Early respiratory care from arrival to the NNU until 72 hours for newborns <30 weeks or <1.5Kg

Neonatal consultant:_____ Baby Name:_____ Hospital number: _____

Date of Birth: _____ Time of Birth: _____ Time of admission: _____

Pathway Item Refer to Respiratory pathway	Tick once done	Time /initial
Ventilated prior to NNU arrival-Golden hour		
Plug in the resuscitaire and turn the heat back on if there is any delay in moving the infant into the incubator. Minimise time break in ventilation pressure during transfer into incubator: Weight the infant on 'external' scales.	☐ ☐ ☐	
Use SIMV [35] and targeted tidal volume ventilation [36, 37] as standard mode of ventilation. Standard settings include: Ti 0.3-0.35 seconds, targeted tidal volume (VT) to 5ml/kg, rate 30-40 breaths/minute, maximum pressure to 26-28 (a required pressure of more than 20-24 cmH_2O to achieve this target tidal volume should prompt review) and FiO_2 titrated to oxygen saturation within acceptable levels.	☐	
Administer further doses of surfactant or first dose if it has not been given in the delivery room and the infant has or develops a sustained significant oxygen requirement (FiO_2 >0.25-0.30, OR pressures >22/5 cmH_2O to achieve reasonable saturations-discuss with attending consultant). Consider CXR to confirm ET tip position first if any doubt.	☐	
Insert a single peripheral intravenous line (IV). Do bloods as outlined below.	☐	
Administer loading dose of Caffeine to promote early extubation.		
Maintain PCO_2 >4 kPa. Obtain a blood gas within 30 minutes of admission, and repeat within 30-60 minutes after ventilation change where PCO_2 is <4 kPa.	☐	
Place a naso-gastric tube.		
If giving additional oxygen, aim to obtain CXR early (<1 hour after admission) for diagnostic purposes and to confirm ETT tip is in the correct position (T 2-3, with 0.5cm from carina). CXR may be delayed in stable infants to reduce handling and radiation exposure if UVC and or UAC placement(s) are planned.		
Document ETT size and length in Badger notes.		
Avoid fluid overload: • apply fluid management strategies based on fluid balance, electrolytes, weight and signs of fluid overload [30] • avoid fluid boluses to control fluid balance, blood pressure (BP) or base excess [38] There is little evidence that fluid boluses in infants with low BP, in absence of other signs of poor perfusion, are associated better outcomes.		

Pathway Item Refer to Respiratory pathway	Tick once done	Time /initial
Non ventilated infants from NNU arrival-Golden hour		
Plug in the resuscitaire and turn the heat back on if there is any delay in moving the infant into the incubator. Measure infants OFC prior to placing CPAP hat on.	☐	
Minimise time break in CPAP pressure during transfer into incubator: • Select and apply the correct CPAP hat and ECG electrodes before moving the infant from the resuscitaire. • Weight the infant on 'external' scales.		
Use nursing Non-invasive Respiratory Support Nursing Guidance.	☐	
Nurse prone at all times from arrival incubator (unless UAC/UVC being sited, but once sited should be nursed prone-tilted).	☐	
Maintain PEEP 5-6 cmH_2O at all times; consider applying a chin strap to reduce air leak via the mouth.		
Use mask CPAP rather than prongs preferentially.		
Use of high flow nasal cannula (HFNC) ventilation is at the discretion of the attending consultant.	☐	
OG tube in place	☐	
Minimal handling-avoid CXR unless specific clinical concern e.g. after intubation or concern about alternative pathologies e.g. pneumothorax.	☐	
Insert a single peripheral intravenous line (IV). Do bloods as outlined below.	☐	
Administer loading dose of Caffeine within one hour.	☐	
It is not routine to place a UVC unless the infant is intubated and less than 26 weeks gestation. Consider deferring UVC/UAC placement for the first 24 hours to allow prone lying until risk of RSD is reduced.	☐	
Take blood sample from IV line for gas analysis; if the result is not within acceptable limits, carry out capillary blood gas sampling.	☐	
Use intubation criteria (see below) and give rescue surfactant if appropriate • Some infants can be extubated very soon after surfactant treatment if they are vigorous and response to treatment is good. There is no set required duration of ventilation for infants' ≥ 25 weeks and extubation outwith guidance below is at the discretion of attending consultant. [14,16,31] • Use of minimally invasive techniques for infants requiring intubation is optional at the discretion of the attending consultant [11, 14,16,31] but in general infants < 25 weeks PMA need longer term ventilation.	☐	
Avoid fluid overload: • apply fluid management strategies based on fluid balance, electrolytes, weight and signs of fluid overload [30] • avoid fluid boluses to control fluid balance, blood pressure (BP) or base excess [38] There is little evidence that fluid boluses in infants with low BP, in absence of other signs of poor perfusion, are associated better outcomes.		

