Delivery Room Management of Preterm Infants <28 weeks Gestation – GL942

Approval and Authorisation

<table>
<thead>
<tr>
<th>Approved by</th>
<th>Job Title</th>
<th>Date</th>
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<tbody>
<tr>
<td>Paediatric Governance</td>
<td>Chair of Paediatric Clinical Governance</td>
<td>February 2015</td>
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Change History

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Author</th>
<th>Reason</th>
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<tbody>
<tr>
<td>1.4</td>
<td>30/3/10</td>
<td>P de Halpert</td>
<td>Change in Surfactant use</td>
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<tr>
<td>1.5</td>
<td>22/05/12</td>
<td>P de Halpert</td>
<td>Due review Amalgated with extremes of viability guideline</td>
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<tr>
<td>1.6</td>
<td>February 2015</td>
<td>P de Halpert</td>
<td>Reviewed, no changes</td>
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DELIVERY ROOM MANAGEMENT OF PRETERM INFANTS <28 WEEKS GESTATION

Following a review of current practice and in concordance with European consensus Statement on management of Neonatal RDS\(^1\), 2007 BAPM surfactant guidelines\(^2\), CESDI 27/28 project\(^3\) We will now aim to give surfactant prophylactically (defined as within 15minutes of birth) in the delivery room.

It is important to make the distinction between Resuscitation and Stabilisation. Babies born <28 weeks may well not need ‘resuscitation’ and to apply the algorithm for resuscitation of an unwell term baby may be detrimental- such babies need stabilisation.

This guideline is to be used in conjunction with the

**Thermal Care regional guideline:**
[http://sql0/sites/intranet/paediatrics/Neonatal%20Guidelines/Premature%20Infants/Thermal%20care%20of%20the%20Newborn%20Regional%20Guideline%20s%20Jan%202008.doc](http://sql0/sites/intranet/paediatrics/Neonatal%20Guidelines/Premature%20Infants/Thermal%20care%20of%20the%20Newborn%20Regional%20Guideline%20s%20Jan%202008.doc)

**Surfactant Guidelines:**
[http://sql0/sites/intranet/paediatrics/Neonatal%20Guidelines/Premature%20Infants/Surfactant%20guideline%20Curosurf.doc](http://sql0/sites/intranet/paediatrics/Neonatal%20Guidelines/Premature%20Infants/Surfactant%20guideline%20Curosurf.doc)
Before delivery:

Every effort should be made to safely transfer all threatened preterm deliveries <27 weeks gestation to a centre with a Tertiary level Neonatal Intensive Care Unit – Oxford being our regional centre.

Good communication between the parents and all health care professionals involved is of paramount importance.

The most experienced clinicians available at the time (preferably consultant obstetrician and consultant paediatrician with an experienced midwife), should discuss with the parents up to date outcome data, clinical information about the baby which may alter outcome and in light of this information the parents views on resuscitation and management. A management plan should then be agreed for the baby.

All discussion should be clearly documented.

Management plans should be clearly recorded in the notes and accessible to all clinical staff.

When appropriate, parents should be encouraged to seek support from family members and religious advisers.

Inform neonatal consultant of expected delivery
Inform neonatal unit of expected delivery

Staff at delivery:

2 neonatal unit staff members. At least 1 of whom must be competent at preterm endotracheal intubation.
If <26/40 a Consultant should be ideally be present.

Preparation:

Standard Resuscitaire checks
Functioning Laryngoscope with Size 0 and 00 straight blades
Size 2, 2.5, 3, 3.5 ETT (straight)
5ml syringe
Size 8 NGT
Scissors
Curosurf 1 x 120mg vial (2mls) (bring from Buscot or LW fridge)
If sufficient time and delivery imminent -> draw up surfactant
Hat for securing ETT
Considerations for the limits of viability

- If gestation *certain* and FH heard during labour:
  >23 weeks gestation: Experienced paediatrician and another clinician (neonatal nurse ± SHO) to attend birth in order to assess whether active resuscitation is appropriate depending on condition of baby at birth and parental wishes of babies at 23-24 weeks gestation.

- If gestation *uncertain* and FH audible during labour:
  Paediatrician to attend all births thought to be >23 weeks to assess whether active resuscitation is appropriate, depending on the condition of the baby and parental wishes if gestation estimated to be 23-24 weeks.

- Factors that may be taken into consideration include: evidence of perinatal asphyxia, advanced sepsis, extensive bruising and low or absent heart rate at the time of delivery.

Immediate management If stabilisation commenced

Place in plastic bag

Dry Head and place hat (with ties) on baby

Assess condition of baby and assess response to initial stabilisation.

Babies, if practically possible, should be stabilised in air initially and then given supplemental O2 if no response (as defined by an increase in heart rate) within 30s.

If signs of life and good response to basic stabilisation -&gt; **Intubate with ETT** (see chart for size and length). Assess position clinically (air entry, chest movement, HR) and secure tube. If satisfactory give prophylactic surfactant 120mg (whole vial dosing) ideally within 15minutes of birth.

