

Early Care of the Preterm – BEACON guideline

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Bradford Early Care Of Neonates (BEACON) - Replaces the Golden Hour document from 2016.

Based on previous drafts originating from Nottingham guideline

Scope

This guideline deals with aspects of stabilisation of very preterm infants (<32 weeks gestation).

Introduction

The CESDI 27-28 week project¹ highlighted deficiencies in resuscitation and early care in many babies born at 27 or 28 weeks gestation as well as communication within teams and with families. This guideline aims to set out a means to deal with the issues around early stabilisation of very preterm infants (<32 weeks gestation) in the Bradford clinical context. The guideline also aims to address many of the recommendations of the CESDI report, as well as reflect more recent emerging evidence.

Sick newborn infants tolerate both handling and hypothermia poorly. Minimal handling and maintenance of normal temperature are paramount. Monitors should be used to provide observation of the infant where practical, even in delivery suite, and an arterial line inserted if more than occasional blood gas measurements required. Painful procedures should be kept to a minimum and babies observed constantly during them for hypoxaemia and hyperoxia.

A key aim in the immediate stabilisation is to enable infants to establish some functional residual capacity. This may be achieved with prophylactic CPAP from birth, mask ventilation and then prophylactic CPAP or prophylactic or therapeutic intubation with ventilation and surfactant administration, according to the clinical situation.

In Bradford we aim to stabilise, admit and put lines into the most vulnerable babies within an hour of admission and then leave them as undisturbed as possible.

Evidence

Timing of Cord Clamping

Some certainty now exists about the optimal timing of cord clamping for preterm babies. (see separate guideline). Aiming to deliver deferred cord clamping leads to a major improvement in mortality. There is interest in, but no real evidence base supporting the use of, stabilisation with cord intact. Cord intact stabilisation is therefore not standard of care,

Bradford Approach:

Currently at BRI our standard is to aim for 1 minute of deferred cord clamping for preterm infants, unless clinical condition dictates immediate clamping. The antenatal presentation might inform this assessment – for example a decision for immediate cord clamping of completely apnoeic 30/40 baby might be hastened by knowledge the CS was done for fetal bradycardia.

We have found that prior discussion of a plan to deliver deferral is helpful, to ensure that both obstetric and neonatal teams understand mutual expectations, and to facilitate any necessary changes to the plan if indicated. Elevation of the baby prior to cord clamping is contraindicated. Leaving the baby undisturbed is best, once a plastic bag (and a hat at vaginal deliveries) is applied.

Indications for immediate cord clamping are discussed in the relevant guideline.

A key priority during a period of deferral is to establish if the baby is breathing – it will affect what you do next.

Thermoregulation

It has long been recognised that Neonatal mortality increases with falling admission temperature³. In the Epicure study hypothermia was independently associated with the risk of death⁴. A recent trial where the control arm babies were colder did not show such a difference in mortality, although secondary outcomes still differed – worse with hypothermia. While some would argue as to whether a truly causal relationship exists between hypothermia and death or illness, clinical observation suggests that hypothermia is so easily abolished that aggressive thermoregulatory support is appropriate. In utero temperature is around 37.8°C and the agreed YNN standard is to admit babies with a temperature of $\geq 36.5^{\circ}\text{C}$.

Bradford Approach:

It is unknown whether iatrogenic hyperthermia is harmful, but it seems prudent to avoid overwarming. Overwarming is possible with a “bag, hat and radiant warmer” approach particularly if an exothermic mattress is used in a larger baby. For this reason we usually limit use of exothermic mattresses to <27 weeks and monitor temperature in real time with a skin probe underneath the baby, or in an axilla if a mattress is being used. Apply plastic bag, and hat if at vaginal delivery, prior to cord clamping. We aim to admit babies normothermic (36.5 – 37.5°C).

Early respiratory management

Surfactant: Both high and low volume lung injury occurs rapidly in the preterm surfactant deficient lung. In elegant studies Bjorkland et al have shown that lung injury is worsened by initial “inflation breaths” at birth whether or not surfactant is administered and that the damage increases with the size of inflation breaths^{5,6,7}. Preterm animals ventilated without PEEP have reduced compliance, increased alveolar protein leak and more histological lung injury than those ventilated with PEEP. These changes are seen within 10 minutes of birth.

