should lie **T8-T9** & usually lies within the cardiac silhouette on a supine X-ray, it does not mean it is in the heart.*
- *POCUS confirmation is gold standard*
- *A UVC tip sited at or below T10 should only be used on short term basis (if considered essential) due to a higher risk of extravasation unless is confirmed on POCUS every day*
- *A well positioned UVC can be used for up to 7 days. Daily POCUS check of tip position advisable in such instances.*

Umbilical Arterial Catheter (UAC)

Indications:

- Continuous monitoring of arterial blood pressure
- Frequent measurement of arterial blood gases or blood sampling
- Exchange transfusion
- **Contra-indications:**
- Abdominal wall abnormality, necrotising enterocolitis, peritonitis, evidence of lower limb or buttocks vascular compromise, IUGR with antenatal absent or reversed end diastolic flow - consider peripheral arterial line as first choice
- **Complications**
- **Positional:** Perforation, misdirection, refractory hypoglycaemia (if UAC tip opposite coeliac axis & dextrose infusion is running)
- **Vascular Accident:** Abdominal aortic thrombosis leading to congestive heart failure, embolism, vasospasm, loss of extremity, air embolism
- **Equipment Related:** Breaks or knots in catheter
- **Other:** Sepsis, haemorrhage, necrotising enterocolitis, intestinal perforation, pericardial effusion, hypertension, arrhythmia

Length by formula (cm): (Right shoulder to Umbilicus length x 1.1 cm) or weight based formula = [3 x weight (kg)] + 9 + stump length (cm)

Position must be confirmed by XRAY or POCUS

- ***High placement:** T6 - T10 | **Low placement:** Below L3 (ideally L4 - L5)*
- *Catheter tips at T11 to L2 **must** be pulled to a low placement or removed*
- *POCUS – 2 vertebral levels above coeliac axis*

To help maintain catheter patency use heparinised saline solution (either 0.45% or 0.9% saline containing 1 unit heparin per ml). Infuse at a rate of 0.5-1ml/hour according to size of baby

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FHOC Ref: EOE Clinical Guidelines: Insertion of a UVC & Insertion of a UAC
Central Venous Access Devices in Neonates – BAPM Framework 2025

VENOUS ACCESS

- Crucial in the first hour and can be difficult for medical practitioners to get access to the infant
- Strong consideration for 1st line access even in infants requiring umbilical lines – risk of hypoglycaemia and delay in antibiotic administration if umbilical access attempts, and confirmation of line positions, are not timely.
- Ideal for bolus medications which do not require central access (Protecting sterility of central lines from multiple access)
- Have peripheral cannula trolley ready and ask her help, 4 hand approach better than 2 hand
- Optimise vein visualisation – naked eye, vein finder or POCUS, **IF NOT SURE DON'T POKE**
- 2 attempts max – if unsuccessful, pass it on to your next senior person

Peripherally inserted central catheter line (PICC) Long lines:

- **Not always first line within the first hour of care** – To be used in the event of contra-indication to umbilical access. Gastroschisis for example

Indications	Line choice
• Major gastrointestinal problems and prolonged intolerance to enteral feeds • Parenteral nutrition administration • Where peripheral access is unsuccessful or to minimise multiple attempts • Requirement for centrally administered drugs/infusions e.g. inotropes • Long term drug administration • Need for higher concentrations of glucose (>12.5%) • Blood products should not be given via a long line due to the risk of occlusion	• Babies <1kg in weight – 1Fr / Premicath • Babies >1kg in weight – 2Fr

Measurement

Measure from the proposed insertion point; To the sternal notch for lines inserted in the upper limbs, To the xiphisternum for lines inserted in the lower limbs, Real-time POCUS is gold standard.

Confirmation of line position

- The tip of upper limb PICCs should ideally lie in the superior vena cava, with the relevant arm positioned off the chest in a neutral position (~ 30 degrees abducted) with the elbow flexed when the check radiograph is taken. Tip must pass the shoulder joint.
- For lower limb inserted PICCs, the tip should ideally be in the inferior vena cava above L4-L5 level, and the possibility of malposition in an ascending lumbar vein requires specific consideration.

