

RESUSCITATION • 1/6

- Check equipment daily, and before resuscitation
- Follow Resuscitation Council UK Guidelines <https://www.resus.org.uk/library/2021-resuscitation-guidelines/newborn-resuscitation-and-support-transition-infants-birth>
- Ensure delivery room is warm (23–25°C), windows closed and fans switched off
- [Delivery room should be >25°C for babies ≤28 weeks gestation](#)

CORD CLAMPING

- Uncompromised term and preterm [babies](#): delay cord clamping (DCC) for ≥1 min from complete delivery of baby
- [Stripping \(milking\) of the cord can be performed in babies ≥28 weeks' gestation if DCC not feasible](#)
- If immediate resuscitation required, clamp cord as soon as possible

DRY AND COVER

- ≥32 weeks' gestation: dry baby, **remove wet towels** and cover baby with **warm, dry towels**
- <32 weeks' gestation: do not dry body but place baby in plastic bag/[sterile suit \(Neohelp™ bag\)](#) feet first, and tuck in sides at the neck to fully enclose baby's torso. Dry head only and put on hat
- Aim to maintain body temperature 36.5–37.5°C (unless decision taken to start therapeutic hypothermia)
- Preterm ≤32 weeks' gestation may require additional interventions to maintain target temperature:
 - [warmed humidified respiratory gases](#)
 - [thermal mattress alone](#)
 - [increased room temperature \(to 25°C\) plus plastic wrapping of head and body, plus thermal mattress](#)

ASSESS

- Assess **colour, tone, breathing and heart rate**

If baby very floppy and heart rate slow, assist breathing immediately

- Reassess heart rate, breathing and chest movement every 30 sec throughout resuscitation process
- If help required, request **immediately**

CHECK AIRWAY

For baby to breathe effectively, airway must be open

- To open airway, place baby supine with head in '**neutral position**'
- If very floppy, give chin support or jaw thrust while maintaining the neutral position

IMMEDIATE TREATMENT

Airway

- Keep head in neutral position
- Use T-piece and soft round face mask, [extending from nasal bridge to chin](#)
- Give 5 inflation breaths, sustaining inflation pressure (**Table 1**) for 2–3 sec for each breath
- Give [peak end expiratory pressure](#) (PEEP) of 5 cm H₂O
- Inflation breaths:
 - term: start in air
 - preterm
 - [≥32 weeks: start in air](#)
 - [28–31 weeks: use low oxygen concentration \(21–30%\)](#)
 - [preterm <28 weeks: use 30%](#)
- Look for chest movement

Table 1: Inflation pressure (avoid using pressure higher than recommended)

Term baby	30 cm H ₂ O
Preterm baby	25 cm H ₂ O

No chest movement

Ask yourself:

- Is head in neutral position?

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- Is a jaw thrust required?
- Do you need a second person to help with airway to perform 2-handed jaw thrust?
- Is there an obstruction and do you need to look with a laryngoscope and suck with a large-bore device?
- Consider intubation to secure airway **if skilled, or placing a laryngeal mask airway (LMA) or i-gel under direct vision using laryngoscope in babies ≥34 weeks/>2 kg**
- i-gels have been used in babies down to 1.5 kg
- Insertion of oropharyngeal airway or naso-pharyngeal airway if unable to secure airway by other means
- Is inflation time long enough?
- if no chest movement occurs after alternative airway procedures above have been tried (volume given is a function of time and pressure), a larger volume can be delivered if necessary by inflating for a longer time (3–4 sec) **or gradually by increasing the peak inspiratory pressure (PIP)**
- Attach saturation monitor to right hand – see **Saturation monitoring** for guidance on SpO₂ targets

Endotracheal intubation

- Nasal **continuous positive airway pressure** (CPAP) rather than routine intubation may be used to provide initial respiratory support of all spontaneously breathing preterm **babies** with respiratory distress

Indications

- Severe hypoxia (e.g. terminal apnoea or fresh stillbirth)
- **Stabilisation of airway**
- Congenital diaphragmatic hernia [see **Congenital diaphragmatic hernia (CDH)** guideline]
- to be electively intubated by most experienced person present
- **never** give mask ventilation

**Safe insertion of endotracheal tube (ETT) requires skill and experience
If you cannot insert an ETT within 30 sec, revert to mask ventilation
Capnography can help to assess ETT placement (see Intubation guideline)**

Breathing

- Most babies have a good heart rate after birth and establish breathing by 90 sec
- if not breathing adequately give **5 inflation breaths**, preferably using air at pressures in **Table 1**
- Heart rate should rapidly increase as oxygenated blood reaches heart

Do not move onto ventilation breaths unless you have a heart rate response OR you have seen chest movement

Review assessment after inflation breaths

- Is there a rise in heart rate?
- Is there chest movement with the breaths you are giving?
- If no spontaneous breathing, provided the heart rate has increased and chest movement has been obtained, perform 30 sec of **ventilation breaths**, given at a rate of 30 breaths/min (1 sec inspiration)
- Increase inspired oxygen concentration to 100%