A school of thought in the early part of the last decade suggested that the appropriate response to these data is to minimise such lung injury by administering surfactant prophylaxis to a subset of babies as early as practicable. Where the operator is certain of successful intubation, this can be before the first assisted breath. Where intubation is part of delivery suite management, we believe such prophylaxis is still appropriate. Babies intubated are not normally electively extubated until they are within the neonatal unit.

CPAP: Recent studies have examined the extent to which CPAP (without prior administration of surfactant) may be seen as an alternative to prophylactic intubation^{8,9}. Use of CPAP seems to avoid iatrogenic harms associated with intubation and ventilation. The interpretation of these studies makes clear the importance of early ventilation strategies that are as close to “physiological” as possible – minimising excessive tidal volume, oxygen toxicity and promoting early removal of any ET tube. These studies suggest that this approach may be seen as equivalently efficacious in preventing death or chronic lung disease, although the interpretation of these studies is complicated by methodological and generalisability issues.

Bradford Approach:

We do not perform “inflation breaths” in babies <32/40.

We aim to admit almost all babies less than 32 weeks gestation on CPAP. Babies who are breathing during a period of deferred cord clamping should usually be tried on CPAP. The same is true for babies with other signs of vigor (movements) in whom breathing cannot clearly be ruled in, or out. Bradycardia that is improving spontaneously with CPAP is neither an absolute indication for mask inflation nor intubation.

We prefer to deliver CPAP using a “short prong” – which is essentially an ET tube cut down and with a tape flag preventing its passage more than 4-5cm into the nasopharynx. You may find it helpful to “seldinger” this prong through the nares over a short length of nasogastric tube. This prong can then be attached to the PEEP circuit and the circuit adjusted to deliver approximately 5-6cm H₂O of PEEP. Short prong CPAP should be used for transfer and can also be used briefly in an incubator if a CPAP driver is not yet ready on arrival on the neonatal unit, despite the lack of humidity. Face mask CPAP is often attempted, and clearly can be delivered on occasion. However, it is known that face mask application can cause a vagal stimulus and still more importantly

can cause upper airway obstruction. If the latter occurs, the baby will appear to be breathing but may be unable to achieve gas exchange. Short prong CPAP is simple, easy and appears effective.

No specific gestation is excluded from a trial of CPAP. However we accept that an important proportion of the least mature (for example <26/40) infants will require intubation for respiratory insufficiency. Such babies, and all less than 28 weeks who are intubated in delivery suite, should receive surfactant as soon as possible after intubation.

Adequate exposure (12 hours or more) to antenatal steroids should influence decision making as to whether elective surfactant use should be considered at very low gestations. Further aids to decision making should include the general vigor (movements) of the infant, respiratory effort and heart rate during and after any period of deferred cord clamping. Absolute indications for intubation include failure to improve a slow HR by mask inflation in an apnoeic baby, and “excessive” work of breathing. The latter judgement requires significant clinical experience – at higher gestations work of breathing that initially appears marked may become more acceptable even with some initial oxygen requirement. In intubated babies, we aim to proceed to intubation as soon as possible after making the decision to avoid inconsistent ventilation and to administer surfactant. We do not use the INSURE techniques. LISA is the subject of a separate guideline. Preterm babies who are intubated in delivery suite should not normally be electively extubated prior to admission to the neonatal unit.

Where neither elective intubation nor an early trial of CPAP are clearly indicated – for example in the case of persistent apnoea in a steroid exposed baby at say 29 weeks, a period mask inflation to try to stimulate respiration and support establishment of FRC is indicated.

CPAP “Failures”: Post admission it is known that some babies started on CPAP will need ventilation^{8,9}, and the threshold at which to intervene with optimal timing is unknown. Too low a threshold will result in too many babies being ventilated; too high a threshold will result in the known advantages of earlier surfactant administration being lost¹⁰. We are confident in conventional means of surfactant administration to treat or provide prophylaxis against hyaline membrane disease. We aim to have very short intubation durations, without using INSURE. Some intubated babies need more than a single dose of surfactant. See *LISA guideline*.

Bradford Approach

We choose to treat babies with evidence of established hyaline membrane disease (ie a sustained oxygen requirement at rest of 30% or more or other evidence of respiratory failure) with intubation, early rescue and extubation as soon after as the baby is clinically fit for extubation (many minutes to hours or even days). A 30% threshold for intubation of babies on CPAP should be interpreted with the whole clinical and therapeutic picture. A CPAP mask or prongs that are too tight seems to occlude the nares, and can certainly cause trauma. Some leak can be compensated for by increasing the flow. It is important to ensure that the baby has the opportunity to be settled on CPAP, prone if possible, while getting a CPAP of 5-6cm H₂O. Babies who are already surfactant exposed might be suitable for a higher threshold for intervention – discuss with consultant.

