Neonatal Resuscitation

Classification:	Guideline		
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Authors Division:	Women's and Children's Health		
Departments/Group this Document applies to:	Maternity, Paediatrics		
Approval Group: Children's Health PIG, Maternity Guidelines, Children's Health CIG, Women's Health CIG		**Date of Approval:**	9/05/2022
		Last Review:	Mar/2022
		Review Date:	Mar/2025
Unique Identifier: MIDW/GL/79	**Status:** Approved	**Version No:** 6	
Guideline to be followed by (target staff): Midwives, Advanced Neonatal Nurse Practitioners (ANNPs), QIS trained nurses and doctors at all levels who attend births and provide resuscitation for newborn babies.			
To be read in conjunction with the following documents: Milton Keynes University Hospital (2021) *Stillbirth, Termination of Pregnancy, and Neonatal Death after 24/40 Gestation (Care for). MIDW/GL/55*. 1.5, 1.6, 3.1 Milton Keynes University Hospital (2022) *Bereavement Policy.* NURS/GL/29			
Are there any eCARE implications?			
CQC Fundamental standards: Regulation 9 – person centred care Regulation 10 – dignity and respect Regulation 11 – Need for consent Regulation 12 – Safe care and treatment Regulation 13 – Safeguarding service users from abuse and improper treatment Regulation 14 – Meeting nutritional and hydration needs Regulation 15 – Premises and equipment Regulation 16 – Receiving and acting on complaints Regulation 17 – Good governance Regulation 18 – Staffing Regulation 19 – Fit and proper			

Disclaimer

Since every patient's history is different, and even the most exhaustive sources of information cannot cover every possible eventuality, you should be aware that all information is provided in this document on the basis that the healthcare professionals responsible for patient care will retain full and sole

responsibility for decisions relating to patient care; the document is intended to supplement, not substitute for, the expertise and judgment of physicians, pharmacists or other healthcare professionals and should not be taken as an indication of suitability of a particular treatment for a particular individual.
The ultimate responsibility for the use of the guideline, dosage of drugs and correct following of instructions as well as the interpretation of the published material **lies solely with you** as the medical practitioner.

Index

Guideline Statement

To enable staff to perform effective neonatal resuscitation.

Executive Summary

"Neonatal resuscitation is required when the circulation fails or when breathing is interrupted or both. Being pushed through the birth canal is by adult standards, a relatively hypoxic experience for the foetus since significant respiratory exchange is interrupted for the 50 – 75 second duration of the average contraction. Though most babies tolerate this well, some do not and these few may require help to establish normal breathing at birth. Thus, in newborn babies, the problem is always initially a respiratory one. The majority of infants require a supported transition rather than resuscitation"
(Resuscitation Council (UK) 2015).

The aim of resuscitation is, therefore, to prevent neonatal death and adverse long- term neuro-developmental sequelae associated with perinatal asphyxia. Newborn life support is intended to provide this help in a structured way and comprises the following elements:

- Enabling placental transfusion, (when safe to do so) by delaying clamping of the umbilical cord
- Drying and covering the newborn baby
- Assessing the need for any intervention
- Opening the airway
- Aerating the lung
- Rescue breathing
- Chest compression
- Administration of drug (rarely)

A trained neonatal resuscitator should be called to attend all births where there are concerns about the wellbeing of the baby. This will usually be on the Labour Ward. However, if a woman attends the Emergency Department (ED) and gives birth prior to transfer to the Labour Ward, then the staff in ED should request a Midwife attend and a neonatal resuscitaire is transferred from Labour Ward to ED for the birth – if not readily available in ED.

The Resuscitation Council (UK) Key changes in practice from 2015 and 2021 updates:

- For uncompromised babies, a delay in cord clamping of at least 1 minute from the complete delivery of the infant is recommended. For infants requiring additional support / resuscitation, this remains the priority (Resus Council 2021).

- The temperature of newborn infants must be actively maintained between 36.5 and 37.5°C after birth unless a decision has been taken to start therapeutic hypothermia treatment. The importance of achieving this has been highlighted because of the strong association with hypoglycaemia, acidosis and increased morbidity and mortality. The admission temperature should be recorded as a predictor of outcomes as well as a quality indicator (Resus Council 2021).

- For term infants, air should be used for resuscitation at birth. If, chest compression are required the Oxygen should be increased to 100% initially . The amount of oxygen should then be titrated against saturation levels of the baby as measured by pulse oximetry,

keeping in mind expected saturation levels at each minute of life for the first 10 minutes. If an oxygen/air blend is not available, use whatever is available.

- Pulse oximetry should be used where it is anticipated that the infant may have problems with transition from placental to pulmonary respiration or needs resuscitation or has persistent cyanosis for more than 5-10 minutes of life. Oxygen saturation can be measured reliably during the first minutes of life with a pulse oximeter.

- If available, use ECG to ascertain the baby's heart rate as this remains the most rapid and accurate measurement of the newborn's heart rate (Resus Council 2021).

- Preterm babies between 28 - 31 weeks gestation may not reach the same arterial blood oxygen saturations in air as those achieved by term babies. Therefore, blended air/oxygen should be given judiciously, and its use guided by pulse oximetry. An initial starting FiO2 of 21-30% should be used. If the gestation is <28/40 a starting FiO2 of 30% can be used, again titrating with pulse oximetry If an oxygen/air blend is not available, use whatever is available.

- Preterm babies less than 32 weeks gestation should be covered up to their necks completely in a food-grade plastic bag or wrap immediately after birth without drying first. A hat should be put on the baby's head as soon as possible to prevent heat loss. They should then be nursed under a radiant heater and stabilized. Prior to transfer to NNU, temperature should be checked. Also consider using a thermal mattress for babies <30 weeks gestation. They should remain wrapped in the plastic bag until their temperature has been checked after admission to the Neonatal Unit and incubator humidity is at required level. For these infants, delivery room temperature should be at least 26°C.

- Positive pressure ventilation (PPV) should be delivered with inflation breaths at peak inspiratory pressure (PIP) of 30cm of water for 5 seconds duration and positive end expiratory pressure (PEEP) set at 5-6cm of water for term babies and 20-25cm PIP with 5-6 cm PEEP for preterm babies respectively. Ventilation breaths should be delivered at 40 – 60 breaths per minute with lower PIP.

- The recommended compression to ventilation ratio for CPR remains at 3:1 for newborn resuscitation.

- For babies born through thick meconium, attempts to aspirate meconium from the nose and mouth while the head is still on the perineum are not recommended. The priority remains to inflate the lungs and support respiration. If an infant is floppy and apnoeic, having been born through meconium, the priority remains to dry the baby, position the head in the neutral position and deliver x5 inflation breaths if ineffective reposition and give another 5 inflation breaths. Suction under direct vision can then be attempted if there continues to be no improvement and should only be performed by someone appropriately trained to do so (Resus council 2021).

  Nasal CPAP with PEEP rather than routine / elective intubation may be used to provide initial respiratory support for all spontaneously breathing preterm babies.

- If adrenaline is given, then the intravenous route via UVC is recommended using a dose of **20 microgram/kg**. If the tracheal route is used, it is a dose of a 100 microgram/kg will be needed.

