

# PERIPrem Bundle - Process Mapping

## Overcoming Potential Barriers to QI

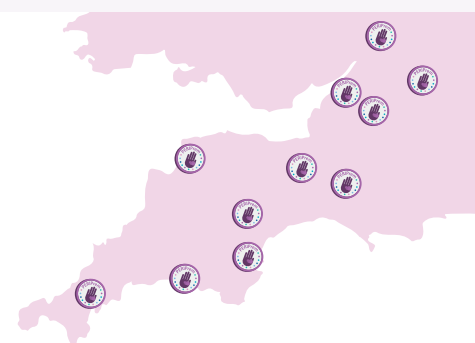


This document is designed to be a starting point for each unit & network to review process for each of the PERIPrem bundle components, to map the issues that can prevent optimisation of that element of the bundle, and to consider ways in which these issues would be overcome.

It is not an exhaustive list, nor is it universally applicable. Some units may find some parts are not relevant, and other units may find they have unique barriers to improvement in a certain area which could be added to the Process Mapping.

### 1. Place of Birth

**85% of babies delivered at <27+0 weeks or with an anticipated birth weight of <800 grams (<28+0 weeks for multiple births) should be born in a maternity service on the same site as a designated NICU. [Ref: 1,2,3,4]**



Process/Barrier	Intervention/PERIPrem Role
Public awareness of signs/symptoms of preterm labour	<ul style="list-style-type: none"> <li>Review antenatal information given out regionally/unit level</li> <li>Work with SWMCN/LMS to assess regional information</li> <li>Work with parental organisations such as Bliss</li> </ul>
Timeliness of assessment of threatened preterm labour (TPL)	<ul style="list-style-type: none"> <li>Triage tools, assessment pathways/decision making tools</li> <li>Consider introduction of audit standards of assessment/decision times</li> <li>Staff awareness of the time critical nature of decision making in TPL, and of the detrimental impact “<i>wrong place of birth</i>” can have on mortality &amp; morbidity for preterm babies</li> </ul>
Improved accuracy of diagnosis of TPL	<ul style="list-style-type: none"> <li>Funding for fFN and QUIPP</li> <li>fFN and QUIPP App implementation across PERIPrem units</li> <li>Perinatal Network approved thresholds and pathways</li> <li>Agreed threshold for other conditions (aside from Threatened Preterm Labour (TPL)) that precipitate preterm birth (eg: TTTS, IUGR, PET etc)</li> </ul>

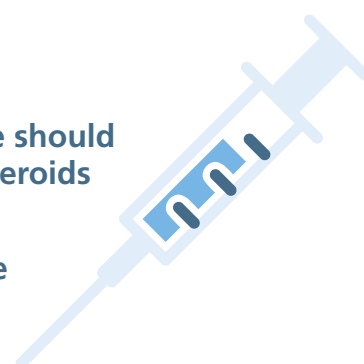
Making a referral for in-utero transfer (IUT)	Single point of access telephone line with oversight over neonatal and maternity beds in NICU settings.  Agreed 'auto accept criteria'
Accepting a referral for in-utero transfer (IUT)	Agreed cultural approach across all 3 NICU maternity units to view IUT patients at <27w (<28w multiples) as equivalent to their own catchment population (ie: cannot decline IUT unless unit is closed to own catchment)
Creating NIC/tertiary capacity	Reducing the NNT (Number Needed to Transfer) by improved accuracy of diagnosis of TPL and prediction of preterm birth (see fFN/QUIPP).  Non NIC units in network (LNU level) accept reciprocal in utero 27-32w transfers out of NIC maternity units for delivery to free up capacity in NIC units
Achieving IUT before delivery	Clear guidance, including staffing support & transport funding for prompt transfers (eg: one midwife per shift is allocated as the 'IUT midwife', and is prepared, trained & equipped to accompany an IUT)  Working with Ambulance Service partners (SWAST) to facilitate prompt availability of transfer ambulance to facilitate IUT (and understanding the time critical nature of IUT)
Data Collection	Data collected already at SWNNetwork level. Incident Exception reports for babies born outside of NIC. Collaborate with SWNN & individual units for thematic analysis to barriers to IUT, to allow continuous QI cycles

