Resuscitation Council UK

# Newborn resuscitation and support of transition of infants at birth Guidelines

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## References

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**ERC Authors:** Hogeveen M, Monnelly V, Binkhorst M, Cusack J, Fawke J, Kardum D, Roehr CC, Rüdiger M, Schwindt E, Solevåg AL, Szczapa T, te Pas A, Trevisanuto D, Wagner M, Wilkinson D, Madar J.

## Key points

- It is reasonable for teams to initiate resuscitation of an infant outside the delivery area using the guideline most familiar to the team (either NLS or PLS) whilst summoning appropriate help and switching algorithm in a timely

fashion if necessary. It is vital for the whole team to be completely clear on the approach used.

- The guideline acknowledges the paucity of resuscitation data available from extremely preterm infants, especially those < 25 weeks, and cautions that these guidelines are based upon evidence from predominantly older gestational ages, which limits applicability to extremely low gestational ages. However, these guidelines remain a reasonable approach to use for extremely preterm infants < 25 weeks.
- Telemedicine can provide remote advice, and health systems should consider how this can be used.
- Equipment should be easily accessible and organised in a standardised way; consider human factor elements when organising equipment and training to maximise efficiency and minimise time delays.
- Although recommendations about delayed cord clamping (DCC) have not changed significantly, there is even more emphasis on its importance for all newborn infants, especially preterm infants. In newborn infants needing resuscitation, if the cord is intact, resuscitation is impractical; clamp the cord for < 30 s to minimise delay to necessary interventions.
- The guideline reinforces not milking the cord in preterm infants < 28 weeks and focuses on trying to perform delayed cord clamping if possible. Cut cord milking is acknowledged as a reasonable alternative if > 28 weeks and DCC is not possible.
- There is a reduced emphasis on skin colour during initial assessment. This reflects the subjective nature of detecting cyanosis or pallor, especially in different skin tones.
- The guideline recognises the increasing role of ECG as a continuous method of HR evaluation, which is more precise than other methods. However, auscultation with a stethoscope remains a reasonable first option.
- Use the two-person method of airway support (jaw thrust) if sufficient providers are available, as this approach is more effective than the single-person technique.
- A supraglottic airway should be considered if face mask ventilation is ineffective.
- If there is no HR response, the chest is not moving with inflations despite airway opening techniques, increase inflation pressure.
- Reduce inflation pressure when chest movement and clinical improvement are seen.
- Use video laryngoscopy for tracheal intubation (if equipment and training allow). This reflects evidence of increased first attempt and increased overall success in tracheal intubation when video laryngoscopy is used. A

conventional direct laryngoscope should be available and remains a reasonable alternative.
- Apply an appropriately fitting nasal interface or a face mask connected to a device for providing positive pressure ventilation.
- CPAP and PEEP are now recommended at a level of 6 cm $H_2O$.
- This guideline acknowledges that CPAP may be considered in infants > 32 weeks GA with respiratory distress if they require supplemental $O_2$.
- Initial oxygen concentration according to gestation has been simplified:
    - Infants ≥ 32 weeks needing respiratory support: start with 21% $O_2$
    - Infants < 32 weeks:  start with ≥ 30% $O_2$
- $SpO_2$ target ranges incorporating newer data from preterm infants, in addition to the established data from mostly term infants before DCC was standard practice, now result in a target range of acceptable $SpO_2$. Reduce $O_2$ if saturations exceed 95%.
- When chest compressions are performed, a supraglottic airway or tracheal tube should be considered, depending on training and experience.
- The time intervals of intravenous or intraosseous adrenaline have been simplified to giving every 4 min.
- Sodium bicarbonate has been removed from the 2025 guideline
- The guideline acknowledges the potential for harm from both hypoglycaemia and hyperglycaemia. There is greater emphasis on checking blood glucose during resuscitation and treating only if it is low, rather than empirical treatment of presumed hypoglycaemia during resuscitation. When hypoglycaemia is treated, the bolus dose of glucose is 200 mg kg-1 10% glucose (2 mL $kg^{-1}$), which aligns with the RCUK Paediatric Guideline.
- The guideline considers out-of-hospital births, especially when unexpected and/or preterm birth. It highlights key considerations and differences when managing newborns in this setting. It addresses the challenges of thermal care and describes differences in equipment and approach, including safe transfer to hospital.