- Detection of exhaled carbon dioxide (capnography) in addition to clinical assessment is recommended as the most reliable method to confirm placement of a tracheal tube in neonates with a spontaneous circulation. It can also be considered during mask ventilation if concerned regarding seeing the chest rise.

- Laryngeal masks can be considered during resuscitation of babies ≥34 weeks gestation in order to stabilize the airway in preference to Guedel airways (Resus Council 2021).

- Infants born at term or near term with evolving moderate to severe hypoxic – ischaemic encephalopathy should be assessed initially for criteria A and, where possible, be treated with therapeutic hypothermia (Cooling Therapy) if appropriate.

Definitions

ANNP	Advanced Neonatal Nurse Practitioner
BVM	Bag valve mask
CNST	Clinical Negligence Scheme for Trusts
CPAP	Continuous positive airway pressure
CPR	Cardio-pulmonary resuscitation
ECG	Electrocardiogram
ED	Emergency Department
ETCO2	End tidal carbon dioxide
ETT	Endotracheal tube
HIE	Hypoxic ischaemic encephalopathy
IT	Inspiratory time
LW	Labour Ward
NLS	Neonatal life support
NNU	Neonatal Unit
PEEP	Positive end expiratory pressure
PIP	Peak inspiratory pressure
PPHN	Persistent pulmonary hypertension of the newborn
PPV	Positive pressure ventilation
SBAR	Situation Background Assessment Recommendation(s)
ST	Specialty Trainee
TVN	Thames Valley Network
UVC	Umbilical venous catheter

1.0 Roles and Responsibilities

Midwives
To ensure that all equipment required for neonatal resuscitation at birth is available and in working order. This includes the Neonatal Resuscitation trolleys in Labour Ward and Phase 1 Theatres.
To ensure that they are competent and confident to perform basic life support for the newborn. All Midwives must have attended the annual "in house" neonatal life support update and have passed the airway assessment as per requirements for CNST compliance.
Know how to summon the relevant medical staff in an emergency.
If completed the Resuscitation Council (UK) NLS (Newborn Life Support) -course, ensure training is up to date.

Maternity Bleep Holder
To ensure they know how to prepare for an emergency and imminent transfer of a newborn baby requiring resuscitation from the community into the hospital.
To attend emergency calls for neonatal resuscitation.

ANNP's
To ensure they have a good working knowledge of the equipment provided for resuscitation of the newborn.
To ensure Resuscitation Council Newborn Life Support (NLS) training is up to date.
To ensure they are competent to perform basic and advanced life support for the newborn in a timely manner.
To attend births and resuscitation of the newborn when required.

Neonatal Nursing Staff
Allocated member of staff who is qualified in speciality to hold Neonatal Emergency Bleep and to initially attend to provide support and ensure appropriate communication and transport to NNU if required
To accompany medical staff/ANNPs attending births of babies less than 32 weeks gestation and any babies requiring resuscitation at birth.
To ensure an emergency cot and ventilator is available, checked and set up within the neonatal unit at all times.
To ensure newborn life support training (NLS) is up to date.
To ensure that the NNU resus-bag/trolley is checked on a daily basis and correctly restocked following use.

Medical staff
To ensure they have a good working knowledge of the equipment provided for resuscitation of the newborn.
To ensure Resuscitation Council Newborn Life Support (NLS) training is current for all Middle Grade/ST4+ level doctors, for all ST3 and below they must be competent in basic/advanced life support. All levels of staff must have completed the annual Trust assessment in order to be CNST compliant.
To attend births/resuscitations in a timely fashion when called.

On call Consultant Paediatrician
The on-call Consultant should be available to attend the hospital within 30 minutes, if needed for difficult resuscitations.
To ensure they have a good working knowledge of the equipment provided for resuscitation of the newborn, that Resuscitation Council Newborn Life Support (NLS) training is current and annual Trust NLS assessment is up to date for CNST compliance.

Designated link Paediatrician for the Labour Ward and Neonatal Unit

The Designated link Paediatrician for the Labour Ward and Neonatal Unit is responsible for clinical care standards in relation to the newborn.

2.0 Implementation and dissemination of document

This document will be disseminated across the Maternity Unit and Paediatric Department including the Neonatal Unit, through team meetings, and circulation to all colleagues. The document can be located via the Hospital intranet.

3.0 Processes and procedures

3.1 Preparation

- A trained Neonatal Resuscitator should be called to attend all births where there are concerns about the wellbeing of the baby. This will usually be on the Labour Ward or in Phase 1 Theatres. However, if a woman attends the Emergency Department (ED) and gives birth prior to transfer to the Labour Ward, then the staff in ED should request a Midwife attend and ensure the ED resuscitaire is available and checked and ready for use.

- The Maternity Service has 24-hour access to Paediatric services (Consultant and Specialist Registrar) in relation to neonatal advanced life support skills including endotracheal intubation.

- Irrespective of the birth setting, resuscitation equipment must be available, checked as per policy and ready for use at all times, including ED. Resuscitaires and newborn resuscitation equipment within the hospital must be checked daily and following use. The Nurse/ Midwife confirms that the checking and stocking process has taken place by signing an 'Equipment Checklist' on Labour ward, Ward 9 and NNU.

- Home birth equipment is checked as per policy by the Community Midwives prior to and following a home birth and Midwife confirms this by signing an Equipment Book.

- A trained neonatal resuscitator should be routinely present at the following births:
  - All instrumental births
  - All emergency LSCS births
  - Any birth deemed to be high risk
  - Where the baby is < 37 weeks gestation
  - Where meconium-stained liquor is present
  - If the baby is known to have severe congenital abnormalities
  - Or any other birth where the Midwife or Obstetric Team have concerns about the health of the baby

- Wherever possible the Neonatal Resuscitator should make sure he/she is familiar with the maternal history, labour, gestation etc. If a trained Neonatal Resuscitator has been called to attend the birth it is the Midwife's responsibility to give a brief SBAR history.

Ensure anyone carrying out neonatal resuscitation is familiar with the resuscitaire. It is the Midwife's responsibility to ensure:

1. That the resuscitaire is checked and ready for use prior to taking it into the birth room and that the correct equipment is available.
2. The oxygen supply is securely connected and Peak Inspiratory Pressure (PIP) 30cmH2O for term infant. For Preterm infants set PIP at 25cm H2O and adjust accordingly. Peak end expiratory pressure (PEEP) should be set at 5-6 cmH2O (Resus Council 2021)
3. Bag Valve Masks (BVM) must be checked to ensure that the 'blow off valve' is working correctly
4. That suction tubing is well fitted to reservoir bottle and is working correctly with a Paediatric Yankauer sucker attached. Size 10 (black) suction catheters must also be available.
5. Overhead heater is on
6. Dry, warm towels are available.
7. Good lighting is available.

8. Clock is working.
9. Equipment for advanced resuscitation is available (Appendix 1) including oxygen saturation monitor.
10. There is sufficient oxygen and air in the cylinders for transfer to NNU.

- All Midwives and Paediatricians/ANNP's need to ensure that they are trained to operate both the drop-down resuscitaires and mobile resuscitaires. If anticipating transfer to Neonatal Unit, the recommendation is to commence the resuscitative measures on a mobile resuscitaire.