Place sats probe on baby (can be placed over plastic bag).

Transfer to transport incubator. Target ventilator settings (for babies that have received surfactant) should be 18/4, rate 45 and FiO2 as required to maintain saturations 85-92% (Hyperoxia should be avoided). If a baby is requiring higher pressures on the resuscitare
neopuff to achieve this saturation range then the transport ventilator pressures should match this.

Audit targets:

Thermal Care: admission temperature 36-37.5 degrees
Surfactant: administration within 15 minutes
Ventilation: O2 sats 86-92% during transfer and on admission
First pCO2 5 - 8 kPa, with ph 7.25-7.40
Admission: admit to NICU within 30 minutes of delivery in uncomplicated premature deliveries
Management at Extremes of viability

Established Preterm Labour

Certain Gestational Age

No

Paediatricians Present at delivery for >23 weeks

Assume viable infant – assess at delivery and resuscitate if appropriate

Yes

Gestation

<22 weeks

Maternal indications

No paediatric involvement

23-24 weeks

Rarely indicated*

The management of an infant delivered at this gestation should be consistent with parents’ wishes**

25-26+6 weeks

Accepted mode of delivery with

Resuscitation and supportive care if good

Caesarean Section

Paediatric Care

* Caesarean section offers no benefit to the fetus <25 weeks gestation and should be performed only when indicated for the health of the mother.

** There are wide variations in prognosis and outcome for infants born at this gestation. The management of an infant delivered at this gestation should be consistent with parents’ wishes. For infants without fatal congenital abnormalities, and with parents who wish resuscitation the clinician’s decision to resuscitate at birth should depend on the infant’s condition. Objective criteria include condition at birth, lack of bruising and presence of spontaneous respiratory efforts.
Intubate with appropriate size and length
Confirm tube placement clinically & ETCO2 detector
Secure tube
Give 120mg curosurf via ETT
Continue IPPV with active PEEP
Airway positioning and Mask ventilation breaths for 30s
PEEP 4-5 cm H2O, PIP max 20cm H2O, FiO2 – Air
(Into Plastic bag)
Dry head and place Hat
Attach Sats probe – can be attached over plastic bag.
Aim to wean to 18/4 pressures
Reduce FiO2 to keep SaO2 85-92%
Rate – 45
Check Airway ↑FiO2 to 0.5 then 1.0 ↑PIP as needed
Serious consideration as to appropriateness of resuscitation
No HR, No respiration
Extensive bruising
Assessed GA <23/40
Signs of life
Not extensive bruising
Assessed GA >23/40
Transfer to Transport incubator
Ventilator pressure settings to match those on resuscitaire (+Ti 0.4)
Approx Gestation
Approx Weight
ET Size
ETT length at lips
23-24 <700g
25-26 <800g
27-29 <900g
30-32 >1000g
2.5-3.0
5.5
6
6.5
7
2.5
8
3.0
3.2-3.5
8.5
9
12
15
20
30
40
100
150
60
10
5
3
2
1
0
-7-
Further Background

Cardio-respiratory Stabilisation

Circulatory stability is dependent upon adequate (not excessive) oxygenation; this is achieved by gentle inflation of the lungs.

There is evidence to suggest that lack of PEEP and the use of excessive tidal volume during initial ventilation may damage the lungs. (4,5,6) There is no evidence from therapeutic trials to suggest that the use of adrenaline to increase heart rate at birth in this patient group improves outcome and it cannot be recommended.

Labour Ward Equipment

- Resuscitation equipment should include the ability to ventilate using PEEP and to vary the oxygen concentration. Ideally there should be the facility to stabilise the baby in Labour Ward and transport to the Neonatal Unit using nCPAP.

Airway Management

- There is no evidence for the use of “inflation breaths” as taught on the NLS course in this patient group. All ventilation, whether via face mask or endotracheal tube, should be gentle and aims only to raise the PaO$_2$ sufficiently to provide for the needs of the cardiac muscle. Air entry should be listened for but it is not necessary to be able to see chest expansion.
- The inflation pressure needed to achieve adequate ventilation will depend upon lung compliance and may range from around 12 – 30 cm H$_2$O, the minimum effective pressure should be used.
- It is entirely appropriate, in the absence of spontaneous respiration, for staff with the requisite experience to go straight to intubation without any use of bag and mask.
- The tip of the endotracheal tube should be seen to pass through the cords and not advanced any further prior to securing.
- It is possible that for some babies elective intubation and administration of surfactant followed by management with nCPAP may be the preferred option but this is not currently supported by published evidence.

The Use of Oxygen

In babies >1000g birthweight (7) and pre-term babies <33w g.a. (8) there is evidence that resuscitation can usually be successfully achieved with room air and there is some evidence that the use of increased oxygen concentration is toxic. No such evidence exists for the extremely pre-term and extremely low
birth weight group but they are unlikely to be different and may be more likely to suffer from oxygen toxicity.

