

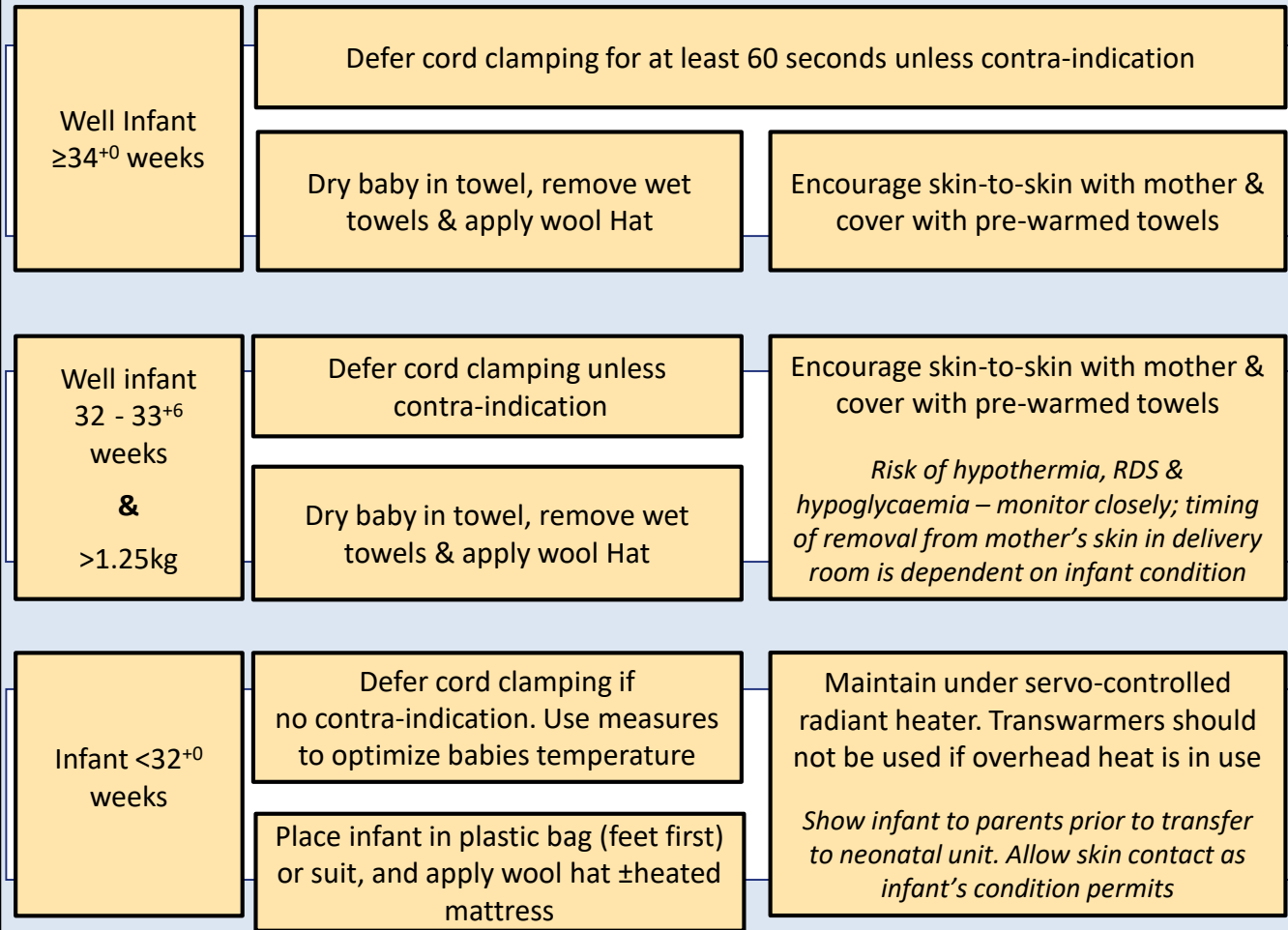
## Thermoregulation Care Bundle

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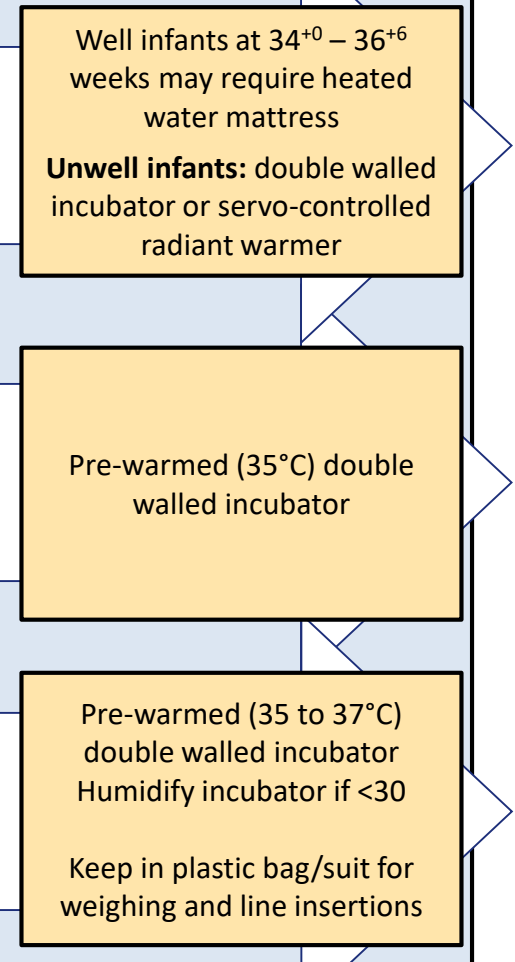
## Summary of Thermoregulation at Delivery:

**Optimise Delivery Room Environment for Delivery:**  
 Room Temp 23-25°C (Aim  $\geq 25^{\circ}\text{C}$  if  $\leq 28$  weeks gestation)  
 Limit drafts (Close doors/windows & avoid fans directed at infant)

### Delivery Room:



### Neonatal Unit:



## 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. There is good quality evidence from a number of systematic reviews showing the benefits of deferred cord clamping in preterm infants. 60 seconds of DCC is recommended for all preterm infants unless there are contraindications

	<b>Term Infant</b>	<b>Preterm Infant</b>
<b><u>Timing of Deferred Cord Clamping:</u></b>	➤ 1 to 5 minutes or sooner if cord pulsation ceases	➤ For at least 60 seconds
<b><u>Infant position during placental transfusion:</u></b>	<ul style="list-style-type: none"> <li>➤ Place on mother's chest or abdomen to encourage skin to skin following vaginal delivery</li> <li>➤ Hold level with introitus if cord too short</li> <li>➤ Position level with abdomen or placenta following c-section</li> <li>➤ Ensure airway open</li> </ul>	<ul style="list-style-type: none"> <li>➤ Position level with introitus for vaginal birth</li> <li>➤ Position level with or below placenta following c-section or across maternal thighs</li> <li>➤ Ensure airway is in neutral position, gentle stimulation</li> </ul>
<b><u>Thermoregulatory considerations:</u></b>	<ul style="list-style-type: none"> <li>➤ Dry &amp; stimulate</li> <li>➤ Skin to skin and cover with pre-warmed towels if vaginal delivery</li> <li>➤ Use sterile towel if C-Section</li> </ul>	<ul style="list-style-type: none"> <li>➤ Place in plastic bag/suit if &lt;32/40 Consider use of heated infant transport mattress in very low birth weight infants if room temperature sub-optimal</li> <li>➤ Dry, wrap &amp; stimulate in pre-warmed towels if &gt;32/40</li> </ul>

### **Contra-indications:**

- The need for maternal resuscitation in the face of massive, acute haemorrhage
- A ruptured vasa praevia, snapped cord or other trauma to the cord vessels which will result in haemorrhage from the baby

### **Special Circumstances**

- Complete placental abruption; consider holding placenta above baby and apply gentle pressure to placenta to aid placental transfusion, clamp at 60 seconds before placenta is lowered
- 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 2021) and should be reserved for extreme circumstances such as maternal collapse where DCC can not be achieved. ▪ 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

## Enhanced Feto-Placental Transfusion (Optimal Cord Management)

	<u>Term Infant</u>	<u>Preterm Infant</u>
<b>Benefits:</b>	<ul style="list-style-type: none"> <li>➤ Haemoglobin concentration in infants at 24 to 48 hours was significantly lower in the early cord clamping group (MD -1.49 g/dL, CI -1.78 to -1.21)(1)</li> <li>➤ Increased risk of iron deficiency at three to six months in the early cord clamping group (RR 2.65, CI 1.04 to 6.73)(1)</li> <li>➤ Significant increase in ferritin levels at 4-6 months with associated increased myelin content (96.4 vs 65.3, p=0.03) (2)</li> </ul> <p><small>1. McDonald et al. Effect of timing of umbilical cord clamping of term infants on maternal and neonatal outcomes. The Cochrane Library. July 2013 2. Mercer, JS, et al. Effects of delayed cord clamping on 4-month ferritin levels, brain myelin content, and neurodevelopment: a randomized controlled trial. The Journal of Pediatrics. <a href="https://doi.org/10.1016/j.jpeds.2018.06.006">https://doi.org/10.1016/j.jpeds.2018.06.006</a> 3. Mercer, JS, et al. Effects of delayed cord clamping on 4-month ferritin levels, brain myelin content, and neurodevelopment: a randomized controlled trial. The Journal of Pediatrics. (2018) <a href="https://doi.org/10.1016/j.jpeds.2018.06.006">https://doi.org/10.1016/j.jpeds.2018.06.006</a></small></p>	<ul style="list-style-type: none"> <li>➤ Reduction in hospital mortality (RR 0.68; 95% CI 0.52-0.90) NNT 33 in all preterm infants NNT 20 in &lt; 28 weeks) (1)(2)</li> <li>➤ Reduction Intra ventricular haemorrhage, all grades (aRR 0.83, 95% CI 0.70 to 0.99) (2)</li> <li>➤ Reduction in rates of necrotising enterocolitis (RR 0.59; 95% CI 0.37-0.94 NNT 12) (3)</li> <li>➤ Reduction in overall number of blood transfusions (MD -1.26, CI -1.87 to -0.64) (1)</li> </ul> <p><small>1. Fogarty M, Osborn DA, Askie L, Seidler AL, Hunter K, Lui K, Simes J, Tarnow-Mordi. Delayed versus early umbilical cord clamping for preterm infants a systematic review and meta analysis. American journal of obstetrics and gynaecology 2018 Jan;218(1) 1-18. 2. Rabe H, Gyte GM, Diaz-Rossello JL &amp; 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 Sep; 17:9:CD003248 3. Garg BD, Kabra NS &amp; 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 Jan;32(1):164-172</small></p>
<b>Safety Profile:</b>	<ul style="list-style-type: none"> <li>➤ No difference in APGARS at 5 minutes (1)</li> <li>➤ No difference in admission to NNU (1)</li> <li>➤ No difference in polycythaemia (Hct&gt;65%) (1)</li> <li>➤ Increased risk of jaundice requiring (1) phototherapy (2.74% of early cord clamp infants vs 4.36% of delayed cord clamp; RR0.62, CI0.41 to 0.96)</li> </ul>	<ul style="list-style-type: none"> <li>➤ No difference in APGAR at 5 minutes (1)</li> <li>➤ No difference in admission temperature (1)</li> <li>➤ Increased peak Haematocrit by 2.73 % (CI 1.94-3.52; p&lt;0.00001) (1)</li> <li>➤ Increased risk of jaundice (1)</li> </ul>