Air/ O₂: Studies in term infants suggest a possible benefit, and certainly no downside to commencing resuscitation in air. Normal term and preterm infants have low saturations in the early minutes of life, which does little to encourage one to administer supplementary oxygen. Our experience has been that many preterm infants can be stabilised in air and any risk of early hyperoxia abolished. Our view has been reinforced by the publication of ILCOR and NLS guidelines.

Bradford approach

We aim to manage the initial stabilisation of all infants in air, only increasing the FiO₂ in the presence of persistent bradycardia which is not responding to airway and breathing management. It is not known if increasing the PIP or FiO₂ should be the first manoeuvre in those babies whose HR does not respond to intubation, and surfactant. Where intubation is certain and bradycardia persists, increase in pressure beyond 20 cm H₂O seems reasonable, and in very exceptional cases may need to be much higher. Careful studies have shown that newborn infants do not have saturations in the first few minutes that we would recognise as normal later in life¹¹.

Ongoing ventilation

Ventilation appears to be part of the downside to a prophylactic intubation approach. Therefore rapid weaning is appropriate. Different ventilation modes have advantages and disadvantages and choice should be discussed with the senior clinician.

Bradford approach

Our standard approach to ventilation is PC-AC + VG with an initial tidal volume set at 4ml/kg (PIP limit of 28, or 10 above requirements – whichever is lower). Volume guarantee (VG) is only successful if the flow sensor is working normally and ET tube leak is below 50-60%. Babies with established respiratory disease – for example an oxygen requirement of more than 30% - may require higher tidal volumes and may benefit from more surfactant and possibly other treatments.

Please see the guideline on *Neonatal Ventilation* for further details.

Communication

We make every effort to communicate with families before preterm delivery. This is particularly true for infants where a significant morbidity or mortality risk is to be expected (e.g. <30 weeks), but is important to all families, as is quick relaying of information about their baby's progress at and after admission. Document antenatal conversations in the maternity EPR (Medway), and postnatal conversations on "yellow sheets" in the baby's notes. It is also good practice, if at all possible, to encourage parents to visit the neonatal unit prior to delivery.

"Borderline" gestations: At very low gestations reviews of results of neonatal intensive care suggest that survival rates are low and many survivors have significant disabilities. In Bradford we have previously taken the view that it is inappropriate to resuscitate infants of less than 23 completed weeks gestation, in common with our neonatal services¹². However, recent guidelines suggest a more considered approach to decisions about postnatal stabilisation may be appropriate (see appendix 2).¹⁴ These should be read. Ensure calculation of gestation is exact and agreed. The obstetric team will wish to have neonatal input at gestations below 23 weeks. This may involve talking to parents antenatally about whether intensive care is appropriate or being present at the delivery to assist with palliative care. Neonatal input of this kind requires considerable experience and should only be undertaken after discussion with the neonatal consultant on-call.

For babies at 23 weeks gestation, the neonatal team (usually a consultant) must discuss the situation with the family prior to the delivery and agree a planned approach.

A "comfort care only" plan will typically involve baby being wrapped and handed to parents without efforts being made to resuscitate the baby, and may include neonatal staff not attending the delivery. Families and professionals need to anticipate that babies may gasp or even breathe at very low gestations – this will may well need to be discussed.

Under certain circumstances it is also acceptable to agree antenatally with parents not to resuscitate infants at slightly higher gestations¹². A consultant needs to be involved in this decision making. Postnatal assessment showing a baby in parlous condition at birth might reinforce such a decision. However at 24 weeks or beyond decision a postnatal assessment is usually necessary. Calculation of exact gestation, by a neonatologist, is obviously vital and helpful to show the family that the gestation has both been considered and is critical.

Attending deliveries where death is expected: While it is without the "resuscitation" aspects of this guideline – very occasionally medical staff from NNU may be asked to attend the delivery of a liveborn infant for whom no intensive care is either anticipated, nor appropriate. This will be when no obstetric member of staff is able to attend, and ensures a death certificate can be written without the involvement of the coroner. A certifying doctor must have seen the baby before death. Prior clear communication with midwifery staff as to the reason for attendance is, as ever, clearly vital. Junior trainees should not be asked to attend the deliveries of babies below 23 weeks gestation. Adhering to, and consideration of modifying, a plan for non-intervention at delivery, takes considerable experience.