3.2 Rationale for main recommendations

Improving medical and midwifery practice, such as checking and stocking up the resuscitaire and understanding the importance of keeping clinical resuscitation skills up-to-date by attending relevant study days and attending drills and skills sessions.

A standardised, structured approach to Neonatal Resuscitation will ensure newborn babies are identified early and correctly as needing assistance, that assistance / resuscitation will be initiated early, and appropriate resuscitation measures carried out in order to improve outcomes and deliver a safe service.

3.3 Basic Stabilisation / Resuscitation for term babies: (See Appendix 2)

Please refer to Resuscitation Council (UK) 2021 NLS Guidelines for explanations around the following recommendations. https://www.resus.org.uk/pages/nls.pdf

Most babies born at term need no resuscitation and can usually stabilise themselves during the transition from placental to pulmonary respiration very effectively. Provided attention is paid to preventing heat loss and a little patience is exhibited before cutting the umbilical cord, intervention is rarely necessary. However, some babies will have suffered stresses or insults prior to or during labour and help may then be required in the form of resuscitation.

- At birth, collect the baby in a warm dry towel. If appropriate (in an uncompromised, spontaneously breathing, healthy baby), delay cord clamping for at least one minute.

- Once the cord is clamped, dry the baby quickly, remove wet towels and place the baby skin-to skin with the mother or wrap the baby in fresh warm towels if skin to skin not appropriate. Cover the head with a hat.

- At the same time as drying, assess the colour, tone and respiratory effort of the baby.

- If the baby is mature, making good respiratory effort and is vigorous, place skin on skin with mother, covered with warm towels. A healthy baby will be born blue but will have good tone, will cry within a few seconds of delivery and have a good heart rate within a few minutes of birth (120-150 beats per minute).

- A less healthy infant will be blue at birth but have less good tone, may have a slow heart rate (<100 beats per minute) and may not establish regular breathing by 90-120 seconds and may need some assistance.

- If the baby seems preterm, or is limp and pale, has not breathed by about one minute, and has a very slow or undetectable heart rate, then the baby will need some resuscitation.

- Place the baby on a warm resuscitaire and start the clock.

- Check for colour, chest wall movement and tone.

- Assess the heart rate. The apex of the heart should be auscultated with a stethoscope as palpating the cord is not always accurate. The heart rate should be reassessed at 30 second intervals throughout any subsequent resuscitation as the first sign of improvement in the baby's condition will be an improvement in the heart rate. If available, ECG leads should be applied. Apply oxygen saturation probe to the right wrist / hand as soon as possible and aim to maintain saturations within the parameter set out in the table below

- If the baby has a good heart rate (>100bpm) and is making good respiratory effort, then no further help is needed.

- If the baby does not have a good heart rate or is not breathing, then follow the flow chart below (Appendix 2). Keep the baby warm throughout the resuscitation.

- **Call for help at any point you need it by using the emergency bell in the delivery room or ward bay. At the same time, request for the Neonatal Resuscitation trolley to be brought as soon as possible.**
- **For the paediatric team (which includes SHO/ANNP and Registrar) and Maternity Bleep Holder, dial 2222 to Switchboard and ask them to put out a "neonatal emergency" call and state which room or operating theatre you are in. Be clear in your instructions.**

- Wherever possible nominate one member of staff to keep contemporaneous notes during the resuscitation.

- If the resuscitation is taking place on the post-natal ward, then the baby should be moved as quickly and safely as possible to the resuscitaire on Ward 10 and basic resuscitation started.

3.4 Advanced life support with Paediatric team in term babies: (See Appendix 2 & 3)

Please refer to Resuscitation Council (UK) 2021 NLS Guidelines for explanations around the following recommendations. https://www.resus.org.uk/pages/nls.pdf

- Check colour, tone, breathing and heart rate. Keep baby warm.

Ensure the airway is open by ensuring the head of the baby is in the neutral position and by taking care not to flex or overextend the neck. If the baby is very floppy, it may also be necessary to apply chin lift or jaw thrust. Opening the airway may be all that is required to resuscitate the baby. Rarely, material (meconium, blood, vernix) may be blocking the oropharynx or trachea and suction under direct vision of the oropharynx should be performed if initial attempts to inflate the lungs are unsuccessful.

Non-vigorous newborn infants delivered through meconium-stained amniotic fluid are at significant risk for requiring advanced resuscitation and a neonatal team competent in advanced resuscitation may be required.

Use the standard NLS algorithm, if chest rise is not seen after 5 inflation breaths, repositioning and delivering a further 5 inflation breaths if no improvement then inspect the airway under direct vision.

Stimulate +/- give 5 inflation breaths using PIP of 30cm H20 (term baby) or 25cm H20 for premature infants) and PEEP set at 5-6 cmH20, sustained over 2-3 seconds each if baby is not breathing adequately. Start any resuscitation in air and titrate Oxygen to meet target saturations

Targeted Preductal SpO2 after birth	Resus Council 2021
2 min	65%
5 min	85%
10 min	95%

- If gases are not available or cylinders are empty use the self-inflating BVM in order to provide lung inflation
- If heart rate improves and baby starts to breathe the lungs have been successfully aerated. Continue to monitor baby. If appropriate prepare to give baby to mother.

- If heart rate, tone and colour improve and have chest wall movement but baby does **not** start to breathe, proceed to ventilation breaths of 30-40 per minute using pressures of around 20cm water and inspiratory times of around 1 second, until baby starts to breathe on his/her own.

- If no response to inflation breaths x 5 i.e. heart rate has not improved either the lungs have not been aerated effectively (by far the most common scenario – especially if there is no chest wall movement with lung inflation breaths) or the baby needs more than lung aeration alone.
  - Recheck head position – ensure it is in the neutral position.
  - Ensure mask is of correct size and no mask leak.
  - Consider need for jaw thrust
  - Consider the need for a longer inflation time and higher inspiratory pressure.
  - Consider 2-person airway control e.g. jaw thrust & chin lift and/or other airway manoeuvres (oropharyngeal airway or LMA / I-Gel).
  - Consider the possibility of an obstruction in the oropharynx and or trachea, which may be removable by suction under direct vision using a laryngoscope.

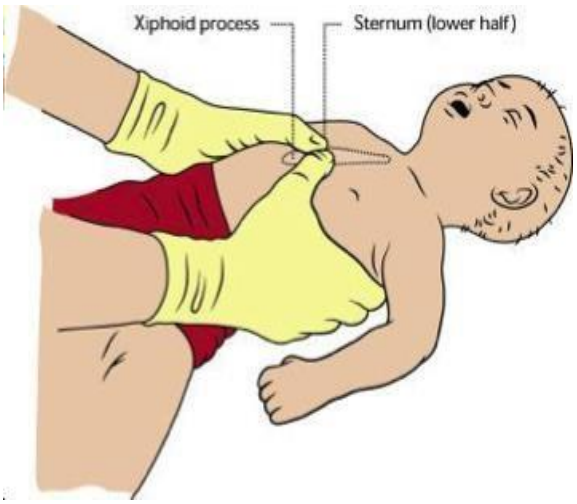
- Repeat inflation breaths. Look for a response including chest wall movement or increase in heart rate.