FHOC Reference: Central Venous Access Devices in Neonates – BAPM Framework 2025

First Hour Fluids:

First Hour Fluids – Suggested Starting Rates	
Preterm Infant <28 weeks gestation:	80 to 100 ml/kg/day
Preterm Infant 28+0 to 36+6 weeks gestation:	60 to 80 ml/kg/day
Term Infant ≥37 weeks gestation:	50 to 60 ml/kg/day
Severe Perinatal Hypoxic-Ischaemic Insult in a Term Infant:	30 to 40 ml/kg/day*

**These infants are at risk of significant fluid retention – 30ml/kg/day may be required if renal impairment is suspected. Frequent blood glucose monitoring is essential as higher strength dextrose solutions may be required to meet the infant's glucose requirement and prevent hypoglycaemia*

- Subsequent choice of IV fluid type, and volume, will be determined by the infant's renal profile, serum electrolyte profiles, fluid balance (including urine output) and weight change
- Extremely preterm neonates will require highly frequent electrolyte monitoring during stabilisation (~4 hourly) and may require rates far in excess of 100ml/kg/day, as guided by senior review, particularly if at the extreme of viability

- All infants with significant clinical indicators of sepsis, significant perinatal stress or those infants < 34 weeks gestation must have fluids started within the first hour
- Where TPN is not indicated, or cannot be started within the 1st hour, **10% Glucose Solution would be the first line solution** where IV fluids are required

Early Onset Neonatal Sepsis and Antibiotics

When to give

- Make antibiotic management decisions based on risk factors and clinical indicators – NICE guidelines NG195 or Kaiser Permanente calculator
- **Manage as early onset neonatal sepsis** in babies with any red flags or with 2 or more 'non-red-flag' risk factors or clinical indicators.
    - Administer antibiotics within 1 hour of decision to treat
    - Do not wait for results before starting antibiotics
- **In babies born after 34+0 weeks of pregnancy, consider using the Kaiser Sepsis Risk Calculator to guide management (see network guideline).** This should be practiced under a prospective audit framework that monitors antibiotic exposure compared to NICE guidance and late presentations/missed cases of sepsis.
- In babies without red flags and only 1 risk factor or 1 clinical indicator use clinical judgement to decide whether it is safe to withhold antibiotics and whether they require a period of monitoring
- For babies without Risk factors or Clinical indicators of possible infection continue routine care

What to give

- Click here for antibiotic dose and prescribing guidance
- First line treatment for early onset sepsis will be **Benzyl Penicillin plus Gentamicin** in the majority of infants or refer to your local antibiotic guidance.

Investigations

- Blood culture and CRP ***before*** starting antibiotics
- Recheck CRP at **18**-24 hours following commencement of antibiotic treatment
- Other useful investigations include FBC and UE.
- In cases of suspected chorioamnionitis the placenta should be sent for histological examination and culture (see page 53)
- If there is strong clinical suspicion of meningitis or **positive blood culture (other than CONS)** and it is safe to do so – perform a lumbar puncture to obtain CSF

FHOC Reference: NICE NG195 https://www.nice.org.uk/guidance/ng195, KP calculator link: https://neonatalsepsiscalculator.kaiserpermanente.org/

Risk factor (RF)
Suspected or confirmed infection in another baby in the case of a multiple pregnancy
Invasive GBS infection in a previous baby OR Maternal group B streptococcus colonisation OR GBS bacteriuria OR infection in current pregnancy
Preterm birth following spontaneous labour before 37 weeks' gestation
Confirmed rupture of membranes for more than 24 hours before a term birth
Confirmed rupture of membranes > 18 hours in preterm birth
Suspected or confirmed maternal sepsis in the intrapartum or early postpartum period
Suspected or confirmed of chorioamnionitis

Clinical indicator (CI)
Apnoea (temporary stopping of breathing)
Seizures
Need for cardiopulmonary resuscitation
Need for mechanical ventilation
Signs of shock
Signs of respiratory distress (including grunting, recession and tachypnoea)
Altered behaviour or responsiveness
Altered muscle tone (for example, floppiness)
Feeding difficulties (for example, feed refusal)
Feed intolerance, including vomiting, excessive gastric aspirates, and abdominal distension
Abnormal heart rate (bradycardia or tachycardia)
Signs of respiratory distress (including grunting, recession, tachypnoea)
Hypoxia (for example, central cyanosis or reduced oxygen saturation level)
Persistent pulmonary hypertension of newborn
Jaundice within 24 hours of birth
Signs of neonatal encephalopathy
Temperature abnormality (lower than 36 C or higher than 38 C) unexplained by environmental factors
Unexplained excessive bleeding, thrombocytopenia or abnormal coagulation
Altered glucose homeostasis (hypo or hyperglycaemia
Metabolic acidosis (base deficit of 10 mmol/L or greater