### ***Some uncertainties persist with respect to deferred cord clamping:***

- *Few infants at the extreme of viability have been studied*
- *Optimal time for deferred cord clamping remains unclear, variable between studies, at least 30 seconds.*
- *Long term neurodevelopment outcomes have not been reported*

- *Stabilisation with an intact cord using specialised equipment, physiological based cord clamping*
- *Possible benefits of stem cells, anti-oxidants and immunoglobulins*
- *Insufficient data on Cord Milking currently not recommended in Infant < 28 weeks as associated with increased rates of IVH*

## Deferred Cord Clamping: Team Protocol

Prior to Delivery

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

Clear communication between the MDT team regarding positioning of infant and specialised equipment 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 / Sterile Plastic suit / Plastic Bag as appropriate

Optimise environment, room temperature, fans off. Anticipate need for infant transport mattress.

**Obstetrician/ Midwife to call clearly once baby delivered**

**Time-Keeper: Call out 15 second intervals**

Dry & Stimulate OR Plastic Bag 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 deferred clamping in notes

Post-natal

## Deferred Cord Clamping: Recommendations by national and international institutions

Organisation	Preterm	Term
<b>WHO (2014)</b>	Delay of umbilical cord clamping for 1–3 minutes after birth is recommended for all births with simultaneous essential newborn care.	
<b>ILCOR</b>	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.	
<b>NLS (2021)</b>	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 cord milking in > 28 weeks	
<b>BAPM (2020)</b>	Optimal Cord Management in all preterm babies less than 34 weeks gestation. Optimal Cord Management 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	
<b>ECG (2019)</b>	If possible, delay clamping the umbilical cord for at least 60s to promote placenta-fetal transfusion.	Term birth not covered
<b>NICE (2017)</b>	Preterm birth not covered	In healthy women 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 women should be supported if they wish this to be delayed further

Abbreviations: WHO World Health Organization, ILCOR International Liaison Committee on Resuscitation, NLS Newborn Life Support (UK Resus Council), ECG European consensus guideline (RDS), NICE National Institute for Health & Clinical Excellence. BAPM British Association of Perinatal Medicine

## Target Temperatures:

Within the *First Hour of Care*:

- Skin surface temperature servo-control should be used where prolonged resuscitation or observation occurs on the delivery room resuscitaire
- In the absence of such facilities, radiant intensity of the overhead heater should be adjusted manually according to the infant's needs
- Axillary temperature should be checked Prior to departure from the delivery unit and on admission to NICU, action taken if out of the normal range (36.5 - 37.5)
- Subsequently, the temperature of any sick newborn or preterm infant should be measured continuously by skin temperature probe (skin to mattress or axilla placement if using overhead heat) with intermittent axillary temperature comparison

***Gold Standard Admission Temperature (Axillary or Core):  $\geq 36.5^{\circ}\text{C}$***

*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***

## Incubator Humidification:

Infants <28 Weeks Gestation	
<i>Age (Days)</i>	<i>Humidity</i>
0	80
1	80
2	80
3	80
4	80
5	80
6	80
7	75
8	70
9	65
10	60
11	55
12	50
13	45
14	40
15	Discontinued

Infants 28 to 29 <sup>+6</sup> Weeks Gestation	
<i>Age (Days)</i>	<i>Humidity</i>
0	80
1	80
2	75
3	70
4	65
5	60
6	55
7	50
8	45
9	40
10	Discontinued
11	-
12	-
13	-
14	-
15	-