# Factors before birth

## Risk factors

- Common factors associated with an increased risk of a need for stabilisation or resuscitation at birth.

| Antepartum factors | Intrapartum factors |
| --- | --- |
| **Fetal**<br>• Intrauterine growth restriction<br>• < 37 weeks' gestation<br>• Multiple pregnancies<br>• Serious congenital abnormality<br>• Oligo and polyhydramnios<br>**Maternal**<br>• Infection<br>• Gestational diabetes<br>• Pregnancy-induced hypertension<br>• Pre-eclampsia<br>• High BMI<br>• Short stature<br>• Preterm lack of antenatal steroids | • Evidence of fetal compromise<br>• Meconium-stained amniotic fluid<br>• Birth by vaginal breech<br>• Forceps or vacuum delivery<br>• Significant bleeding<br>• C-section before 39 weeks<br>• Emergency C-section<br>• General anaesthesia<br>• Out-of-hospital birth |

## Staff attending births in hospital

- Any infant may develop problems during birth. Local guidelines indicating who should attend deliveries should be developed, based on current understanding of best practice and clinical audit, and considering identified risk factors. As a guide:
    - An interprofessional team with appropriate experience and training in NLS proportionate to the expected risk should attend the birth.
    - Neonatal staffing levels should acknowledge the potential need to deliver unexpected support in the delivery room.
    - A process should be in place for rapidly mobilising extra team members with adequate resuscitation skills for any birth.

## Telemedicine

- Consider the use of collaboration through telemedicine, as it facilitates providing remote advice.

## Training and education

- Institutions or clinical areas where births may occur should provide sufficient opportunities and resources for healthcare professionals involved in neonatal resuscitation to receive regular training, maintaining up-to-date knowledge as well as technical and non-technical skills.
- The content and organisation of such training programmes may vary according to the needs of the providers and the local organisation.
- Undertake training at least once per year, to prevent skill decay, using standardised resuscitation training materials based on current national guidelines. Ideally, this should be supplemented with more frequent short-duration booster sessions (e.g. every 3-6 months).

## Equipment and environment

- Regularly check all equipment to ensure it is ready for use.
- Ensure that equipment is easily accessible and organised in a standardised way.
- Consider human factors and non-technical skills when organising equipment to maximise efficiency and minimise time delays.
- Resuscitation should occur on a well-illuminated, flat resuscitation surface that can support thermal care (see thermal control).

## Briefing and checklists

- Team briefing is important and should be performed before birth.
- The purpose of the briefing is to:
    - review available clinical information
    - assign roles and tasks
    - check equipment and presence of personnel
    - consider and plan an approach to cord management
    - prepare the family.
- Use a checklist and/or cognitive aid to facilitate all the above, reduce mental load, and enhance safety.

## Thermal control

- Maintain the temperature of newborn infants between 36.5°C and 37.5°C.
- Monitor the infant’s temperature regularly or continuously after birth.
- Record the admission temperature as a prognostic and quality indicator.
- Rewarm infants who are hypothermic after birth; avoid hyperthermia.
- In appropriate circumstances, therapeutic hypothermia may be considered after resuscitation (see post-resuscitation care).

## Environment

- Protect the infant from draughts. Ensure windows are closed and air conditioning is appropriately programmed.
- In infants > 28 weeks, keep the delivery area at 23-25°C.
- In infants ≤ 28 weeks, keep the delivery area at > 25°C.

## Newborn infants ≥ 32 weeks

- Dry the infant immediately after birth and remove wet towels.
- Cover the head with a hat, and the body with dry towels.
- Assess the baby with the umbilical cord intact, aim to provide ≥ 60 s delayed cord clamping.
- If no intervention is required, place the infant skin-to-skin with the mother if they desire, cover both with towels and remain vigilant for signs of airway obstruction.
- Ongoing careful observation of mother and infant is required, especially in more preterm and growth-restricted infants, to ensure they both remain normothermic.
- Consider the addition of a plastic bag/wrap alongside other measures if skin-to-skin care is not possible.
- Place the infant on a warm surface using a preheated warmer, if support of transition or resuscitation is required.