FHOC Ref: NICE NG195 https://www.nice.org.uk/guidance/ng195 Risk Factors and Clinical Indicators Reference Grid

Antibiotics: Early Onset Sepsis – up to 72 hours of age

(See EoE Antibiotic Prescribing policy if suspected abdominal pathology)

Indication	Drug, dose and route	Dose interval	Notes
Early onset	BENZYLPENICILLIN 25mg/kg IV	12 hourly up to 7 days or 8 hourly if very ill	• Use intravenous Benzylpenicillin with gentamicin as the first-choice antibiotic regimen for empirical treatment of suspected infection unless microbiological surveillance data reveal local bacterial resistance patterns indicating a different antibiotic • Higher dose of Benzylpenicillin (50mg/kg) is recommended for babies who have suspected meningitis to achieve bactericidal concentration in the CSF • If the baby appears very ill consider shortening the dose interval to every 8 hours • If there is microbiological evidence of gram negative bacterial sepsis, add another antibiotic such as cefotaxime. If gram negative infection is confirmed, stop benzylpenicillin • Care is needed with prescribing times and trough levels
	BENZYLPENICILLIN 50mg/kg IV** ***If meningitis is suspected***		
	+ GENTAMICIN 5mg/kg IV *See EoE Gentamicin prescription chart for drug monitoring and dose interval instructions	Up to 7 days 5mg/kg every 36 hours	
Suspected CSF involvement	AMOXICILLIN 100MG/KG and	12 hourly up to 7 days	• Decision to be made by a senior clinician, especially if blood stained CSF. • If meningitis is suspected but the causative pathogen is unknown, treat with intravenous amoxicillin and cefotaxime. • If meningitis is caused by Gram negative infection, stop amoxicillin and treat with cefotaxime alone • If GpB Strep is confirmed in CSF, then antibiotics should be changed to Benzylpenicillin, giving a dose of 50mg/kg and gentamicin 5mg/kg. Treatment using Benzylpenicillin should be continued for 14 days. Gentamicin to be given for 5 days. • If Listeria is in blood culture or CSF, treat with amoxicillin and gentamicin
	CEFOTAXIME 25mg/kg IV BUT 50mg/kg In severe infection	12 hourly up to 7 days	
E-Coli infections If no improvement after 48 hours.	CEFOTAXIME 25mg/kg IV BUT 50mg/kg In severe infection	12 hourly up to 7 days	

Vitamin K & Caffeine Citrate:

VITAMIN K (PHYTOMENADIONE):

Indications:
- For prophylaxis against haemorrhagic disease of the newborn
    - Although a best interests argument can be made for most preterm and sick term infants, ideal practice would include antenatally advising parents regarding the need & use of vitamin K; public misconceptions persist

Dose:
- Vitamin K (Phytomenadione) 0.4mg/kg IM (up to maximum initial dose of 1mg IM) at birth (if IM injection is refused by parents oral Vitamin K at a dose of 2mg can be administered as 2nd line)

Notes (doses based on KONAKIAN PAEDIATRIC – see BNFc for other formulations)
If the first dose is given via the oral or intravenous routes;
- Repeat an oral dose of 2mg at 4-7 days age
- If solely breastfed and received initial oral doses – give a further oral dose of 2mg at 4 weeks age

CAFFEINE CITRATE:

Indications:
- Apnoea of Prematurity
- Facilitate premature infants weaning off mechanical ventilation
- 'Prophylaxis' in premature infants at high risk of needing mechanical ventilation (e.g. infants <1.25 kg on non-invasive ventilation)
- Neuroprotection: Improves rate of survival without neurodevelopmental disability at 18 to 21 months (reduces incidence of cognitive delay & cerebral palsy) in infants of very low birth weight (<1.25kg in trials)
- Should be administered promptly for all eligible infants.

Dose:
- Prescribe as 'CAFFEINE CITRATE'
- May be given BY MOUTH or BY INTRAVENOUS INFUSION:
    - Loading Dose: 20mg/kg (Administer over 30 minutes if given by intravenous injection)
    - Daily Maintenance Dose: 5mg/kg (Started 24 hours after first dose)
    - Daily maintenance may be increased to maximum of 10mg/kg IF apnoeas persist

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FIRST HOUR OF CARE: QUICK REFERENCE MANUAL