**Vascular Access**

It is not usually necessary to establish vascular access on Labour Ward. If access needs establishing in emergency the umbilical vein will usually be the most effective route.

**Survival and outcome at <29/40**

When counselling parents antenatally it is useful to have the survival figures for the appropriate gestation. It is important to understand the denominator when using survival figures. When referring to survival, the most recent figures should be used (EPICure 2 or local) and when talking about longer term outcome EPICure 1 should be used (9).

**Percentage born alive:**
Of all deliveries at each gestation the percentage born alive is shown below.

<table>
<thead>
<tr>
<th>Gestation/weeks -&gt;</th>
<th>23</th>
<th>24</th>
<th>25</th>
<th>26</th>
<th>27</th>
<th>28</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPICure 1</td>
<td>39%</td>
<td>60%</td>
<td>67%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Admissions:**
The survival to discharge figures listed below are for admissions ie. Those babies that are well enough to be resuscitated and admitted to the neonatal unit. The subsequent graphs show the comparison in survival to discharge from those admitted to neonatal unit in Epicure 1 and 2. The last graph shows that the risk of dying once admitted was highest in the first week of life.

<table>
<thead>
<tr>
<th>Gestation/weeks -&gt;</th>
<th>23</th>
<th>24</th>
<th>25</th>
<th>26</th>
<th>27</th>
<th>28</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBH 2006-08</td>
<td>No data</td>
<td>70%</td>
<td>84%</td>
<td>90%</td>
<td>93%</td>
<td>95%</td>
</tr>
<tr>
<td>EPICure2</td>
<td>15%</td>
<td>45%</td>
<td>65%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percent Survival

Gestational age at birth

- 22 weeks
- 23 weeks
- 24 weeks
- 25 weeks

see notes in text:
* 4 survivors in 2006
** 45 survivors in 2006 (not a statistically significant rise)

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Date: February 2015
Job Title: Consultant Paediatrician
Review Date: February 2017
Policy Lead: Urgent Care Group Director
Version: 1.6
Location: Corporate Governance Shared Drive – GL942
Longer term outlook:

Parents will, of course, be worried about the longer term outcome. The following data is from the Epicure Website.

Different functional problems are often combined together to produce an overall risk of "disability". Obviously the size of this risk depends upon what is included in the final category. Although the risks are high, it is very important to remember that the majority of extremely premature children have no problems or only relatively minor problems as they grow up - by this we mean doing reasonably well at school, keeping up in the classroom, and have normal behaviour patterns. This is often not emphasised in discussions. In the table below, based on the outcome of the EPICure group at 6 years, we give the risks of different degrees of disability at each gestational week:

<table>
<thead>
<tr>
<th>Gestation at Birth</th>
<th>23 weeks or less</th>
<th>24 weeks</th>
<th>25 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Disability</td>
<td>12%</td>
<td>14%</td>
<td>24%</td>
</tr>
<tr>
<td>Mild Disability</td>
<td>25%</td>
<td>36%</td>
<td>35%</td>
</tr>
<tr>
<td></td>
<td>e.g. low normal IQ scores, wears glasses &amp; has a squint, mild hearing loss, minor neurological abnormalities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate Disability</td>
<td>38%</td>
<td>22%</td>
<td>22%</td>
</tr>
<tr>
<td></td>
<td>e.g. moderate learning problems, cerebral palsy but walking, hearing aids, some vision deficit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe Disability</td>
<td>25%</td>
<td>29%</td>
<td>18%</td>
</tr>
<tr>
<td></td>
<td>e.g. severe learning problems, cerebral palsy &amp; not walking, profound deafness, blindness</td>
<td></td>
<td></td>
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</tbody>
</table>

We can then combine these risks with the survival information we have to look at the chances of a child surviving without serious problems (a moderate or severe disability) based on the original 1995 survival data:

<table>
<thead>
<tr>
<th>at birth</th>
<th>% going onto survive without Serious Disability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>after Admission to NICU</td>
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</table>

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Note - these figures relate to the EPICure children born in 1995 and how they were at their 6 year follow up. The reason why the chance of surviving without disability goes up for babies once they are admitted to a Neonatal Unit is that this group has already excluded those babies born alive but who, sadly, died before admission for intensive care.

New survival figures from EPICure 2 are now available and will be followed by longer term outcome information in 18 months time. Early indications are that the number of problems babies have during their first admission to the neonatal unit have not decreased and therefore the outcome may be very similar for these babies. If we use survival information from the 2006 study and outcome data from the 1995 study we can estimate very roughly what current chances are for survival without serious problems in England today:

<table>
<thead>
<tr>
<th>Weeks</th>
<th>23 weeks</th>
<th>24 weeks</th>
<th>25 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>1%</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>3%</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>9%</td>
<td>12%</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>20%</td>
<td>24%</td>
<td></td>
</tr>
</tbody>
</table>

References

10. http://www.epicure.ac.uk/overview/overall-risks