## Newborn infants < 32 weeks

- Dry the infant’s head and cover with a hat.
- Put the infant’s body in a plastic (polyethene) bag or wrap without drying.
- Assess the baby with the umbilical cord intact, aim to provide ≥ 60 s delayed cord clamping.
- Consider the use of additional measures during delayed cord clamping to ensure thermal stability (e.g. increasing room temperature, warm blankets, and a thermal mattress).

- Use a preheated heat source (e.g. radiant warmer).
- Be careful to prevent hypothermia during skin-to-skin care during assisted transition, especially in the more preterm and/or growth-restricted infants.
- Consider the use of heated humidified respiratory gases for infants receiving respiratory support.
- Be aware of the risk of hyperthermia when multiple heat-preservation interventions are used simultaneously, especially while using a thermal mattress in hospital.

## Management of the umbilical cord

### Cord clamping

- Ideally, delayed cord clamping is performed in all births, for ≥ 60 s and after inflation of the lungs.
- Discuss how to facilitate delayed cord clamping with parents and obstetricians/midwives before birth.
- Perform thermal management, stimulation and initial assessment during delayed cord clamping whilst ensuring an open airway.
- Newborn infants without need for support: facilitate at least 60 s of delayed cord clamping; longer may be beneficial.
- Newborn infants in need of resuscitation: minimise any delay to necessary interventions and, if necessary, clamp the cord < 30 s.
- If stabilisation with an intact cord can be safely undertaken, longer delayed cord clamping is preferred, especially in infants < 34 weeks.

### Cord milking

- Do not milk the cord in preterm infants < 28 weeks.
- Consider cord milking as an alternative in infants ≥ 28 weeks, but only if delayed cord clamping cannot be performed.

# Initial assessment

- Perform initial assessment as soon as possible after birth, ideally during delayed cord clamping, stimulating, drying and wrapping to:
    - Identify the need for support and/or resuscitation.
    - Call for help if required or anticipated.

    - Aid decisions relating to the appropriateness and duration of delayed cord clamping.
- Assess:
    - breathing
    - heart rate (HR)
    - muscle tone.
- Provide thermal management and simulation during delayed cord clamping and assessment.
- Reassess breathing and HR every 30 s to assess any response and determine if further interventions are required.

## Breathing

- Note the presence or absence of breathing.
- If present, note the rate, depth, symmetry, and work of breathing.

## Heart rate

- Initial HR assessment can be performed with a stethoscope.
- Continuous HR assessment methods (pulse oximetry, electrocardiography (ECG)) are preferred when interventions are indicated or during stabilisation of preterm newborns.

## Response to tactile stimulation

- Gently stimulate the newborn infant by drying and rubbing the soles of the feet or their back.
- Avoid more vigorous methods of stimulation, especially in preterm infants.

## Muscle tone and pallor

- A very floppy infant is likely to need breathing support.
- Hypotonia is common in preterm infants.
- Do not use skin colour to assess oxygenation.
- Interpret pallor within the clinical context and ethnicity, as it may have several causes such as hypoxia, acidosis, blood loss, or chronic anaemia.

# Actions according to initial assessment

- Based on the initial assessment, further actions can be implemented guided by the NLS algorithm.

## Airway

- Ensure the airway is open and the lungs are inflated. Until the airway is opened, other interventions will be unsuccessful.
- Following initial assessment, start respiratory support if the infant is not breathing regularly or the HR is < 100 $min^{-1}$.

## Position

- Place the newborn infant on their back with the head supported in a neutral position.
- Gently push the lower jaw forward with pressure from behind (jaw thrust) to open the airway.

### Two-person method

- Use the two-person method of airway support (jaw thrust) as soon as sufficient people are available, as this approach is more effective than a single-person jaw thrust.

### Single-person method

- May be necessary if there are insufficient people to complete a two-person manoeuvre.

## Lung Inflation after airway opening

- If apnoeic, gasping or not breathing effectively, start positive pressure ventilation (PPV) as soon as possible to inflate the lungs; ideally within 60 s.