When the baby is born (<27/40) - see also additional guidance for <24/40

Actions	Rationale and comments
<ul style="list-style-type: none"> Place baby in plastic bag during period of 1 minute deferred cord clamping, put hat on baby (unless CS) Use Transwarmer (don't preheat the transwarmer under the resuscitaire radiant heater – there is a risk of overheating and burns - activate it away from an external heat source). 	<ul style="list-style-type: none"> To ensure adequate maintenance of temperature <ul style="list-style-type: none"> Activate Transwarmer (at room temperature, away from heater). Cover with towel. Place baby directly in a plastic bag, without drying, at birth. Ensure plastic bag covers as much of baby as possible. Ensure tight seal to prevent draught and evaporative heat loss. Make small hole for left hand for SpO₂ monitor. If access required for UVC, cut small hole. Place a woollen hat on baby's head, without drying it. Do not cover baby with towels until heater switched off immediately before transfer
<ul style="list-style-type: none"> Use air for breathing support Increase to O₂ if persistent bradycardia, may be appropriate to increase PIP prior to increasing FiO₂ Use PEEP circuit for breathing support, using PEEP 6, unless needing ventilation breaths 	<ul style="list-style-type: none"> In animal work PEEP is as important as early surfactant in the establishment of FRC. Add oxygen if not responding after intubation, surfactant and appropriate inflation (see comments in introduction) PEEP circuit allows delivery of CPAP or conversion to mask inflation. Autobreath circuit useful for ongoing ventilation (e.g. intubated baby)
<ul style="list-style-type: none"> If decision for intubation - attempt within 30 seconds of decision Tube position may be confirmed by Direct vision Videolaryngoscopic insertion HR improvement with ventilation Clear misting inside ETT Pedicap <p>Ensure ETT is not inserted too far</p> <p>No "inflation breaths</p> <p>Surfactant (Curosurf 120mg, one vial) administered once ETT in correct position Minimise delay</p> <ul style="list-style-type: none"> Initial PIP 20 – increase if persistent bradycardia 	<ul style="list-style-type: none"> Allows airway control and very early surfactant Significant chest movement may represent excessive tidal volume for some babies. Use surfactant administration packs (or cut ET 15.5cm) Unsuccessful intubation in active spontaneously breathing baby – may consider CPAP
<ul style="list-style-type: none"> Inexperienced personnel, unable to intubate, Gentle mask inflation, no "inflation breaths", max initial pressures 20cm H₂O. Monitor effect by assessing heart rate. Use "difficult airway" guideline (attached to emergency trolley) 	<ul style="list-style-type: none"> Use mask and "Autobreath". Do not use bag, valve mask system - cannot control pressure Call SpR /consultant if not already present Call paediatric ward SpR if difficulties with intubation and consultant not yet available
<ul style="list-style-type: none"> Non responders: <ul style="list-style-type: none"> Is baby intubated? <ul style="list-style-type: none"> Pedi-cap Direct Laryngoscopy Auscultation Is ETT too far in? <ul style="list-style-type: none"> Review tube length compared to original intubation 	<ul style="list-style-type: none"> Best test of intubation is seeing tube pass through cords Pedi-cap can be useful confirmation of successful intubation, but beware false negatives (Insufficient pressure/ tidal volume, poor cardiac output) Rise in SpO₂ is not an appropriate test of successful intubation. Rise in HR can be useful confirmatory evidence of ETT placement Surfactant should be administered as soon as confidence in intubation is achieved – not be necessary to await change on Pedicap

<ul style="list-style-type: none"> ▪ Auscultation <ul style="list-style-type: none"> ○ Is PIP sufficient? ○ Is FiO₂ sufficient? ○ Have you waited sufficient time? ○ Did surfactant enter lungs? 	<ul style="list-style-type: none"> • Consider repeat surfactant if ETT shown to be in oesophagus at any time
<ul style="list-style-type: none"> • Apply SpO₂ probe and plug into Masimo monitor (kept on trolley) 	<ul style="list-style-type: none"> • Apply lead to baby before plugging into (turned on) monitor. • Apply lead to baby's right hand (cut hole in plastic bag for hand)