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Ongoing Care

East of England Neonatal Operational Delivery Network

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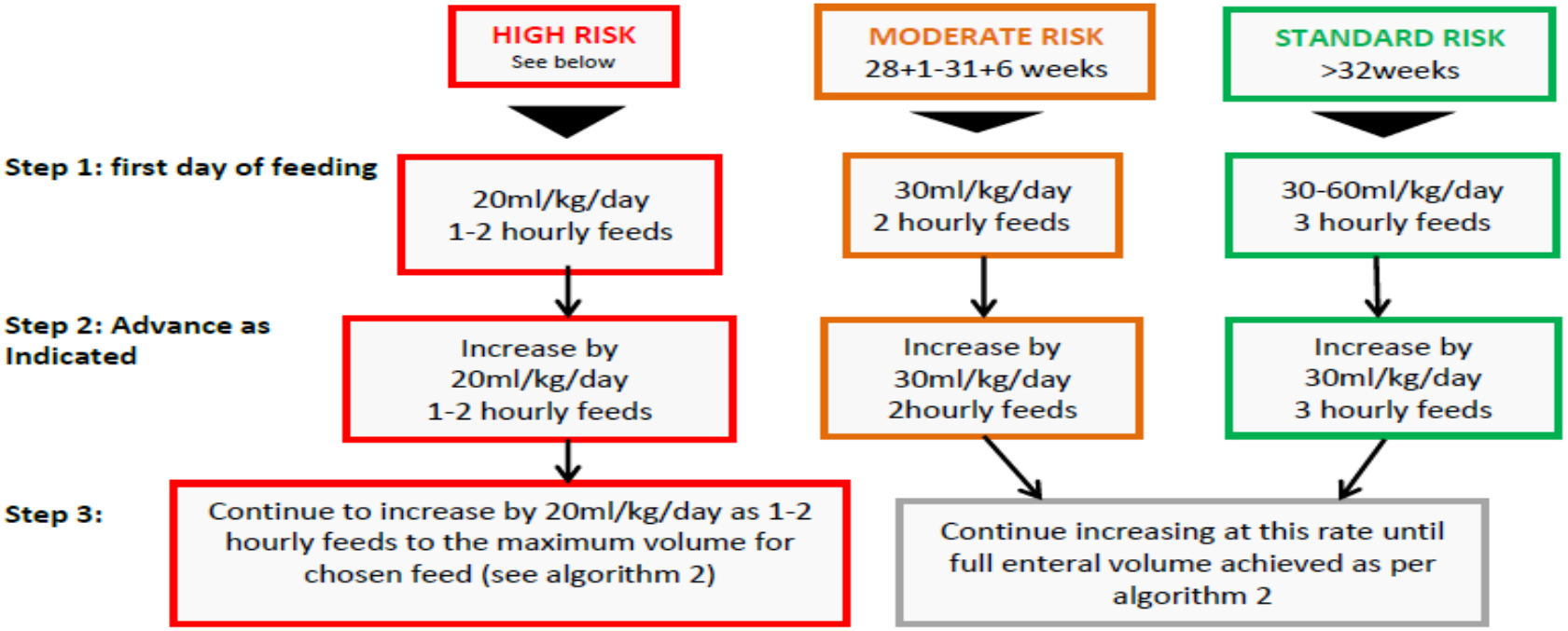
Initiating & Advancing Enteral Feeds:

- ✓ Commence feeding as close to birth as possible following clinical assessment
- ✓ There is no clear benefit to the use of minimal enteral feeds (Trophic feeds), however where used, maintain only as long as clinically indicated (and no more than 3-7 days).
- ✓ Infants can move between risk categories following clinical assessment



High Risk

- <28 weeks gestation **OR** < 1000g birth weight
- Unstable/hypotensive ventilated Neonate
- Re-establishment of feeds following NEC or Gut surgery
- Perinatal hypoxic ischaemia with significant organ dysfunction
- Absent or reversed end diastolic flow in infants <34 weeks
- Perinatal hypoxia-ischaemia with significant organ dysfunction
- Congenital gut malformations (eg gastroschisis)

Caution*

- ➢ Severe SGA infants (<0.4th percentile and >34 weeks)
- ➢ Preterm SGA infants (<2nd percentile and <34 weeks)
- ➢ Indomethacin or Ibuprofen for PDA
- ➢ Complex congenital cardiac disease
- ➢ Dexamethasone treatment
- ➢ Polycythaemic infants

**Caution should be taken initiating feeds in the following subgroups. The decision to manage as "high risk" is at clinician's discretion.*

FHOC Reference: EoE ODN Enteral Feeding Guideline 2024

Parenteral Nutrition (PN):