## 2. Antenatal Steroids

**85% of mothers who give birth at less than 34 weeks gestational age should receive the full course and appropriately timed dose of antenatal steroids**

**Timing of Steroids: Developmental standard**

**Units should monitor (and aim to increase) rates of a complete course of antenatal steroids administered within the optimal timeframe (24 hours to 7 days prior to delivery). [Ref: 2,4,5]**



Process/Barrier	Intervention/PERIPrem Role
Allowing prompt administration of steroids to allow sufficient time precipitate for efficacy	Improved accuracy of diagnosis of TPL (see above fFN QUIPP)  Awareness of other conditions (aside from TPL) that preterm birth (eg: TTTS, IUGR, PET etc)  Staff awareness of impact of missed steroids on preterm morbidity and mortality

Avoiding excessive time interval between steroids & birth	Improved accuracy of diagnosis of TPL (see above fFN QUIPP)  Agreeing guidance on repeat courses of steroids in women who receive A/N steroids but deliver (prematurely) 12 hours to 7 days after steroid administration.
Data collection	Administration antenatal steroids is already mandatory data item on Badgernet/NNAP  NEW data item: Recording timing of steroid doses on Badgernet/PERIPrem dashboard

### 3. Antenatal Magnesium Sulphate

85% of mothers who give birth at less than 30 weeks gestational age should receive antenatal Magnesium Sulphate. [Ref: 2,4,5,6]



Process/Barrier	Intervention/PERIPrem Role
<i>Pull across from Precept work</i>	<i>Align with PReCePT project refresh</i>
Data collection	Administration Mg is already mandatory data item on Badgernet/NNAP & PReCePT dashboard

### 4. Deferred Cord Clamping

85% of eligible babies born at less than 34 weeks gestational age should have their cord clamped at or after one minute. [Ref: 2,4,7]

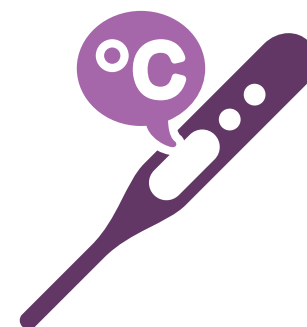


Process/Barrier	Intervention/PERIPrem Role
Awareness of benefits of Deferred Cord Clamping (DCC)	Staff awareness of impact of early cord clamping on mortality  Staff awareness that cord milking is not equivalent or an alternative to DCC in cases where DCC is contraindicated
Maintenance of normothermia during DCC	Develop and share mechanism of providing optimal thermal care during DCC, including during the sterile conditions of operative deliveries

Provision of airway & breathing support & lung inflation/PEEP during DCC	<p>Develop &amp; share mechanism of providing initial respiratory support during DCC, including during the sterile conditions of operative deliveries</p> <p>Work with equipment manufacturers to produce sterile PEEP/mask ventilation circuits (investigate NBT technique of sterilising circuits in-house)</p>
Finalise DCC technique	Combine the above techniques to develop a simple standardised approach to high quality perinatal care during DCC
Exclusions to DCC	<p>Collate best evidence around which (if any) babies should not receive DCC (eg: monochorionic twins?)</p> <p>Explore opinions/experience in each unit around which babies are excluded from DCC, map to evidence base if possible.</p>
Perinatal team collaboration to embed DCC into maternity practice & neonatal practice at normal delivery & caesarean delivery	<p>On site perinatal team workshops, individualised with each trust focusing on team culture &amp; cross speciality shared goals &amp; problem solving</p> <p>Recruitment of DCC 'champions' from obstetrics, midwifery &amp; neonatology in each trust</p> <p>PERIPrem supported simulation training in each unit for normal delivery and caesarean delivery</p>
Data collection	<p>Time to cord clamp is on Badgernet, but not yet mandatory (planned for NNAP 2020)</p> <p>NEW data item: Recording time to cord clamp (and concurrent provision of thermal care &amp; respiratory support during DCC) on Badgernet/PERIPrem dashboard</p>