When the baby is born <24/40

Actions	Rationale and comments
<ul style="list-style-type: none"> • At 22/40 - 23/40 a decision not to start resuscitation may be an appropriate approach, but if resuscitation is commenced, the HR response of the baby to mask inflations will be critical in deciding whether to proceed to intubation and intensive care 	<ul style="list-style-type: none"> • Depends on confident estimation of gestation. See BAPM, The Management of Babies born Extremely Preterm at less than 27 weeks of gestation - A Framework for Clinical Practice at the time of birth. See www.bapm.org • Antenatal discussions about agreed treatment plans should be recorded in mothers notes wherever possible
<ul style="list-style-type: none"> • Weigh baby at delivery if knowing the weight will contribute to the clinical assessment 	<ul style="list-style-type: none"> • Babies weighing less than 500g at gestation <24/40 have a very poor prognosis indeed. Take this into account when deciding appropriateness of instituting intensive care.

When the Baby is born 27-31⁺⁶/40

Actions	Rationale and comments
<ul style="list-style-type: none"> Place in plastic bag and put hat on during deferred cord clamping, before commencing stabilisation 	
<ul style="list-style-type: none"> Start delivery of CPAP short cut ETT, unless assessed as not breathing (typically during DCC) 	<ul style="list-style-type: none"> Promote alveolar recruitment and may prevent hyaline membrane disease Preferred technique is ETT cut short, and passed via nares
<ul style="list-style-type: none"> Gentle mask ventilation breaths via PEEP circuit if not breathing, no inflation breaths, initial PIP 20cm H₂O. Monitor effect by assessing heart rate until SpO₂ available. Do not plan to give prophylactic surfactant on delivery suite, unless known not be steroid exposed or other known risk factor for bad outcome Note that no evidence guides the use of drugs if they are apparently required to achieve cardiac output. 	<ul style="list-style-type: none"> Surfactant to be given to intubated babies as soon as possible and within 30 minutes of birth. Elective intubation may be appropriate for immature or very SGA babies (eg at 27, 28 weeks) if baby has not had exposure to full course of antenatal steroids (<12 hours). <p>Bradford team remain very aware that concentration on use of drugs may detract from clinical focus on airway and breathing interventions – which are most likely to be important in achieving good outcome.</p>

Transfer to NNU – All Babies <32/40

Actions	Rationale and Comments
<ul style="list-style-type: none"> • Fix ETT prior to transfer • Use short prong CPAP. Transfer on resuscitaire 	<ul style="list-style-type: none"> • Ensure pads are well stuck to face and Velcro tight, (clean face if necessary gently with towel/ saline and cotton wool) • • Short tube CPAP appears effective and avoids risk of occluding upper airway with mask pressure during stabilisation and transfer..
<ul style="list-style-type: none"> • Do not disconnect from power until ready to go • Cover in warm towels immediately prior to transfer • Show baby to parents – encourage mother to touch baby. Record whether this occurred 	<ul style="list-style-type: none"> • Power off stops alarms
<ul style="list-style-type: none"> • Ensure sufficient gases before leaving delivery suite • Ensure cord pH samples taken (all <28/40, and all LSCS) 	<ul style="list-style-type: none"> • Air and oxygen must be full enough for transfer. Remember to check fullness of cylinders with cylinder turned on but wall gas not applied. “lefty loosie”, “righty tighty”
<ul style="list-style-type: none"> • Consider offering father/ one relative a brief visit to NNU as baby is brought round, then return him to delivery suite until stabilisation complete. 	<ul style="list-style-type: none"> • May decrease family anxiety if they know where baby has gone, pending later visit from senior member of medical staff.