- Apply an appropriately fitting face mask or nasal prongs connected to a device for providing positive pressure ventilation.
- Give 5 inflations with an inflation time of 2-3 s:
  - Infants ≥ 32 weeks: starting inflation pressure 30 cm $H_2O$.
  - Infants < 32 weeks: starting inflation pressure 25 cm $H_2O$.
- Use $O_2$ blenders (if available) during resuscitation/stabilisation in the birth area.
- Infants needing respiratory support:
  - ≥ 32 weeks start at 21% $O_2$.
  - < 32 weeks start at ≥ 30% $O_2$.
- In infants needing positive pressure ventilation, if possible, start with PEEP at 6 cm $H_2O$.

## Assessment

- During lung inflations: look for chest movement.
  - Visible chest movement during inflations indicates a patent airway and delivered volume.
  - Failure of the chest to move may indicate that the airway is not open, or that insufficient inflation pressure/volume is delivered.
- After lung inflations: check HR
  - An increase in HR within 30 s of positive pressure ventilation, or a stable HR > 100 $min^{-1}$, usually confirms adequate ventilation/oxygenation.
  - HR < 100 $min^{-1}$ or decreasing usually suggests continued hypoxia and almost always indicates inadequate ventilation, in which case chest movement will be poor.

## Has chest rise been seen after inflation breaths?

- **No**
  - Reapply face mask, repeat 5 inflation breaths and reassess.
  - If this does not work, use an alternative airway manoeuvre and reassess.
  - If alternative airway manoeuvres are unsuccessful, consider increasing inflation pressures and reassess.
- **Yes**
  - Proceed to ventilation breaths (30 $min^{-1}$) if the baby is not breathing.
- Ensure the airway is open and the lungs have been inflated before progressing further down the NLS algorithm.

## Alternative airway opening techniques

- If one airway opening technique is unsuccessful (e.g. no chest movement and no increase in heart rate), use another and assess the effect of each airway technique by observing chest movement and assessing HR.

## Airway adjuncts

- Use airway adjuncts if suitable equipment and personnel are available; if not, reapply face mask or nasal prong ventilation with a two-person manoeuvre if possible.

## Supraglottic airway

- Consider using an appropriate size supraglottic airway (SGA):
  - When face mask ventilation is ineffective.
  - When a more definitive airway is required as an alternative to tracheal intubation.
  - Where tracheal intubation is not possible or deemed unsafe because of a congenital abnormality, a lack of equipment, or a lack of skill.
  - When chest compressions are performed.

## Nasopharyngeal and Oropharyngeal airways

- Consider nasopharyngeal or oropharyngeal airways in specific clinical situations (e.g. micrognathia), especially when face mask ventilation may be difficult.
- Use oropharyngeal airways with caution in infants < 34 weeks. They might contribute to airway obstruction.

## Suction

- Do not routinely suction meconium or amniotic fluid from the airway because it delays initiating ventilation.
- Consider physical airway obstruction if lung inflation is unsuccessful despite alternative airway opening techniques.
- Only perform oropharyngeal suction under direct vision.
- Rarely, with no response to inflations and no chest wall movement, an infant may require tracheal suctioning to relieve an airway obstruction below the vocal cords.

### Tracheal tube

- If equipment and skills permit, consider tracheal tube placement:
  - When face mask or SGA ventilation are ineffective.
  - With prolonged ventilation.
  - When suctioning the lower airways (removal of presumed tracheal blockage).
  - When chest compressions are performed.
- When performing tracheal intubation:
  - Have a range of different-sized tubes available.
  - Use video laryngoscopy (VL) if available and skills allow.
  - Use a direct laryngoscope if VL is not available and skills allow.
  - Use exhaled $CO_2$ detection and clinical assessment to confirm tracheal intubation.
  - Be aware that exhaled $CO_2$ detection may be falsely negative in low or no cardiac output states at birth.
  - A respiratory function monitor may be used to monitor ventilation if equipment and skills are available.

### Following alternative airway opening techniques

- Repeat inflation breaths after every airway opening technique if chest rise has not been seen previously.
- Reassess chest movement and HR until visible chest movement **or** HR response.
- If used, check with a respiratory function monitor that expired tidal volume is within the target range (4-8 mL $kg^{-1}$).