## 5. Normothermia

**90% of eligible babies born at less than 34 weeks gestational age should have a first temperature on admission which is both between 36.5–37.5°C and measured within one hour of birth. [Ref: 2,4]**



Process/Barrier	Intervention/PERIPrem Role
See BAPM normothermia toolkit	Recruit normothermia champions within each PERIPrem unit to implement <a href="http://www.bapm.org/pages/105-normothermia-toolkit">www.bapm.org/pages/105-normothermia-toolkit</a>
Data collection	Administration admission temperature is already mandatory data item on Badgernet/NNAP

## 6. Early Maternal Breast Milk (MBM)



**85% of babies born at less than 34 weeks gestational age should receive MBM within 6 hours of birth**

**Units should monitor (and aim to increase) rates of first MBM within 6 hours of birth for babies born at less than 34 weeks gestational age.**

**MBM feeding at 14 days - Units should monitor (and aim to increase) rates of babies born at less than 34 weeks gestational age receiving MBM at 14 days of age. [Ref: 2,8]**

Process/Barrier	Intervention/PERIPrem Role
Awareness of benefits of MBM for Preterm babies	<p>Staff awareness (medical, nursing, maternity, obstetric) via posters, training, mini teaching of specific evidence base for impact of MBM (BPD, NEC, ROP, development)</p> <p>Antenatal advice (written &amp; verbal) to women with threatened preterm delivery. Amend and adopt PERIPrem Early Maternal Breast Milk Patient Leaflet</p>
Awareness of the importance of early and regular expressing	Staff & Parental information to dispel myths such as 'my body is not ready to make milk yet', 'my baby is too little to need milk yet', 'my milk will not have come in yet so I won't express till then')
Expressing within 6 hours prior to delivery	<p>Where delivery is unavoidable (eg: planned delivery for PET, or established preterm labour, women should be supported to express (by hand, or pump with premi-cycle) and harvest colostrum.</p> <p>Identifying these women to offer support &amp; education to (eg: Board magnets, 'liquid gold packs', HCA/MSW staff identified to support early expressing, dedicated breast pump on delivery suite)</p>
Expressing within 2 hours of birth	There is growing evidence that expressing within the first two hours (as opposed to waiting until later) is associated with nearly double milk volumes by 2 weeks postnatally.
Prioritising early mother-baby contact & bonding	<p>In units that have a safe and structured approach to Delivery Room Cuddles, this should be supported, data and best practice/SOPs shared</p> <p>In all other units, facilitating Kangaroo care as early as possible (aiming within first 24 hours) should be a priority</p> <p>Utilising photos, open visiting, exchange of muslin squares etc. can all help. Later, vCreate video messaging or Badger MyBabyDiary can all help family bonding when the parents are separated from their baby</p>

Administration of first MBM to baby as soon as available	<p>Exploring barriers to early colostrum (small amounts of colostrum given ideally into mouth/buccal mucosa, or via NGT if oral route not possible)</p> <p>Aiming to minimise delay between expressing, MBM being taken to the neonatal unit, and the minimising delay before MBM is given to baby (ie: ideally no reason to be refrigerated or frozen at this stage)</p>
Ongoing expressing & breastfeeding support	<p>Emphasising clear consistent advice around expressing 8-10 times in 24h</p> <p>Ready availability of cot-side breast pumps and loan breast pumps</p>
Data collection	<p>NEW data item: Recording time to first breast milk on the South West PERIPrem Passport.</p> <p>Badgernet data collects data on administration of MBM on first day of life</p>

## 7. Caffeine

**100% of eligible babies should be started on caffeine as soon as possible (aim within the first 6 hours... NICE says: "starting it as early as possible and ideally before 3 days of age") in all babies [Ref 9,10]:**

- Less than 30 weeks gestation
- Birth weight less than 1500g



Process/Barrier	Intervention/PERIPrem Role
Awareness of neurodevelopmental benefits of caffeine for Preterm babies	Staff awareness (medical, nursing)
Embed caffeine into routine 'first day' neonatal admission protocols	Many units will already have this as part of routine preterm admission protocol.
Data collection	NEW data item: Recording administration of caffeine on day 1 of life on Badgernet/PERIPrem dashboard.