Admission – All Babies <32/40

Actions	Rationale and comments
<ul style="list-style-type: none"> • Nurse caring for baby may need assistance from others, but remains with baby for duration of admission. • Coordinator can provide or delegate this role. 	<ul style="list-style-type: none"> • Identified nurse provides continuity and gets help from others with drugs etc
<ul style="list-style-type: none"> • Initial actions <ul style="list-style-type: none"> ○ Weigh baby in plastic bag ○ Transfer to incubator still in bag ○ Attach to ventilator/ CPAP ○ Reassess ABC ○ Give surfactant if intubated and not already given, assess response 	<ul style="list-style-type: none"> • Ti 0.3s, PEEP 6, PIP and FiO₂ as at resuscitation. • Is baby on appropriate ventilatory support? Review chest movement and VT.
<ul style="list-style-type: none"> • Nursing admission procedure <ul style="list-style-type: none"> ○ Take axilla temperature using electronic thermometer. If low and skin temp normal, repeat ideally using “direct” “Filac” thermometer. ○ Commence monitoring (skin temp, ECG, SpO₂) ○ Record baseline observations ○ Give Vitamin K ○ Photograph baby for parents 	<ul style="list-style-type: none"> • Medical staff/ANNP prepare to insert umbilical lines giving nursing staff time to complete initial admission procedures • Target admission temp 36.8°C. Avoid temp>38°C • Lie baby on skin temp probe – no tape is needed • No ECG leads <26/40 (causes skin damage), source heart rate from SpO₂ until UAC HR available.
<ul style="list-style-type: none"> • Do not remove bag until all procedures (UAC etc) complete and humidity and incubator temp optimised • “Pull” a hole in the bag for access to umbilicus 	<ul style="list-style-type: none"> • Minimise use of sharps in incubator
<ul style="list-style-type: none"> • Monitor oxygenation/ blood gas <ul style="list-style-type: none"> ○ SpO₂ target - see SPO2 guideline ○ PaCO₂ 5-7kPa 	

Admission – All Babies <32/40 (continued)

Action	Rationale and Comments
<p>Intubated babies</p> <ul style="list-style-type: none"> • Site umbilical arterial and venous lines where a senior decision indicates they are needed. Many babies less than 32 weeks will need central venous access for parenteral nutrition, but not all. UAC placement is indicated where there is significant respiratory disease or if very low gestation means invasive blood pressure monitoring and frequent sampling are needed. <ul style="list-style-type: none"> ○ UAC for IBP and HR monitoring – ventilated babies and those with significant oxygen requirement ○ Double lumen UVC ○ Operator attaches UAC fluids, once both lines in using clean technique with help of admitting nurse. • Take blood for <ul style="list-style-type: none"> ○ ABG ○ CRP (if sepsis considered) ○ Blood glucose (as part of gas) ○ FBC ○ Blood Group and Coombs ○ Blood culture ○ Start maintenance fluid 75ml/kg 10% glucose. <p>Target time for both IV and IA fluids up is 60 minutes after birth</p> <p>Prescribe prophylactic antifungal prophylaxis</p>	<p>Arterial access is easiest in 1st hour –do not delay</p> <p>UAC</p> <ul style="list-style-type: none"> ○ Commence 0.9% saline with heparin (1iu/ml) at 1ml/hr ○ Monitor heart rate via UAC. Ensure alarms on monitors set correctly. <p>UVC</p> <ul style="list-style-type: none"> ○ Use a double lumen UVC (with tip placed just outside right atrium). If difficult to obtain use a single lumen UVC ○ A sterile procedure should be used to access line (use Matching Michigan techniques and insertion checklist) ○ The UVC tip must lie at or immediately above the diaphragm on X-ray. If it lies kinked within the liver then the catheter should be removed. ○ All drugs including PN can be given through it if the UVC tip lies in the IVC or right atrium ○ Give maintenance fluid 75ml/kg Babiven startup through UVC whilst awaiting X-ray. <p>Do not delay the administration of drugs or fluids before the X-ray is available.</p> <p>Lines must be placed by a skilled practitioner to avoid delays, learners may assist Attending nurse may make up and attach IV fluids before procedure completed,</p> <p style="text-align: center;">Care must be taken not to pull out line accidentally.</p> <p>Do not site peripheral line</p> <ul style="list-style-type: none"> ○ <28/40 within first 24 hours, ○ Defer peripheral IV in babies <26/40