## Breathing

- After successful inflation breaths, give ventilation breaths:
  - Use a face mask or nasal interface to ventilate the lungs when the newborn infant is not breathing effectively.
  - Give 15 ventilation breaths over 30 s using an inflation time of approximately 1 s.
  - Reassess breathing and HR after 30 s.

### Is there a HR response?

- Continue uninterrupted positive pressure ventilation until the infant begins to breathe adequately and the HR > 100 $min^{-1}$.
- Reassess breathing and HR every 30 s, until the newborn infant is stabilised.

- Consider inserting an SGA or tracheal tube if apnoea continues.

## If there is no HR response

- Call for help.
- Recheck equipment.
- If no chest rise, perform an alternate airway opening technique and consider increasing inflation pressures.
- Confirm effective ventilation during 30 s of ventilation breaths through observed chest movement or other measures of respiratory function.
- Re-assess HR and chest rise.
- If the HR remains < 60 $min^{-1}$ after 30 s of ventilation breaths start chest compressions.
- If used, check with a respiratory function monitor that expired tidal volume is within the target range (4 to 8 mL $kg^{-1}$), depending on gestational age.
- Without adequate lung inflation, chest compressions will be ineffective.

## Oxygen

- Consider pulse oximetry +/- ECG.
- Check $O_2$ and saturations every 30 s during resuscitation/stabilisation.
- Avoid $SpO_2$ < 80% and/or bradycardia at 5 minutes of age.
- Titrate inspired $O_2$ to achieve target $SpO_2$ between the 25th-75th centile.

| Time from birth | Acceptable right-hand oxygen saturations |
|---|---|
| 3 min | 70–75% |
| 5 min | 80–85% |
| 10 min | 85–95% |

## Ventilation devices

- Use an appropriately sized face mask or nasal interface.
- Ensure effective seal with minimal force.

- Where possible, use a T-piece resuscitator capable of providing either CPAP or positive pressure ventilation + PEEP when giving ventilatory support, especially in the preterm infant.
- A bag-valve mask should be available as backup:
  - Take care not to deliver excessive volumes.
  - Be aware that CPAP might not be effectively delivered even when a PEEP valve is used.

### Increasing inspiratory pressure

- If the airway is open but chest rise is poor, consider increasing inflation pressures by 2-5 cm $H_2O$ incrementally. It is rare to need an inspiratory pressure of > 40 cm $H_2O$.
- Reduce inflation pressure when chest movement is seen and there is clinical improvement.

### Continuous positive airway pressure (CPAP) and Positive end-expiratory pressure (PEEP)

- Use either a face mask or a nasal interface as the device-patient interface to deliver CPAP if spontaneously breathing or PEEP if not.
- Start with CPAP at 6 cm $H_2O$ as initial breathing support in:
  - Spontaneously breathing infants < 32 weeks with respiratory distress.
  - Spontaneously breathing infants ≥ 32 weeks with respiratory distress requiring supplemental $O_2$.
- In infants needing positive pressure ventilation, start with PEEP at 6 cm $H_2O$.

## Circulation

### Chest compressions

- Start chest compressions if the HR is < 60 $min^{-1}$ after at least 30 s of effective ventilation.
- When starting chest compressions:
  - Increase $O_2$ to 100%.
  - Call for experienced help if not already summoned.
  - Consider securing the airway and establish vascular access for drugs or intravascular volume.

- Use a 3:1 synchronised compression-to-ventilation ratio (C:V), aiming for 90 compressions and 30 ventilations (120 events) per min.
- Use the two-thumb, hands-encircling technique with overlapping or adjacent thumbs to deliver chest compressions.
- Compress to a depth of one-third of the anterior-posterior chest diameter.
- Allow full chest recoil between compressions.
- Reassess HR every 30 s.
- If HR remains < 60 $min^{-1}$, secure the airway with an SGA or tracheal tube (if competent and not already done) with minimal interruptions to ongoing chest compressions.
- After SGA placement or tracheal intubation, continue with the 3:1 C:V ratio.
- Titrate $O_2$ against the oxygen saturation once a reliable value is achieved.
- Discontinue chest compressions once the HR is > 60 $min^{-1}$; check for output (e.g. auscultation, pulse check, pulse oximetry, signs of life).