## 8. Probiotics

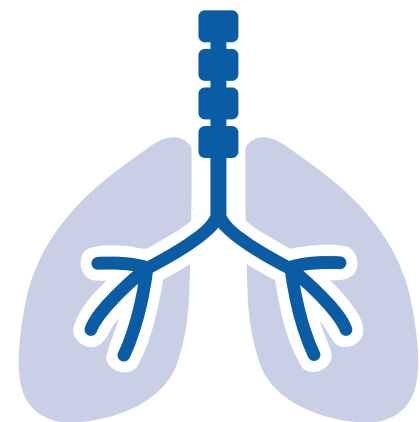
**100% of eligible babies (<32 weeks, <1500g Birthweight) should be commenced on a multi strain probiotic with their first non nutritive feed (could add: aim with first MBM <6h) [Ref 11]**



Process/Barrier	Intervention/PERIPrem Role
Awareness of evidence of benefits of multi-strain probiotics	Staff awareness (medical, nursing). Collation of evidence summary, plus 'FAQs' regarding concerns about probiotics. Exploring with unit who are not using probiotics about this issue.
Embed probiotics into routine 'first day' neonatal admission protocols	Many units will already have this as part of routine preterm admission protocol. Raise awareness of administration of probiotics with first breast milk.
Data collection	NEW data item: Recording administration of probiotics on day 1 of life on Badgernet/PERIPrem dashboard.

## 9. Volume Guarantee (VG) or Volume Targeted Ventilation (VTV)

**100% of preterm babies who need invasive ventilation, use volume-targeted ventilation (VTV) in combination with synchronised ventilation as the primary mode of respiratory support. [Ref 10]**



Process/Barrier	Intervention/PERIPrem Role
Awareness of evidence of benefits of VG/VTV ventilation	Staff awareness (medical, nursing). Most units have this embedded as standard practice already
Data collection	NEW data item: Recording mode of ventilation (VTV/VG) in ventilated preterm babies on Badgernet/PERIPrem dashboard.

# 10. Prophylactic Hydrocortisone

85% of preterm babies (less than 28 weeks) who need invasive ventilation, as the primary mode of respiratory support to receive Prophylactic Hydrocortisone. [Ref 10]



Process/Barrier	Intervention/PERIPrem Role
Awareness of evidence of benefits of prophylactic hydrocortisone	Staff awareness (medical, nursing, parental). Staff education sessions (previously a controversial area, so may be many myths/concerns etc to address). Develop parental information leaflets.
Administration	Develop a SW Neonatal Network Guideline on this topic regarding indications, contraindications, administration etc.
Data collection	NEW data item: Recording of administration of prophylactic hydrocortisone to <28w babies on Badgernet/PERIPrem dashboard.



# Outcome Data Collection – Process Mapping

100% of preterm babies who are eligible for part or all of the PERIPrem Care Bundle must have all outcome data completed fully.

Process/Barrier	Intervention/PERIPrem Role
Agreement of outcome data items	<p><b>Core Outcomes:</b></p> <ol style="list-style-type: none"> <li><b>Survival to discharge</b> from the neonatal unit (final discharge home, not transfer to another unit)</li> <li><b>Severe Perinatal Brain Injury</b> – Severe (Grade III or IV) IVH <u>OR</u> cystic periventricular leukomalacia (cPVL) on cranial ultrasound at term equivalent age (or on final discharge from the neonatal unit). cPVL reported on term equivalent MRI should also be reported.</li> </ol> <p><b>Additional Outcomes:</b></p> <ol style="list-style-type: none"> <li><b>Bronchopulmonary Dysplasia (BPD)</b> – requirement for oxygen or respiratory support at 36 weeks corrected gestational age.</li> <li><b>Necrotising Enterocolitis (NEC)</b> – align with NNAP definition (which is clear, and already collected on Badgernet) <ol style="list-style-type: none"> <li>NEC may be diagnosed at surgery, post-mortem or based on the following clinical and radiographic signs.</li> <li>At least one clinical feature from: <ol style="list-style-type: none"> <li>Bilious gastric aspirate or emesis</li> <li>Abdominal distension</li> <li>Occult or gross blood in stool (no fissure)</li> </ol> </li> <li>And at least one radiographic feature from: <ol style="list-style-type: none"> <li>Pneumatosis</li> <li>Hepato-biliary gas</li> <li>Pneumoperitoneum</li> </ol> </li> <li>Infants clinically diagnosed as NEC using the clinical and radiographic criteria who are found at surgery or post-mortem to have “Focal Intestinal Perforation” should not be recorded as having NEC.</li> </ol> </li> <li><b>Breast Milk Feeding</b> at discharge – proportion of babies receiving any MBM at discharge from the neonatal unit. Already collected as mandatory field on Badgernet and NNAP.</li> <li>?Consider ROP, LOS, other core neonatal outcomes.</li> </ol>
Data Administration	Support in unit PERIPrem champions with Badgernet access, training, dashboard use and funded time to allow high quality accurate data collection.