Subsequent Care

Actions	Rationale and Comments
<ul style="list-style-type: none"> Reassess 1 hour after admission 	<ul style="list-style-type: none"> Structured assessment of oxygenation, CO₂ clearance, temp (Axilla T) and appearance as well as brief examination (OFC, anus, morphology, skin etc – not hips) is key part of admission documentation. Quality notes matter.
<ul style="list-style-type: none"> If ventilated and <30% O₂ and good CO₂ clearance with low PIP, aim for early extubation. Load with caffeine. Extubate baby to CPAP using “extubation to CPAP” guideline. 	<ul style="list-style-type: none"> Babies <26/40 should be discussed with consultant on call before moving to extubation.
<ul style="list-style-type: none"> If needing 30-50% O₂ continue PC-AC+ VG (if sensor working normally). Aim for TV 4-6ml/kg (usually started at 4ml/kg). Discuss with consultant as to whether further surfactant is indicated. Consider also <ul style="list-style-type: none"> ETT position Sufficient surfactant in correct place Pneumothorax Pneumonia/ Pulmonary hypoplasia/ hypertension Does baby need HFOV? 	<ul style="list-style-type: none"> Avoid “volutrauma” – i.e. the traumatic effect of excessive tidal volume and overdistension – is as important as the old concept of “barotrauma” delivered during attempts to progressively recruit collapsed alveoli
<ul style="list-style-type: none"> If FiO₂ >30%: has baby had sufficient surfactant? 	<ul style="list-style-type: none"> Consider ETT position? Big leak?
<ul style="list-style-type: none"> Chest and Abdominal x-ray (after NGT passed) 	<ul style="list-style-type: none"> Immediately after UAC and UVC are in position. If no umbilical lines and not ventilated delay until 4 hours of age
<ul style="list-style-type: none"> Explain reason for admission and care baby is receiving to both parents. Encourage early visit, avoiding time of ward round. Discuss expressing, and ensure practical advice “showing you what to do” is given. Give milk as available – 0.5ml/h does not require any medical decision 	<ul style="list-style-type: none"> Document meeting between member of senior medical staff and parents in notes, ideally within 1 hour of birth, certainly within 12 hours of delivery. Document that “Bliss family handbook” given to mother/ father.
<ul style="list-style-type: none"> Suctioning 	<ul style="list-style-type: none"> Not routinely required in 1st 12 hours post surfactant. Perform when there are clinical features suggestive of ETT obstruction.

Monitoring and Thermoregulation

Parameter	Day 1	Day 2	Day 3	Day 4	Stop	Comment
Monitoring						
SpO ₂	Continuous	Continuous	Continuous	Continuous	WR decision, when stable in air	Ongoing whilst receiving supplementary O ₂ Target SpO ₂ according to guidelines
Heart Rate	Continuous	Continuous	Continuous	Continuous	WR decision	Source from BP if <27/40 for first 4 days Place leads laterally on chest wall to maintain XR quality
Blood Pressure MAP > gestation	Continuous if UAC in situ If no UAC, 1 -2 hourly depending on gestation		Continuous if UAC in situ		WR decision	NI BP cuff can damage skin and is unreliable. Ideally arterial.
Thermoregulation						
Temperature 15	Continuous	Continuous	Continuous	Continuous		D14 onto 3-6 hrly

Humidity <28/40 gestation	85%	85%	85%	85%		85% till D7, then wean 5% BD Stop D10
Humidity 28-32/40	85%	80%	75%	70%		Wean by 5% daily, stop at D10

Initial Incubator settings

<28/40	(<1.0kg)	37°C
28-32/40	(1.0-1.5kg)	35°C
32-34/40	(1.5-2.5kg)	34°C
>34/40	(>2.5kg)	33°C

*If babies are admitted with an appropriate temperature, i.e. $\geq 36.8^{\circ}\text{C}$.
If admitted with hypothermia then an increased incubator temperature may be required to warm the baby up promptly. Pressing the ">37°C" button, allows the incubator to be adjusted to higher temperatures.