## Vascular access

### Umbilical Venous Access

- Use the umbilical vein as the preferred option for rapid emergency vascular access during resuscitation at birth.
- Perform emergency umbilical venous catheter (UVC) placement under clean rather than sterile conditions to ensure timely vascular access is secured.
- Consider the use of an emergency umbilical venous catheter for a few days after birth, as it may still be achievable.

### Intraosseous Access

- Use intraosseous (IO) access as an alternative method of emergency vascular access for drugs/fluids if UVC access is not possible.
- Consider device-specific weight limitations for IO-related equipment.
- Ensure there is no extravasation when administering drugs/fluids.
- Do not aspirate from IO; even when correctly positioned, it is often not possible.

### Drugs

- Resuscitation drugs may be considered where, despite adequate control of the airway, effective ventilation, and chest compression for at least 30 s, HR

remains < 60 $min^{-1}$ and is not increasing.

**Adrenaline**

- UVC is the preferred route; IO is an alternative.
  - Give 20 mcg $kg^{-1}$ (0.2 mL $kg^{-1}$ of 1:10,000 adrenaline [0.1 mg $mL^{-1}$]).
  - Give subsequent doses every 4 min if HR remains < 60 $min^{-1}$.
- If no UVC or IO access but intubated:
  - Give intra-tracheal adrenaline at dose of 100 mcg $kg^{-1}$ (1 mL $kg^{-1}$ of 1:10,000 adrenaline [0.1 mg $mL^{-1}$]).
  - If HR remains < 60 $min^{-1}$, as soon as UVC or IO access is obtained, immediately give a dose via this route, irrespective of when the intra-tracheal dose was given.

**Glucose**

- If possible, check the blood glucose value during resuscitation.
- Give glucose 200 mg $kg^{-1}$ (2 mL $kg^{-1}$ of 10% glucose) if blood glucose is low (a commonly used threshold is 2.6 mmol $kg^{-1}$).

**Intravascular volume replacement**

- Give 10 mL $kg^{-1}$ of group O Rh-negative blood or isotonic crystalloid solution if suspected blood loss or in a newborn infant unresponsive to other resuscitative measures.

**Bicarbonate**

- Bicarbonate is no longer recommended in resuscitation but may be considered as part of post-resuscitation care according to local protocols and practice.

## In the absence of an adequate response

- Consider other factors which may impact the response to resuscitation, and may require addressing, such as the presence of pneumothorax, hypovolaemia, congenital abnormalities, and equipment failure.

# Post-resuscitation care

- Once effective ventilation and circulation are established, a thorough reassessment should be undertaken and any issues addressed. This approach can also be used to maintain situational awareness as further resources arrive.
- Thermal care remains a priority for active monitoring and intervention.
- The family should be supported throughout the resuscitation and post-resuscitation processes.
- The infant should be cared for in or transferred to an environment in which close monitoring and anticipatory care can be provided.

## Glucose management

- Measure blood glucose values early and regularly until they have stabilised in the normal range; especially in newborns resuscitated at birth, those at risk of hypoxic-ischaemic encephalopathy (HIE), and/or receiving intravenous glucose.
- Avoid hypoglycaemia, hyperglycaemia, and large swings in blood glucose.

## Thermal care

- Monitor the infant’s temperature frequently or continuously after resuscitation.
- Maintain temperature between 36.5°C and 37.5°C and rewarm if the temperature is below this.

## Therapeutic Hypothermia

- Consider inducing therapeutic hypothermia (33-34°C) after completion of resuscitation and detailed assessment of an eligible term infant with clinical, biochemical, and (if available) neurophysiological evidence of HIE.
- Use appropriate eligibility criteria and strictly defined protocols to guide the cooling process; inappropriate application of therapeutic hypothermia may be harmful.
- Arrange safe transfer to an appropriately equipped facility where monitoring and treatment can be continued.

- Monitor (rectal) temperature during transport and, if available, apply active cooling with a servo-controlled device while transferring the infant.

### Oxygenation and ventilation

- Consider monitoring pre- and post-ductal oxygen saturations to identify pulmonary hypertension.
- Avoid hypoxia and hyperoxia.
- Avoid inadvertent hypocapnia during mechanical ventilation.