Thermal control		
1. Leave the infant in the plastic bag until all handling procedures have occurred. 2. Take axillary 'admission' temperature and document result in Badger notes. 3. Place toe and core temperature probes on the infant; monitor and adjust incubator temperature to maintain a neutro-thermal environment. 4. Avoid breaking into plastic bag until minimal handling required and infant is stable.	☐ ☐ ☐	

Intubation criteria (from one hour to 72 hours of life)

1. FiO_2 >0.35-0.40 (levels above 0.30 should prompt consultant discussion) but <0.5 for greater than 60 minutes to achieve target saturations of 90-95%[12,28,29,31]
2. FiO_2 > 0.5 at anytime
3. $PaCO_2$ >9-10 kPa more than once trending up
4. Persistent metabolic acidosis with pH <7.1
5. Recurrent apnoea (requiring intervention)
6. Consider WOB, oxygen saturation and respiratory rate trend

Early extubation/weaning guidance (GET THEM OFF)

1. Aim to extubate all infants within 4 hours of intubation and once they have met the extubation criteria (see below)[14]
    a. Give further doses of surfactant early where FiO_2 remains >0.3.
    b. Actively wean from ventilator by reducing rate by 5-10 breaths/minute every 30 minutes. Blood gas sampling is not required unless FiO_2 increases.
2. Extubate as soon as extubation criteria are met.
3. Use Non-invasive Respiratory Support Nursing Guidance.

Extubation criteria - infant must meet all of the following in the first 72 hours of life:

1. Infant is:
    a. PMA > 24+6 weeks
    b. spontaneously breathing over the ventilator
2. Ventilator support includes:
    a. FiO_2 < 0.3 (if not in air, consider whether a further dose of surfactant would be beneficial)
    b. mean airway pressure is <8 cmH_2O
    c. PIP is < 22 cmH_2O
    d. rate ≤ 30 breaths/minute

Re-intubation criteria following previous extubation

1. An acute unexpected deterioration causing significant cardio-respiratory compromise, and where the infant is not stabilised with standard measures.
2. Any other concerns that an infant may require intubation should be discussed with a consultant, these may include:
    a. Increasing oxygen requirement (with no specific oxygen cut off).
    b. Recurrent desaturation requiring IPPV to recover
    c. Persistent acidosis with pH <7.1, resistant to intervention.

Consider WOB, oxygen saturation and respiratory rate trend

Infants born at 22-24+6 weeks PMA

1. Not routinely for extubation before 72 hours of life, assess extubation criteria once the risk of IVH lessens (after 72 hours of life).

Infants on Non-invasive ventilation following extubation having received surfactant.		
1. Further CXR not routine unless specific clinical concern 2. Nurse prone/OG tube in place 3. Minimal handling 4. Use Non-invasive Respiratory Support Nursing Guidance 5. Use of mask CPAP rather than prongs 6. Maintain PEEP 5-6 cmH_2O at all times; consider applying a chin strap to reduce air leak via the mouth. 7. Consider higher Peep 7-9 cmH_2O in infants who have already received surfactant. 8. Use of high flow nasal cannula (HFNC) ventilation (at the discretion of the attending consultant) 9. A trial of BiPAP or nasal intermittent positive pressure ventilation (NIPPV) can be considered in an attempt to reduce the risk of extubation failure at consultant discretion (this may not offer any significant long-term advantages[31])-in general a trial of increased CPAP pressure would precede. 10. Use intubation criteria and give rescue surfactant if appropriate, use suxamethonium, morphine and intubation pause if requires intubation.	☐	

Criteria to trial off CPAP/HFNC or change to HFNC or nasal cannula oxygen (NC) (first 72 hours)
Eligible infants include those with (at consultant discretion): 1. oxygen saturation within acceptable limits in room air (low oxygen <25) 2. no increased work of breathing or raised RR. 3. no apnoea or bradycardia at rest or on handling

Criteria to restart CPAP/HFNC (first 72 hours)
1. FiO_2 >25-30 (consultant discretion) –clear increased oxygen requirement 2. increased work of breathing a. Respiratory rate consistently >60 breaths/minute Increased frequency of apnoea and bradycardia

Prescription/investigations/Examination		
1. Prescribe Vitamin K and Caffiene 2. Admission FBC, Blood spot, G&C 3. Does the baby need FBC, BC and AB's (Ab's should be given within 1 hour of decision to give, use Autostop) 4. During minimal handling it is acceptable to delay full medical examination until it is clear whether infant will be stable on non-invasive ventilation. Clinical examination should occur without delay in unstable infants or ventilated infants.	☐ ☐	

Feeding / Parental comms		
1. Aim to speak to parents and midwifes about expression within 1-2 hours, discuss the importance of mother's own breast milk. Also start to educate them about how best to express (ask someone who is better qualified, such as a neonatal nurse if necessary). Remember any relevant trials.	☐	
2. Document first parental communication.	☐	
3. Ensure that mothers are given support in expressing MEBM, and feed the baby whatever amount is available even if it is only a few drops as soon as the baby is considered ready for enteral feeds, ideally as the first feed. Aim to obtain first expressed milk before 6 hours.	☐	
4. In the above groups, ask for consent to use donor breast milk if needed soon after admission to the unit.	☐	
5. If in the above groups, no MEBM is available at 12 hours, start DEBM.	☐	
6. If any MEBM is available at 12 hours, continue to support breast milk expression and review at 24 hours.	☐	
7. After 24 hours in a baby receiving MEBM, any shortfall should be made up with DEBM. Ideally, MEBM and DEBM should be mixed at each feed to enable the baby to get the benefit of the lipases in unpasteurised MEBM, which will result in better fat absorption.	☐	
8. Fill in a feeding chart when practical to start incrementing feeds- this should be within 24 hours.	☐	