- At any point during resuscitation, apply an oxygen saturation probe to the right wrist of the baby as soon as possible. If a saturation monitor is not available immediately on the resuscitaire, request someone (midwife, healthcare assistant) to fetch one as soon as possible. The Neonatal resus trolley/bag contains a portable saturation monitor which can be used. Placement of the sensor on the baby before connecting to the machine may result in faster acquisition of signal.

- If there is no response to ventilation breaths and the mother has been administered opioids in labour, continue ventilation. If the heart rate is above 80 beats per minute but no respiratory effort, consider giving 200 micrograms of Naloxone Hydrochloride

intramuscularly (BNFC 2020). **Naloxone must not be given to any infant of a mother on regular opiates or illicit drugs.**

- If heart rate continues falling to below 60 beats per minute despite effective ventilation via mask (good chest wall movement) commence external cardiac massage aiming for 90 compressions and 30 breaths per minute using hands around (encircling) the chest with both thumbs over the sternum



- Compress the chest quickly and firmly, reducing the antero-posterior diameter by about one third. **The recommended compression : ventilation ratio remains at 3:1.** Allow enough time between compressions for the heart to refill with oxygenated blood. Ensure that the chest is inflating with each breath. If chest compressions are required, ensure FiO2 has been increased to 100%, in a term infant, 30 % in a preterm infant and titrate to achieve target saturations` . Ensure that pulse oximetery is in situ and all assistance called for.

- Inform the Neonatal Consultant Paediatrician On Call, if not already done so, as soon as possible **through switchboard, 2222 via fast bleep** and request to attend as soon as possible. **NB, the consultant Paediatrician is NOT on the "neonatal emergency" or "Category One Section" bleeps.**

- If there is no improvement in heart rate despite chest compressions with effective lung inflation, consider the following drugs – all ideally to be administered via an umbilical venous catheter (UVC):
  - Adrenaline 1:10 000 solution **20mcg/kg (0.2ml/kg)** via umbilical venous catheter This dose can be repeated as required.
  - Adrenaline 1:10 000 at a dose **100mcg/kg via tracheal tube** can be considered if there is a delay in achieving intravenous access but must not interfere with ventilation or further delay intravenous access (Resuscitation Council 2021).
  - Sodium Bicarbonate: 1-2mmol/kg (2-4ml/kg) of 4.2% solution.
  - 10% Dextrose: 2.5ml/kg/dose
  - Volume replacement is very rarely needed – usually only if there is a **clear history of blood loss** from the baby. Emergency blood is obtained from Phase One Theatres. Occasionally no such history is available. Use of crystalloid (0.9% sodium chloride) is preferred over albumin. Dose is 10ml/kg over 10 – 20 seconds, which can be repeated if required. Avoid giving rapidly especially in preterm babies due to the risk of intraventricular haemorrhage.
    (Resus Council 2021)

- If drugs and cardiac compression is required then stabilisation of the airway by intubation should be considered and performed by a trained member of staff. Continue to ventilate titrating supplemental oxygen to achieve targeted saturations at 30-60 breaths per minute. Use the minimum pressure required to achieve good chest movements. Auscultate the chest to assess tube position. End tidal CO2 must also be used to confirm ETT position (colour will change from blue to yellow on expiration if ETT in trachea but not the correct position).

- False negative reading on ETCO2 detector may occur in very low birth weight babies and in infants during cardiac arrest. A brief period of chest compressions may bring about a colour change as CO2 is delivered to the lungs. False positive readings may occur with colorimetric devices contaminated with adrenaline, surfactant and atropine.

- If there is ongoing poor response to resuscitation:
    - Check that the ETT is in the correct position using end tidal CO2 detector and auscultation (ETT not in right main bronchus).
    - Check that the ETT isn't blocked.
    - Consider using longer inspiratory time (IT), increase the PIP and/or PEEP.
    - Increase FiO2 if not already at 100%.
    - Consider the following possible underlying diagnoses:
        - Tension pneumothorax
        - Cyanotic congenital heart disease
        - Persistent Pulmonary Hypertension of the Newborn (PPHN)
        - Severe anaemia post abruption / foeto-maternal transfusion
        - Maternal opioid use

- Laryngeal masks can be used effectively at birth to ventilate the lungs of infants ≥34 weeks gestation and ≥2000g birth weight needing resuscitation where facemask ventilation has been ineffective and intubation unsuccessful or unfeasible. It should only be inserted by someone who is appropriately trained to do so (Resus council 2021).

- In situations where the heart rate has remained <60/min for more than 10-15 minutes of continuous resuscitation, there is NO clear guidance as to whether or not to stop resuscitation. Therefore, the decision to stop resuscitation must be taken at senior level (Registrar or Consultant present) on a case-by-case basis (Resus council 2021).

- If resuscitation is successful, then prepare to transfer the baby to the Neonatal Unit.
    - Secure endotracheal tube if present prior to transfer to reduce the risk of accidental extubation.
    - If parents are present, ensure they are aware of and the reasons for transfer to NNU.
- Try to telephone ahead to NNU so they can prepare equipment.
- Allow mother to see and wherever possible, touch the baby prior to transfer.
- Ensure all babies transferred to NNU post resuscitation have identity bands before transfer to NNU.

- Babies >36/40 who are still requiring resuscitation at 10 minutes of age or who are ventilated at this time should be considered for therapeutic hypothermia treatment, which is considered to be the gold standard of treatment for babies with evolving moderate to severe hypoxic ischaemic encephalopathy. Inform NNU to prepare the

cooling mattress equipment. Once on NNU, assess the baby regularly to see if cooling criteria A and/or B are met. Refer to TVN Guideline on Therapeutic Hypothermia evaluation and treatment. Do NOT commence passive cooling in Labour Ward or Theatre as uncontrolled hypothermia may worsen cardiac function and increase metabolic acidosis.

NB: Placenta must be sent for Histopathology for any babies that require advanced resuscitation including cardiac massage or admission to the NNU, see below relevant criteria:

- All babies born in unexpectedly poor condition with admission to NNU or transferred for tertiary care
- All stillbirths and neonatal deaths
- All preterm deliveries from 24-32 weeks whether iatrogenic or not
- All abnormal babies WITHOUT a clear antenatal diagnosis
- All suspected abnormally invasive or morbidly adherent placentas (placenta accreta)
- All babies suspected of severe growth restriction (birthweight below 3rd centile)
- Monochorionic twins
- Foetal hydrops
- Maternal pyrexia (>38ºC)
- Placental abruption
- Maternal coagulopathy
- Maternal substance abuse
- Suspected chorioamnionitis

3.5 Home Birth

- The on-call community Midwife should check that she has the appropriate equipment for attending all home births and that it is working prior to attending the woman in labour.
    - The home birth equipment should include: bag valve mask device
    - Face Masks of varying sizes
    - oropharyngeal airway of varying sizes
    - Laryngoscopes

- If the baby requires resuscitation following the birth or the clinical condition of the baby causes concern, the Midwife should commence and continue basic neonatal resuscitation using the bag valve mask. (See Appendix 2).

- The second Midwife or the birth partner dials 999 and requests a paramedic ambulance for transfer to hospital.