### Documentation and prognostication

- Keep an accurate time-based record of the infant's clinical state, interventions and responses during resuscitation to facilitate retrospective review.
- Record time-based heart rate and breathing assessments.
- Record APGAR scores, including individual score components.
- Document all conversations with the parents.

### Clinical team debriefing

Use performance-focused, interdisciplinary/interprofessional team debriefings following resuscitation or other non-routine situations to optimise individual and team performance as well as systems issues (e.g., emergency supplies, equipment).

## Communication with the parents

### Where intervention is anticipated

- The decision to attempt resuscitation of an extremely preterm or clinically complex infant should be taken in close consultation with the parents and senior clinicians, e.g. paediatricians, midwives, and obstetricians.

- Discuss the options, including the potential need and magnitude of resuscitation and the likely prognosis before birth, so that an individualised management plan can be agreed.
- Ensure concise and factual documentation of discussions is recorded in the mother's notes before birth and in the infant's notes after birth.

### For every birth

- If parents want and resources allow, enable parents to be present during the stabilisation or resuscitation.
- Consider the views of the resuscitation team, parents and circumstances.
- Parental position or actions must not impede resuscitation.
- Ensure that parents are fully informed about the progress of the care provided to their infant.
- Identify a member of healthcare staff to support parents and be aware that witnessing the resuscitation of their infant will be distressing for them.
- Encourage parents to hold or touch their infant as soon as possible after resuscitation; this should be facilitated, especially when the resuscitation was unsuccessful.
- Provide an explanation of any procedures and why they were required.
- Facilitate further discussions later to enable parents to reflect and to aid their understanding of events.
- Provide additional support for parents following resuscitation at birth.

## Out-of-hospital Birth and Newborn Life Support

### Planned home births

- For planned homebirths, parents should receive documented, personalised care planning in the antenatal period. This should include:
  - Information about what the midwives will do if unexpected complications occur.
  - Information about what resuscitation can be provided compared to other birth settings.
  - Arrangements for conveyance to hospital if required.
  - Information that response times and transfer times are unpredictable and cannot be accurately stated ahead of time.
- Ideally, two trained midwives should be present at all home births.

- All midwives attending homebirths should have appropriate training in initiating Newborn Life Support.
- Have a minimum set of equipment of an appropriate size for the newborn infant available.
- Midwives attending home births should know how to call for help from emergency services should an unexpected situation arise.

## Unexpected births outside the hospital

- Ideally, at least two double-crewed ambulances should be dispatched to all imminent births and babies born before arrival (BBA).
- Dispatch of team leaders, scene managers and enhanced or critical care resources should be considered if available.
- Pre-hospital clinicians should have access to a minimum set of equipment for newborns of all gestations to support thermal care and oxygenation.
- Pre-hospital clinicians should be prepared and trained to manage births out of hospital.

## Out-of-hospital management (specific additional considerations)

### Thermal control:

- Infants born unexpectedly outside the hospital environment are at higher risk of hypothermia and subsequent poorer outcomes.
- Thermal control measures should be used early and proactively, regardless of the perceived environmental temperature. These measures include thermal mattresses, blankets (warmed if possible), hats, foil blankets and bubble wrap.

### Airway:

- Use a two-person technique as soon as there are enough resources on the scene.
- Supraglottic airways should also be considered early if minimal resources are on scene, to ensure optimal ventilation. They should also be considered to facilitate extrication and conveyance when ongoing resuscitation is required.

## Breathing:

- Titrating oxygen is not possible with a self-inflating bag.  Resuscitate in air, unless chest compressions are required, then use 100% oxygen.
- For babies < 32 weeks gestation, where possible, connect the self-inflating bag to oxygen from the start.

## Circulation:

- Two-thumb, hand-encircling technique should be used where possible, but in some situations, including extrication, it may be more practical to use the two-finger technique.
- Intraosseous access is the first line for vascular access in an out-of-hospital setting, unless clinicians on scene have the necessary skills and equipment for umbilical venous access. IO access may be impractical in babies < 32 weeks.

## Telemedicine:

- Where remote clinical advice lines are available, consider their use to support decision-making.