WHEN TO START PARENTERAL NUTRITION

- 100% of infants meeting the absolute indicators should commence parenteral nutrition within 8 hours of decision to commence PN.
- Any neonate who has not made sufficient progress with enteral feeds within the first 3 days after birth should also be considered for PN

Absolute Indications

- Premature infants < 30 weeks gestation or <1.25kg birth weight
- Intestinal Failure (i.e. short gut, pseudo-obstruction)
- Gastrointestinal Surgery
- Necrotising Enterocolitis (NEC)
- Congenital gastrointestinal defects (i.e.gastroschisis, intestinal atresia)

Relative Indications

- Any infant ≥ 30 weeks gestation or ≥ 1.25kg who has not made sufficient progress with enteral feeds and is unlikely to have established enteral feeding within 72 hours of birth

WHAT TO START

- Standardised PN solutions should be used wherever possible (EoE standardised bags as opposed to bespoke PN) in order to maximise nutrient delivery and to minimise the risk of errors. PN prescription should be guided by senior clinicians and the pharmacist or dietician
- Where electrolyte manipulation is clinically indicated patient specific electrolytes should be prescribed in the “non standard” column

AQUEOUS PN

- Preterm infants should commence **‘Preterm Concentrate PN’** in order to maximize nutrient delivery
  - If their final PN volume is likely to be <->120ml/kg/day then change to **‘Standard bag’**
- Term or near-term infants (>35 weeks) should commence **‘Term Standard PN’**
  - If their final PN volume is likely to be <150ml/kg/day then a **‘Preterm Standard’** or bespoke PN bag may be considered

LIPID PN

- Lipid PN should commence as soon as possible on the 1st day of life
- Incremental introduction may reduce the risks of high triglycerides
- Minimum essential fatty acid requirement is met by:
  - 0.5g[2.5ml]/kg/day Intralipid **OR** 1.5g[7.5ml]/kg/day SMOF Lipid
- Maximum provision: 3-4g/kg/day or 25-40% of non protein calories
- **SMOF Lipid should be used:** in infants at high risk of needing PN for >28 days or if significant liver dysfunction occurs before 28 days on PN [conjugated bilirubin >50micromol/l, ultrasound evidence of hepatomegaly, or clinical cholestasis (pale stools, dark urine)]

FHOC Reference: EoE Parenteral Nutrition Guideline - 2025

Cerebral Function Monitoring (CFM)/ Amplitude integrated Electroencephalogram (aEEG):

- The amplitude-integrated EEG (aEEG) is a single or dual channel time-compressed and filtered EEG which is recorded on a cerebral function monitor (CFM). The aEEG provides useful information on overall global or hemispheric electrical activity

WHICH INFANTS SHOULD BE MONITORED?

i) CFM should routinely be used for all infants of gestational age ≥ 36 weeks that meet criteria A & B.

a) Evidence of perinatal distress suggestive of possible hypoxic-ischaemic encephalopathy (HIE):

- fetal/neonatal academia with cord pH or arterial pH within 1 hour of birth showing pH <7.0 or Base Deficit of ≥16
- APGAR score of <5 at 10 mins after birth
- continued need for resuscitation, including endotracheal or mask ventilation, at 10 minutes after birth

b) Evidence of moderate or severe encephalopathy consisting of altered state of consciousness (lethargy, stupor or coma) with at least one of the following:

- hypotonia, abnormal reflexes (including oculomotor or pupillary abnormalities), absent or weak suck, clinical seizures

ii) CFM may also provide useful information in:

- Suspected Meningitis (requiring intensive care)
- Evidence of extensive structural brain injury or serious congenital brain anomalies (e.g. cerebral infarction, haemorrhage/ tumour, hydrocephalus)

iii) Preterm Infants (CFM monitoring should be at discretion of attending consultant)

The CFM may be less easy to interpret in preterm infants. Nevertheless, it can provide very useful information and so may be considered in some infants of ≤36 weeks gestation, e.g.:

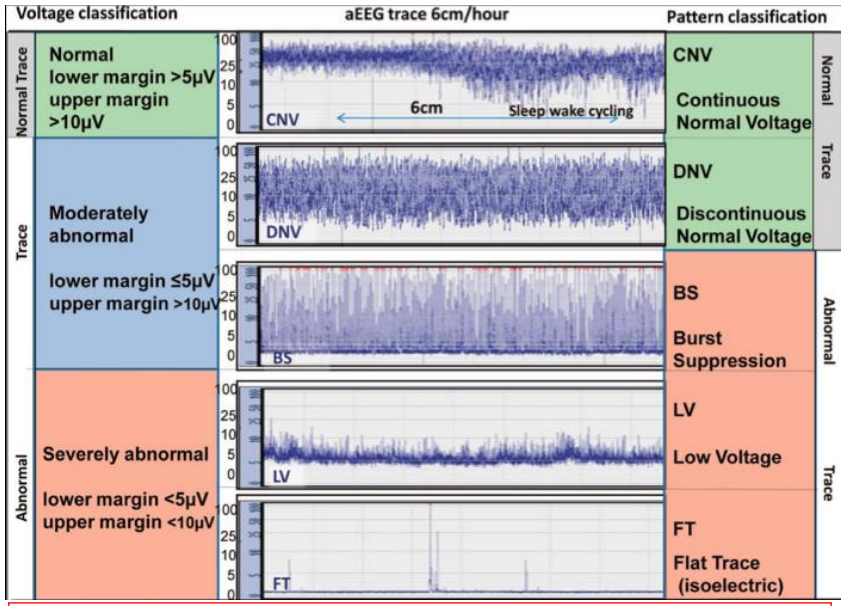
- Clinical or suspected seizures
- Moderate to severe encephalopathy
- Grade 3 or 4 intraventricular haemorrhage

Apply CFM as soon as possible following admission to the NICU of any infant with suspected hypoxic-ischaemic encephalopathy.
Infants who meet at least one A criteria but on initial examination are neurologically normal require frequent neurological assessment during the first 6hours of life. These examinations should be carried out by someone competent in performing a neonatal neurological examination. The findings of the neurological examination must be clearly documented. The first examination should take place as soon as the infant is clinically stable (e.g. gas normalising, respiratory and cardiovascularly stable). Further examinations will inform the neurological progression and guide further neuroprotective interventions.

FOR HOW LONG SHOULD aEEG MONITORING BE CONTINUED?

Generally continue monitoring until the patient has clinically stabilised with no risk of further cerebral insult, and at least until:
The background recording has become stable for 24 hours / there have been no seizures for 12–24 hours
This will often necessitate continuous monitoring for the first 4 days of clinical encephalopathy.
aEEG monitoring should be continued during rewarming as this is a period associated with re-emergence of seizures

Cerebral Function Monitoring: Interpretation



SEIZURES: *usually seen in the aEEG as high voltage and reduced amplitude (narrowing of the trace) – correlate with the raw EEG trace which should show simultaneous seizure activity*

SLEEP-WAKE CYCLING: *A normal finding in the aEEG. Characterized by smooth sinusoidal variations, mostly in the minimum amplitude. Broader bandwidth represents discontinuous background activity during quiet sleep, and narrower bandwidth corresponds to the more continuous activity during wakefulness and active sleep*

Neurological Examination (BAPM, 2020)

Domain	Stage1	Stage2	Stage3
Seizures	None	Common focal or multifocal seizures	Uncommon (excluding decerebration) Or frequent seizures
Level of consciousness	Normal hyper alert	Lethargic Decreased activity in an infant who is aroused and responsive Can be irritable to external stimuli	Stuperose/ comatose Not able to rouse and unresponsive to external stimuli
Spontaneous activity when awake or aroused	Active Vigorous does not stay in one position	Less than active Not vigorous	No activity whatsoever
posture	Moving around and does not maintain only one position	Distal flexion, complete extension or frog – legged position	Decerebrate with or without stimulation (all extremities extended)
tone	Normal – resists passive motion Hypertonic, jittery	Hypotonic or floppy, either focal or general	Completely flaccid like a rag doll
Primitive reflexes	Suck: vigorously sucks finger or ET tube Moro – Normal extension of limbs followed by flexion	Suck: weak Moro: incomplete	suck: completely absent Moro: completely absent
Autonomic system	Pupil – normal size Reactive to light Heart rate normal >100 Respirations - normal	Pupils – constricted <3mm but react to light Heart rate: bradycardia (<100 variable up to 120) Respirations: periodic irregular breathing effort	Pupils: fixed dilated, skew gaze not reactive to light Heart rate: variable inconsistent rate, irregular, may be bradycardic Respirations: completely apnoeic requiring positive pressure ventilation

-British Association of Perinatal Medicine(2020) Therapeutic Hypothermia for Neonatal Encephalopathy: A Framework for Practice. BAPM (ONLINE). Available: https://www.bapm.org/resources/237-therapeutic-hypothermia-for-neonatal-encephalopathy:

- Sarnat HB, Sarnat MS. Neonatal encephalopathy following fetal distress. A clinical and electroencephalographic study. Arch Neurol. 1976;33:696-705

Hypoxic Ischaemic Encephalopathy & Therapeutic Hypothermia

Starting Therapeutic Hypothermia:

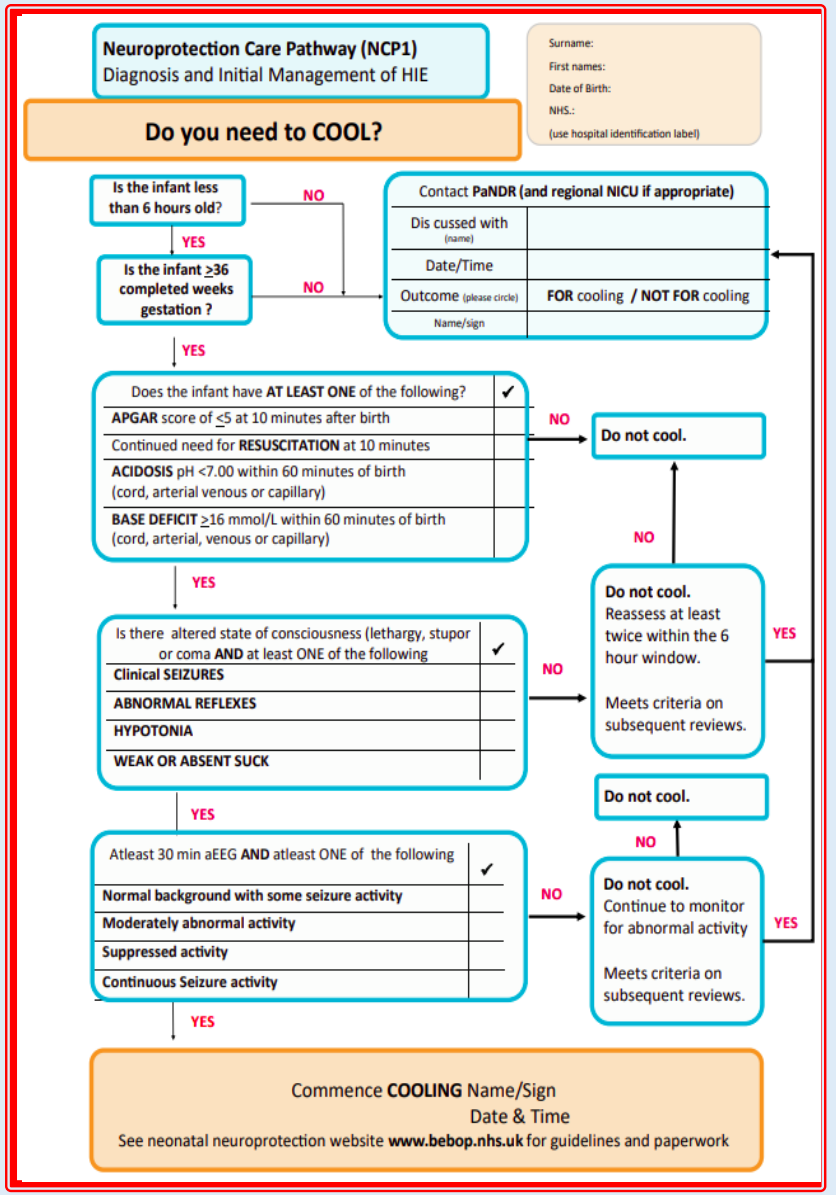
- Cooling should be started as soon as **cardiorespiratory stability and eligibility is confirmed.** Normothermia should be maintained until then.
- LNU/SCUs should discuss with their regional NICU/PANDR prior to initiating therapeutic hypothermia
- Maximum benefit can be derived from cooling when it is commenced within 6 hours of birth
- PaNDR should be contacted for advice regarding cooling outside of trial criteria
- When an infant has been identified as suitable for cooling, the PaNDR team should be contacted as soon as possible to locate a cot and provide advice regarding cooling - ***PANDR – 01223-274274***

Temperature Monitoring: **Commence rectal temperature monitoring before starting passive or active cooling.**

- Monitor rectal temperature continuously
  - Record every 15 minutes
- Target rectal temperature: 33.5°C
  - Range: 33-34°C (do not allow it to drop below this)
- Target of 33.5°C should be reached in a controlled manner
  - Plot on Neuroprotection Care Pathway 1 (NCP1) to guide rate of cooling

Ensure correctable causes of encephalopathy are excluded Consider wider investigation of encephalopathy, including:

- LP / Metabolic screen (e.g. ammonia, amino acids, urine organic acids, ketones, reducing substances, genetics), congenital structural anomalies & neurosurgical conditions.