- The basic resuscitation should continue until the condition of the baby improves or the ambulance arrives.

- A further phone call should be made to the Maternity bleep holder to inform them of the emergency and imminent transfer to hospital. The bleep holder should then inform the Emergency Department and on call paediatrician of the transfer in.

- Where possible the mother and baby should be transferred in together with a Midwife accompanying them. The second Midwife should follow the ambulance into the hospital and the birth partner should make their way safely into hospital in their own transport.

- If the mother and baby are unable to be transferred into the hospital together for whatever reason and the mother's clinical condition is satisfactory, she may be taken to the hospital in her birth partner's car with the second Midwife following or if necessary.

3.6 Resuscitation / Stabilisation of Extremely preterm babies (see TVN GL)

Most preterm babies, including those born less than 30 weeks gestation, are healthy at the time of delivery. However, they all benefit from assistance in making the transition from foetal to extra-uterine life. Intervention is thus usually limited to ensuring baby remains healthy and is, therefore, more appropriately termed *stabilisation*.

Spontaneously breathing preterm babies should be supported with CPAP + PEEP initially rather than routine intubation.

Preterm babies less than 32 weeks gestation may not reach the same arterial blood oxygen saturations in air as those achieved by term babies. Therefore, blended air/oxygen should be given judiciously and its use guided by pulse oximetry as hyperoxaemia is particularly damaging to preterm babies and, if oxygen is used to achieve saturations of 95% and above, the risk of hyperoxaemia is high. If an oxygen/air blend is not available, use whatever is available. The rate of rise on oxygen saturations post birth should not exceed that of term babies. The recommended initial FiO2 for preterm babies <32 weeks is 30%.

Preterm babies of less than 34 weeks gestation should be completely covered up to their necks in a food-grade plastic wrap or bag, without drying, immediately after birth and a hat should be placed on their head. They should then be nursed under a radiant heater and stabilised. They should remain wrapped until their temperature has been checked after admission.

At least two professionals experienced in neonatal resuscitation, one of whom should be at senior level (Registrar/Consultant), should attend the birth of preterm babies less than 32 weeks gestation. The consultant Paediatrician on call is to be informed of any imminent delivery of preterm babies <32 weeks gestation or as soon as possible thereafter. The Consultant Paediatrician should be present for the birth of any baby <28 weeks gestation. He/she can be contacted via Switchboard and, if attendance is required quickly / urgently, then "Fast Bleep" the consultant via Switchboard. There may, however, be circumstances when the Paediatric Consultant may not be immediately available. In this situation, the Paediatric Registrar will lead the resuscitation.

3.6.1 22+0 – 26+6 weeks gestation

See Extremes of Prematurity Guideline – Thames Valley on Trust Intranet for management of babies born <27 weeks gestation. Extremes_of_prematurity_Final_Guideline.Jan2021.pdf (southodns.nhs.uk)

Neonatal stabilisation may be considered for babies born from 22+0 weeks of gestation following assessment of risk and multi-professional discussion with parents. It is not appropriate to attempt to resuscitate babies born before 22+0 weeks of gestation. (British Association of Perinatal Medicine (BAPM) Framework for Practice 2019). The Paediatric Team will not attend deliveries of babies less than 22 weeks gestation on confirmed dates for purpose of resuscitation.

Risk assessment should be performed with the aim of stratifying the risk of a poor outcome into three groups: extremely high risk, high risk, and moderate risk.

For foetuses/babies at extremely high risk, palliative (comfort focused) care would be the usual management.

For foetuses/babies at high risk of poor outcome, the decision to provide either active (survival focused) management or palliative care should be based primarily on the wishes of the parents.

For foetuses/babies at moderate risk, active management should be planned.

Examples of risk categories:

1. Extremely high-risk Babies (considered to have a > 90% chance of either dying or surviving with severe impairment if active care is instigated):
    - Babies at 22+0 - 22+6 weeks of gestation with unfavourable risk factors
    - Some babies at 23+0 - 23+6 weeks of gestation with unfavourable risk factors, including severe foetal growth restriction
    - (Rarely) babies ≥ 24+0 weeks of gestation with significant unfavourable risk factors, including severe foetal growth restriction

2. High risk Babies (considered to have a 50-90% chance of either dying or surviving with severe impairment if active care is instituted):
    - Babies at 22+0 - 23+6 weeks of gestation with favourable risk factors
    - Some babies ≥ 24+0 weeks of gestation with unfavourable risk factors and/or co-morbidities

3. Moderate risk Babies (considered to have a < 50% chance of either dying or surviving with severe impairment if active care is instituted):
    - Most babies ≥ 24+0 weeks of gestation.
    - Some babies at 23+0 – 23+6 weeks of gestation with favourable risk factors.

In all circumstances, wherever possible, discussion with Obstetric and Neonatal Teams, both MKUH and Tertiary and parents should take place and be fully documented as soon as possible to ascertain parental wishes and plan for delivery.

When a decision has been made to offer active management, and the fetal heart is heard during labour then at least 2 professionals experienced in resuscitation, one of which should be at senior level (Registrar or, ideally, Consultant – see above) should attend the birth.

Active management at birth (BAPM 2019):

- Deferred cord clamping for at least 60 seconds should be routine practice (unless contraindicated)
- Particular attention should be paid to the maintenance of normothermia, with the use of a plastic bag and/or other methods of delivering thermal care, and skin protection.
- Stabilisation and supported transition with lung inflation, using an appropriately sized facemask, should be initiated.
- Care should be taken not to over distend the lungs.
- Clinical assessment in the delivery room is not a good predictor of survival in extremely preterm babies (44) ; if there is no response to mask ventilation, and any doubt around the adequacy of ventilation, the baby should be intubated and surfactant administered.
- The most important intervention is establishment of adequate lung recruitment, and the most important measure of success is heart rate.

- Use of advanced measures for resuscitation including cardiac massage and endotracheal or intravenous adrenaline are rarely required following extreme preterm birth.
- In the absence of sufficient evidence to justify a different approach in extremely preterm babies, if advanced resuscitation is considered appropriate, the Working Group recommends applying newborn resuscitation algorithms as used in more mature babies.
- Where babies are born in much poorer condition than expected it may be appropriate to reconsider the planned provision of active management and to move to palliative care.
- Absent heart rate or severe bradycardia persisting despite effective cardiopulmonary resuscitation for more than a few minutes is associated with high rates of mortality and neurodevelopmental impairment in extremely preterm babies. The most senior experienced attending professional should decide if or when attempts to stabilise and/or resuscitate the baby should stop.
- Stabilisation should normally be undertaken in the same room as the parents, who should be offered the opportunity to see, touch and photograph their baby.
- Following successful stabilisation of the baby, the mother should be supported to express breast milk as early as possible, with ongoing facilitation of parental contact and family involvement as partners in care.

3.7 Discontinuing resuscitation

- The decision to discontinue resuscitation should be made by the most senior Paediatrician (Registrar or Consultant) present. The decision should be discussed and agreed with the resuscitation team. Wherever possible the parents should be included in the discussion and in agreement when a decision to discontinue resuscitation is being made (Resuscitation Council 2021). Full documentation of decision to discontinue resuscitation is to be made in the baby's notes, including all team members present and job roles.