# References

1.	NHS England: Neonatal Critical Care Transformation Review (2019) <a href="http://www.england.nhs.uk/publication/implementing-the-recommendations-of-the-neonatal-critical-care-transformation-review">www.england.nhs.uk/publication/implementing-the-recommendations-of-the-neonatal-critical-care-transformation-review</a>
2.	NNAP (RCPCH) 2020 Audit standards, set by NNAP Project Board. <a href="http://www.rcpch.ac.uk/sites/default/files/2019-11/nnap_2020_audit_measures_guide_v1.0_191119_0.pdf">www.rcpch.ac.uk/sites/default/files/2019-11/nnap_2020_audit_measures_guide_v1.0_191119_0.pdf</a>
3.	Helenius K, Longford N, Lehtonen L, Modi N, Gale C. Association of early postnatal transfer and birth outside a tertiary hospital with mortality and severe brain injury in extremely preterm infants: observational cohort study with propensity score matching. <i>bmj</i> . 2019 Oct 16;367:l5678.
4.	BAPM: Perinatal Management of Extreme Preterm Birth Before 27 Weeks of Gestation (2019). Available at <a href="http://www.bapm.org">www.bapm.org</a>
5.	NICE Guidance for Preterm Birth (2019) <a href="http://www.nice.org.uk/guidance/ng25">www.nice.org.uk/guidance/ng25</a>
6.	Doyle LW, Crowther CA, Middleton P, et al. <i>Magnesium sulphate for women at risk of preterm birth for neuroprotection of the fetus</i> . <i>Cochrane Database Syst Rev</i> 2009:CD004661
7.	Rabe H, Gyte GML, Díaz-Rossello JL, Duley L. Effect of timing of umbilical cord clamping and other strategies to influence placental transfusion at preterm birth on maternal and infant outcomes. <i>Cochrane Database of Systematic Reviews</i> 2019, Issue 9. Art. No.: CD003248. DOI: 10.1002/14651858.CD003248.pub4.
8.	Parker MG, Melvin P, Graham DA et al. Timing of First Milk Expression to Maximize Breastfeeding Continuation Among Mothers of Very Low-Birth-Weight Infants. <i>Obstet Gynecol</i> . 2019b;133(6):1208-1215
9.	<a href="http://swneonatalnetwork.co.uk/media/107035/swnn-guideline-caffeine-use-in-preterm-infants-rs.pdf">http://swneonatalnetwork.co.uk/media/107035/swnn-guideline-caffeine-use-in-preterm-infants-rs.pdf</a>
10.	Specialist neonatal respiratory care for babies born preterm, NICE guideline [NG124] Published date: April 2019 <a href="http://www.nice.org.uk/guidance/ng124/chapter/Recommendations">www.nice.org.uk/guidance/ng124/chapter/Recommendations</a>
11.	<a href="http://www.swneonatalnetwork.co.uk/media/89842/swnn-guideline-probiotics-in-preterm-babies-final-January-2016-version-02.pdf">www.swneonatalnetwork.co.uk/media/89842/swnn-guideline-probiotics-in-preterm-babies-final-January-2016-version-02.pdf</a>