Nursing Procedures <32/40

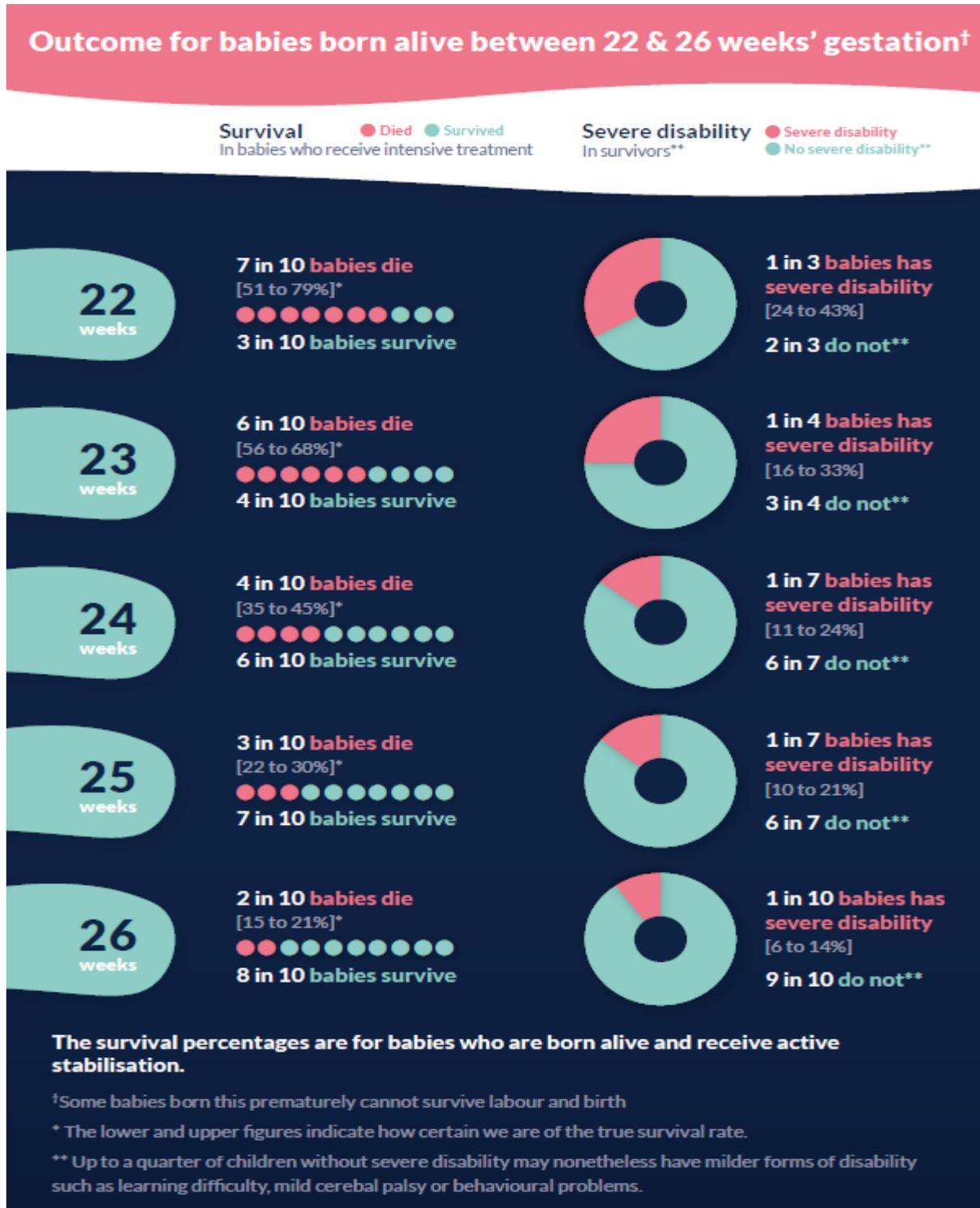
Parameter	Day 1	Day 2	Day 3	Day 4	Review/stop	Comment
Nutritional needs						
Weight	Twice daily weight for all babies <27/40 first 4 days Daily weight 27- 32/40				Twice weekly D10 ealier if WR decision	
Fluids						Amount of fluid should be based on daily U&E's, weight and fluid balance
Breastmilk	Ensure support offered, and booklet given out. Feed any available milk at up to 0.5ml/h without seeking medical input into decision.	Check out expression progress				See “ Guideline for the Expression, Preparation, Storage and Safe use of Breast Milk”
Nappies	Weigh 6 hourly	Weigh 6 hourly	Weigh 6 hourly	Weigh 6 hourly	Review weighing nappies at D7	
Urinalysis	Daily	Daily	Daily	Daily	Daily whilst on TPN	May need BD if glycosuria, hyperglycaemia present or abnormal urine output

Cares						
Nappy change/hygiene	6/12 hrly	6/12 hrly	6/12 hrly	6/12 hrly	D7 6 hrly nappy Daily top and tail	Dust with CX powder at cares
Positioning Supportive	Side lying	Prone/ side lying	Prone/ side lying	Prone/ side lying	Prone for maximum respiratory support, consider developmental care.	Side lying first 24 hrs- observe UAC/ UVC site Use positioning and developmental aids
Handling	Minimal	Minimal	Minimal	Minimal		Cluster handling episodes, avoid over stimulation

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Appendix 1 Perinatal Management of Extreme Preterm Birth Before 27 weeks of Gestation (2019) A BAPM Framework for Practice



Appendix 2 Perinatal Management of Extreme Preterm Birth Before 27 weeks of Gestation (2019) A BAPM Framework for Practice – Proposed visual tool for assessment of risk