- Discontinuation of resuscitation should be considered when:
  - The infant does not have spontaneous circulation (i.e. a heart rate) and is not showing any signs of life (no detectable cardiac activity) despite 10 minutes of continuous and adequate resuscitative efforts.
  - If the heart rate has persistently remained at 60b/min or below for 10 – 15mins, an evaluation on whether to continue resuscitation should be made on a case by case basis by the resuscitating team and senior clinician (Resus Council 2021)
  - Stopping resuscitation should be discussed and occur if there has been no response after **20 minutes** and reversible problems have been excluded

3.8 Family Support

- A senior member of the resuscitation team should speak to the parents as soon as possible following resuscitation.
- Information given to the parents should be objective and should avoid prejudging care.
- Ensure the parents understand the information given to them following resuscitation by asking them to explain what they think you mean.
- Any bad news should be given by the senior team member present and should be given in a timely and unhurried manner and in a private area.
- If death of the baby is imminent then this should be discussed with the parents rather than waiting until death occurs.

- Staff caring for the mother during the period of resuscitation should provide reassurance but should be mindful not to comment on the success or otherwise of the resuscitation attempts.

(Canadian Paediatric Society 2001, Resuscitation Council 2021)

Please see "Stillbirth, Termination of Pregnancy and Neonatal Death after 24/40 Gestation" Guidelines"

3.9 Documentation

- The following information should always be recorded in the notes by the people involved in the resuscitation:

  - When you were called, by whom and why
  - The time you arrived, who else was there and the condition of the baby on your arrival
  - What you did, when you did it and the timing and details of any response from the baby
  - Whether the baby appeared atonic and areflexic at birth
  - Whether gasping respiration preceded the onset of rhythmical breathing, when gasping started and how long it lasted
  - When the baby started to breathe evenly, regularly and effectively 30-60 times per minute (even if gasping is still occurring intermittently)
  - The date and time of writing your entry and your signature and job title

- A scribe should be allocated at the time of the resuscitation to note the details of the resuscitation contemporaneously. These can then be transferred onto eCare. There is a scribe board and proforma on each resuscitaire. However, scraps of paper used to note down information during the resuscitation may be attached to the case notes as they constitute a contemporaneous record of what took place and should be scanned onto EDM as well. (Resuscitation Council 2021)

3.10 Staff Training

Midwives and staff working within the Maternity Department will attend neonatal resuscitation training sessions as outlined in the Learning Needs Analysis (LNA). The Practice Development Team will ensure that training records are maintained regarding this. **Please see Mandatory Training Guideline for Maternity (With Learning Needs Analysis).**

4.0 Statement of evidence/references

References:

British Association of Perinatal Medicine: Perinatal Management of Extreme Preterm Birth before 27 weeks of gestation - A Framework for Practice October 2019

British National Formulary for Children (2020)

Canadian Paediatric Society (2001) Guidelines for health care professionals supporting families experiencing a perinatal loss, *Paediatric Child Health,* Vol 6(7), pp 469-477.

Patel H and Beeby PJ (2004) Resuscitation beyond 10 minutes of term babies born without signs of life *Journal of Paediatrics and Child Health*, Vol 40 (3), pp 136-138

Fawke J, Wyllie,J., Madar J, Tinnon R, Chittick R, Wenlock N, Cusack J, et al (2021) *Newborn resuscitation and support of transition of infants at birth Guidelines* (May) Resuscitation Council UK, London.

Thames Valley Guideline for Initial resuscitation and Stabilisation of preterm infants < 32 weeks. January 2017. Thames Valley and Wessex Neonatal Operational Delivery Network.

Thames Velley and Wessex ODN Guideline for Management at the Extremes of Prematurity January 2021.

External weblink references:

5.0 Governance

5.1 Document review history

Version number	Review date	Reviewed by	Changes made
5	**12/2021**	Zuzanna Gawlowski with input from Georgena Leroux	Full review and update

5.2 Consultation History

Stakeholders Name/Board	Area of Expertise	Date Sent	Date Received	Comments	Endorsed Yes/No
Zuzanna Gawlowski	Consultant	19/9/21	20/9/21	Incorporated	Yes
Lesley Kilby	ANNP	06/2022	06/2022	Reviewed and Updated	Yes
Laurie Gatehouse	ANNP	20/9/21	20/9/21	Incorporated	Yes
Indranil Misra	Consultant Paediatrician	27/09/2021	27/09/2021	Reviewed. No changes required.	
Georgena Leroux	Midwife	04/10/2021	04/10/2021	Reviewed and comments incorporated.	Yes
Marian Forster	Senior Staff Nurse	06/10/2021	06/10/2021	Reviewed and comments incorporated.	Yes
Mya Aye	Consultant Paediatrician	06/10/2021	06/10/2021	Reviewed and comments incorporated.	Yes
Lisa Viola	Neonatal Matron	07/10/2021	07/10/2021	Reviewed and comments incorporated.	Yes
Janice Styles	Interim Deputy Head of Midwifery	09/10/2021	09/10/2021	Reviewed. No changes required.	
Georgena Leroux	Midwife	01/2022	01/2022	Additional updates included.	Yes.

5.3 Audit and monitoring

Audit/Monitoring Criteria	Tool	Audit Lead	Frequency of Audit	Responsible Committee/Board
Adherence to guideline	M and M meetings, SI	Neonatal Team	Annually	Children Health, Women's Health

5.4 Equality Impact Assessment

As part of its development, this Guideline and its impact on equality has been reviewed. The purpose of the assessment is to minimise and if possible remove any disproportionate impact on the grounds of race, gender, disability, age, sexual orientation, religion or belief, pregnancy and maternity, gender reassignment or marriage and civil partnership. No detriment was identified. Equality Impact assessments will show any future actions required to overcome any identified barriers or discriminatory practice.

Equality Impact Assessment			
Division	Women's & Children's	Department	Paediatrics
Person completing the EqIA	L Kilby	Contact No.	1630
Others involved:	N/A	Date of assessment:	May 2022
Existing policy/service	Yes	New policy/service	No

Will patients, carers, the public or staff be affected by the policy/service?	Yes
If staff, how many/which groups will be affected?	Midwives, Advanced Neonatal Nurse Practitioners (ANNPs), QIS trained nurses and doctors at all levels who attend births and provide resuscitation for newborn babies.

Protected characteristic	Any impact?	Comments
Age	NO	Positive impact as the policy aims to recognise diversity, promote inclusion and fair treatment for patients and staff
Disability	NO	
Gender reassignment	NO	
Marriage and civil partnership	NO	
Pregnancy and maternity	NO	
Race	NO	
Religion or belief	NO	
Sex	NO	
Sexual orientation	NO	

What consultation method(s) have you carried out?
Emails, meetings
How are the changes/amendments to the policies/services communicated?
Emails, meetings
What future actions need to be taken to overcome any barriers or discrimination?