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Additional Information

PaNDR EMERGENCY DRUG CALCULATOR: https://pandreastofengland.co.uk/drug-calculators

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Neonatal Emergency Drugs – Summary Table

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Table 8.1 Neonatal resuscitation drug doses

Drug	Dose	Route	Comments
Adrenaline	0.2 mL kg^{-1} 1:10 000 (20 microgram kg^{-1})	IV/IO	Use 3 mL saline flush with adrenaline dose. Repeat every 4 min.
	1 mL kg^{-1} 1:10 000 (100 microgram kg^{-1})	Tracheal tube	Continue to seek vascular access.
Glucose	2 mL kg^{-1} bolus 10% glucose (200 mg kg^{-1})	IV/IO	Useful in prolonged resuscitation. Never give via tracheal tube.
Volume	10 mL kg^{-1} 0.9% sodium chloride or O -ve blood	IV/IO	Slow bolus over ~2 min. If suspected blood loss or unresponsive to other resuscitation measures.
All IV/IO drugs should be flushed with at least 5 mL of 0.9% sodium chloride. The preferred vascular access route for IV administration is a UVC.			IO: intraosseous, this is a secondary option.

Table 8.2 Pragmatic resuscitation drug doses for a term baby

	Adrenaline (1 in 10,000)	Glucose (10% solution)	Volume (0.9% sodium chloride or blood)
Suggested doses for a term baby*	0.7 mL	7 mL	35 mL
Birth weight will not be known at the onset of newborn resuscitation, and an estimated weight has to be used.			

* Adrenaline can be given via intra-tracheal route if intubated and no other access available. 100 micrograms kg-1 (1.0 mL kg-1 of 1:10,000 adrenaline [1000 micrograms in 10 mL])" "If tracheal adrenaline is given IV or IO access should still be sought.

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FHOC Ref: Newborn resuscitation and support of transition of infants at birth (2025) Resuscitation Council (UK)

Indications for referral of placentas for pathological examination*:

Examination of the placenta may provide vital information relating to the aetiology of both maternal and neonatal conditions. In this respect, it may help in management of subsequent pregnancies, as well as provide vital clues for unusual neonatal presentations and provide information for medico-legal defense. Please refer to your local guidance.

Referral of placenta for examination is ESSENTIAL for:	Referral of placenta for examination may be DESIRABLE for:	Referral is NOT indicated in the following conditions as pathological examination is unlikely to provide useful information:
• Stillbirth (antepartum or intrapartum) • Late miscarriage • Severe fetal distress requiring admission to NNU • Prematurity <32^{+0} weeks gestation • Fetal growth restriction with birthweight below 3rd centile and or drop in fetal growth velocity > 2 quartiles • Abnormal umbilical artery Dopplers • Fetal hydrops • Early onset (<32 weeks) severe pre-eclampsia requiring delivery • Peripartum hysterectomy for morbidly adherent placenta • Severe maternal sepsis • Massive placental abruption with retroplacental clot • Monochorionic twin with TTTS	• Prematurity 32^{+0}–36^{+6} weeks • Fetal congenital malformation • Rhesus (and other) isoimmunisation • Twins or other multiple pregnancy (uncomplicated) • Abnormal placental shape (if clinically relevant) • Two vessel cord, etc. • Prolonged rupture of the membranes (more than 36 hours) • Gestational diabetes • Maternal group B streptococcus • Pre-eclampsia/maternal hypertension • Maternal coagulopathy • Maternal substance abuse	• Cholestasis of pregnancy • Pruritis of pregnancy • Hepatitis B, HIV, etc. • Other maternal disease with normal pregnancy outcome • Placenta praevia • Post-partum haemorrhage • Polyhydramnios • Normal pregnancy

***Royal College of Pathologists:** *Tissue pathway for histopathological examination of the placenta (Document G108, September 2022)*

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East of England Neonatal ODN
First Hour of Care 2026 Update – Work Group

East of England Neonatal ODN

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- Sankara Narayanan, Medical Education & Training Lead, EoE ODN

❑ Workgroup members

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- Teresa Berry, Lead Practice Development Nurse, EoE ODN
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