## Post-resuscitation care:

- A thorough T(ABCDE)F assessment should be undertaken and any issues addressed. This approach can also be used to maintain situational awareness as further resources arrive.
    - Thermal care (T) remains a priority for active monitoring and intervention.
    - The Family (F) should be supported throughout the resuscitation and post-resuscitation processes.
- Temperature control measures should be adjusted to maintain the temperature between 36.5-37.5°C; measure the temperature of the baby regularly.
- Therapeutic hypothermia should not be started in an out-of-hospital setting.
- Any baby that has received resuscitation should be conveyed to hospital.
    - Thermal care of the baby should be maintained during conveyance.
    - National guidance around safe mother and baby transfer should be followed; this may involve a separate ambulance.

# Withholding or discontinuing resuscitation in hospital

- When discontinuing, withdrawing or withholding resuscitation, care should be focused on the comfort and dignity of the infant and family and should ideally involve senior paediatric/neonatal staff.

## Withholding resuscitation

- Decisions to withhold life-sustaining treatment should be made in advance of birth, together with parents, in the light of national evidence on outcomes if resuscitation and active (survival-focused) treatment is attempted.
- In situations where there is extremely high (e.g. > 90%) predicted neonatal mortality and unacceptably high morbidity in surviving infants, attempted resuscitation and active (survival-focused) management are usually not appropriate.
- Resuscitation is nearly always indicated in conditions associated with lower (e.g. < 50%) neonatal mortality and what is deemed to be acceptable morbidity. This will include most infants with congenital malformations and most infants > 24 weeks or above in high-resource settings with access to neonatal intensive care.
- In situations where there is high mortality (e.g. > 50%) and/or a high rate of morbidity, and where the anticipated burden of medical treatment for the child is high, parental wishes regarding resuscitation are usually supported. It may be appropriate to provide full resuscitation, to provide some measures (but withhold other interventions) or to provide comfort-focused care.
- **In babies < 25 weeks,** it may be appropriate to agree on the extent of resuscitation as the prognosis is much better for a baby that responds to thermal care, airway and breathing support, compared to needing this plus chest compressions and adrenaline.
- Provision of antenatal palliative care support can be beneficial to parents in the face of certain or uncertain poor outcomes.
- Resuscitation should usually be commenced in situations where there is uncertainty about the outcome and there has been no chance to have prior discussions with parents.

## Discontinuing resuscitation

- If the HR remains absent despite resuscitation, review clinical factors, e.g. relevant antenatal history, presence/absence of dysmorphic features, gestation of the infant, duration and effectiveness of resuscitation, and the views of other members of the clinical team about continuing resuscitation.
- If the HR of a newborn infant remains absent for more than 20 min after birth despite the provision of all recommended steps and exclusion of reversible causes, consider stopping resuscitation.
- For preterm infants (particularly extremely preterm), it may be appropriate to discontinue resuscitation earlier than 20 min. The decision should be individualised.
- Where there is partial or incomplete HR improvement despite apparently adequate resuscitative efforts, the choice is much less clear. It may be appropriate to take the infant to the intensive care unit and later consider withdrawing life-sustaining treatment.
- Where life-sustaining treatment is withheld or withdrawn, infants should be provided with appropriate palliative (comfort-focused) care.

## Additional out-of-hospital considerations when withholding or discontinuing resuscitation

- In most UK out-of-hospital settings, clinicians would not be expected to discontinue resuscitation.
- Enhanced or critical care resources may offer more advanced resuscitation interventions or, where appropriate, help to make resuscitation decisions either remotely or on scene.
- If a baby is born showing signs that they died in advance of birth (such as established maceration or rigor mortis), it is reasonable not to start or continue resuscitation.
- National guidelines relating to survival-focused care/comfort care should be followed.
- As with babies born in hospital, if gestation is unknown and the baby shows signs of life, or if asked by the parents to do so when at a gestation > 22 weeks and < 24 weeks, survival-focused care may be started.

Downloads

Newborn life support algorithm 2025 63.51 KB

Out-of-hospital newborn life support algorithm 2025 45.29 KB
Advanced resuscitation of the newborn infant algorithm 2025 39.94 KB
Minimum equipment for newborn resuscitation and the support of transition of infants at birth in the pre-hospital setting 207.19 KB