What?	Who will lead this?	Date of completion	Resources needed
N/A	N/A	N/A	N/A
Review date of EqIA	May 2025		

Appendix 1: Neonatal Advanced Life Support Equipment for Resuscitaires

Neonatal Advanced Life Support Equipment in neonatal resus trolley on Labour Ward and in the Obstetric Theatre

- Stethoscope
- Yankauer Sucker
- Suction catheters size 10fg.
- Variety of sized face masks.
- Endotracheal tubes, three of each size: 2.5, 3.0, 3.5, 4.0
- Endotracheal tube introducers (stylets) – s
- Neonatal Laryngoscope + blades size 0 and 00
- Spare laryngoscope bulbs and batteries
- Various sized hats.
- Endotracheal tube fixation devices
- End Tidal CO2 device
- Size 6fg umbilical catheter for emergency UVC insertion
- Three-way tap
- 10ml vial of normal saline – x2
- Sterile disposable scissors
- 2ml, 5ml and 10 ml syringes
- Red emergency drug box
- Laryngeal Masks one of each size
- Airways one of each size.
- 500ml bag of normal saline
- 500ml bag of 10% dextrose
- Intraosseous needle

Basic Resuscitation Equipment available on Postnatal Ward

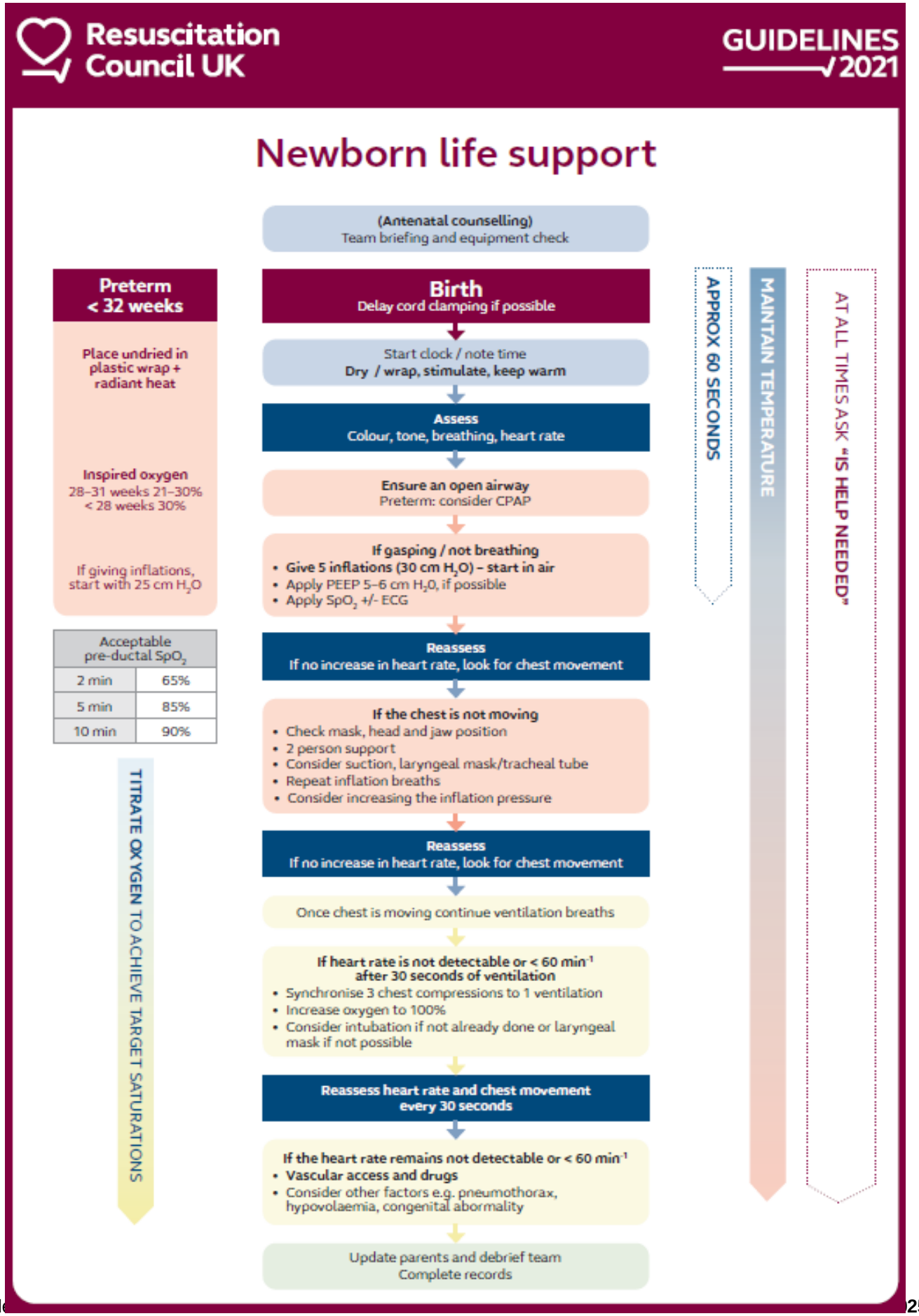
- Resuscitaire located Ward 10
- Piped oxygen and suction
- Radiant heater
- Suction catheters size 10fg
- Yankauer Sucker
- Variety of sized face masks
- Stethoscope
- Correctly functioning T-Piece and Mask for positive pressure ventilation
- Neonatal emergency trolley

Newborn Resuscitation Equipment for Community Midwives

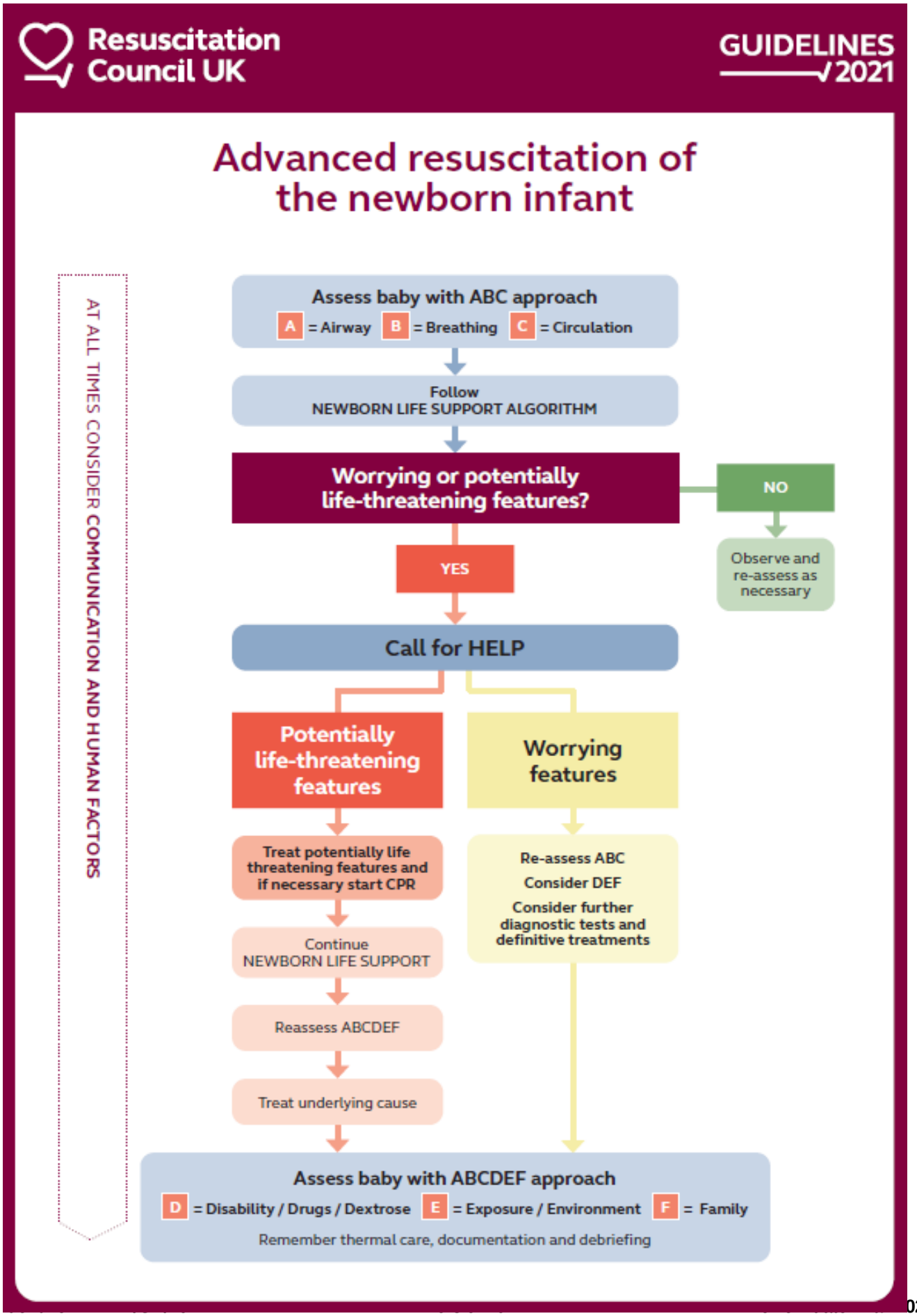
- Bag valve mask device and various masks
- Oropharyngeal airway

- Laryngoscope

Appendix 2: Newborn Life Support Resuscitation Algorithm



Appendix 3: Advanced Neonatal Resuscitation Algorithm



Appendix 4: Emergency Calls in Maternity

Other useful bleeps
Support team: 1480
Security: 1483
Rapid response: 1950
ITU anaesthetist: 1954
Phase 1 Theatre Co-ordinator: 1081

DIAL 2222
STATE THE FOLLOWING USING THE EXACT WORDS

FAST BLEEP - DIAL 2222
FAST BLEEP SPECIFIC INDIVIDUAL TO THE SPECIFIC LOCATION

Maternity Matron bleeps:
Mary Plummer: **1128**
Sophie Conneely: **1137**

Urgent security issues – Dial **2222** and state **'CODE VICTOR'**

"OBSTETRIC EMERGENCY" 09

"WARD & ROOM OR THEATRE NUMBER"

Automatically bleeped
Obstetric SpR **1433**
Obstetric SHO **1628**
Gynae SHO **1629**
Obs Consultant (baton) **1323**
Obstetric anaesthetist **1876**
Anaesthetic SHO **1626**
Anaesthetic SpR **1627**
LW Co-ordinator **1967**
MUM **1440**
Theatre ODP **1457**
Maternity Matrons
MPDT **1274**

"MAJOR OBSTETRIC HAEMORRHAGE" 18

"WARD & ROOM OR THEATRE NUMBER"

Automatically bleeped
Obstetric SpR **1433**
Obstetric SHO **1628**
Obs Consultant (baton) **1323**
Obstetric anaesthetist **1876**
LW Co-ordinator **1967**
MUM **1440**
Theatre ODP **1457**
Theatre scrub Nurse **1081**
Maternity Matrons
MPDT **1274**
Support team **1480**
On call BMS **1412**
……

Additional fast bleep to On-call BMS **1412** – state **NAME, MRN AND SITUATION**

"NEONATAL EMERGENCY" 03

"WARD & ROOM OR THEATRE NUMBER"

Automatically bleeped
Neonatal SHO **1630**
Neonatal SpR **1631**
ANNP **1257**
LW Co-ordinator **1967**
MUM **1440**
Maternity Matrons
MPDT **1274**

Paediatric bleep **1136**
Paediatric SHO **1632**
Paediatric SpR **1633**
PAU Consultant **1857**
……

If Consultant Neonatologist required fast bleep via Switch

"CATEGORY 1 CAESAREAN" 08

"WARD & ROOM OR THEATRE NUMBER"

Automatically bleeped
Obstetric SpR **1433**
Obstetric SHO **1628**
Obs Consultant (baton) **1323**
Obstetric anaesthetist **1876**
Neonatal SHO **1630**
Neonatal SpR **1631**

LW Co-ordinator **1967**
Maternity Matrons
MUM **1440**
MPDT **1274**

Theatre ODP **1457**
Theatre coordinator **1081**

Paediatric SHO **1632**
Paediatric SpR **1633**

"CARDIAC ARREST - ADULT" 01

"WARD & ROOM OR THEATRE NUMBER"

Automatically bleeped
Adult Resus Team
Obstetric SpR **1433**
Obstetric SHO **1628**
Obs Consultant (baton) **1323**

Obstetric anaesthetist **1876**
ITU Anaesthetist **1954**

LW Co-ordinator **1967**
Maternity Matrons
MUM **1440**

Theatre ODP **1457**
Theatre coordinator **1081**
Support team **1480**
Rapid response **1950**
MPDT **1274**

Appendix 5

Neonatal Emergency Proforma

Mothers name: ……MRN: …… Drill: Yes ☐ No ☐

Assigned Midwife:…….....Date and time: ……..

Gestation: …… Time of delivery: …… Mode of delivery: ……..

Known Risk factors: …… Meconium present:

2222 Neonatal emergency Time of call ……

Initial assessment; Colour……..…..Tone ……Breathing……Heart rate……

	Yes	No	N/A	Performed by	Time performed
Baby dried					
Wet towels removed					
Head in neutral					
Apgar timer started					
Heater on					
Inflation breaths x 5					
Inflation breaths x 5 repeated (if required)					
Suction under direct vision					
Guedel airway inserted					
2 person jaw thrust					
Sats probe applied					
Chest rise observed					
Heart rate rise auscultated					
Ventilation breaths for 30seconds if HR <60 following inflation breaths					
Chest compressions and ventilations breaths (ratio 3:1)					
Intubation performed					
UVC inserted					

ASSESSMENTS										
Time										
COLOUR										
TONE										
BREATHING										
HEART RATE										
OXYGEN SATURATIONS										

Called for help	Name	Time called	Time arrived
Senior Midwife			
ANNP			
Paediatric SHO			
Paediatric Registrar			
Consultant Neonatologist			
Neonatal Nurse			
Scribe			
Others (Please list)			

	Specify	Dose/Rate	Given by	Time given
Fluids				
Drugs				

Baby transferred to **NNU**: Yes ☐ No ☐ Time: ……

Apgars

1 Minute:

5 Minutes:

10 Minutes:

Cord gases taken: Yes ☐ No ☐ Arterial pH Venous pH

BE BE

pO2 pO2

pCO2 pCO2

Successful resuscitation: Yes ☐ No ☐ If no, time called: ……

Name of paediatrician making decision to stop resuscitation: ……..