Table 2: Outcome after 30 sec of ventilation breaths

Heart rate	Breathing	Action
Increases	Not started breathing	<ul style="list-style-type: none"> • Provide 30 breaths/min • Where available, use PEEP at 5 cm H₂O with T-piece system
<60 bpm	Obvious chest movement	<ul style="list-style-type: none"> • Start chest compressions (see Chest compression) • Increase inspired oxygen concentration to 100%

Chest compression

- Use if heart rate approximately <60 bpm (do not try to count heart rate accurately as this will waste time)

Start chest compression only after successful inflation of lungs

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Figure 1

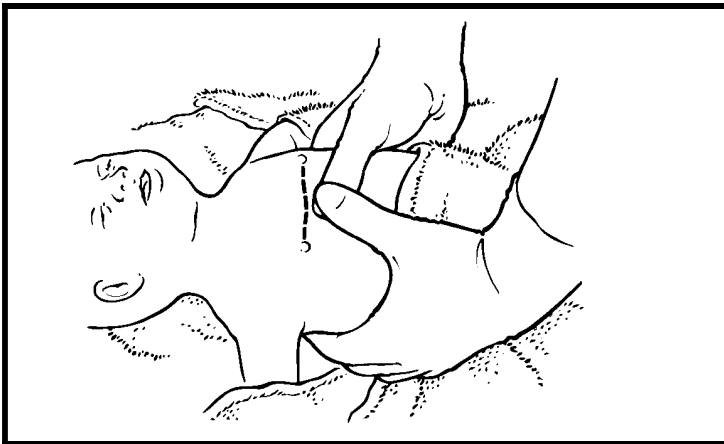
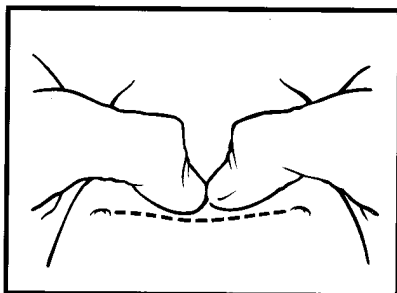
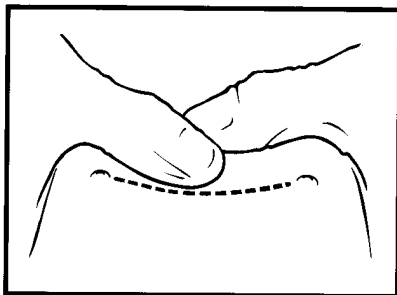


Figure 2



Pictures taken from NLS manual and Resuscitation Council (UK) and reproduced with their permission

Ideal hold (Figure 1/Figure 2)

- Circle chest with both hands so that thumbs can press on the sternum just below an imaginary line joining the nipples with fingers over baby's spine

Alternative hold (less effective)

- Compress lower sternum with fingers while supporting baby's back. The alternative hand position for cardiac compressions can be used when access to the umbilicus for umbilicus venous catheterisation is required, as hands around the chest may be awkward

Action

- Compress chest quickly and firmly to reduce the antero-posterior diameter of the chest by about one-third, followed by full re-expansion to allow ventricles to refill
- remember to relax grip on the chest during IPPV, and feel for chest movement during ventilation breaths, as it is easy to lose neutral position when cardiac compressions are started

**Co-ordinate compression and ventilation to avoid competition.
Aim for 3:1 ratio of compressions to ventilations
and 90 compressions and 30 breaths (120 'events') per min**

Resuscitation drugs

- Always ask about drugs taken recently by, or given to mother

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- Give drugs only if there is an undetectable or slow heartbeat despite effective lung inflation and effective chest compression
- Umbilical venous catheter (UVC) is the preferred route for urgent venous access
- Intraosseous (IO) access can be an alternative method of emergency access for drugs/fluids
- **Recommence cardiac compressions and ventilation breaths ratio 3:1 after each drug administration and re-assess after 30 sec**
- If no heart rate increase, progress onto next drug

Adrenaline 1:10,000

- 0.2 mL/kg (20 microgram/kg) 1:10,000 IV, **repeated every 3–5 min**
- Administration via ETT, use only when IV access not available; dose is 1 mL/kg (100 microgram/kg) 1:10,000

Sodium bicarbonate 4.2%

- 1–2 mmol/kg (2–4 mL/kg) IV (never give via ETT)

Glucose 10%

- 2.5 mL/kg IV slowly over 5 min

Sodium chloride 0.9%

- 10 mL/kg IV

Blood

- If there is evidence of fetal haemorrhage and hypovolaemia, consider giving O negative emergency blood

Naloxone

- Give only after ventilation by mask or ETT has been established with chest movement seen and heart beat >100 bpm
- If mother has been given pethidine within 2–4 hr of delivery, give naloxone IM:
 - 100 microgram (0.25 mL) for small preterm babies
 - 200 microgram (0.5 mL) for all other babies

WHEN TO STOP

- If no sign of life after 20 min, **outlook is poor with few survivors, majority will have cerebral palsy and learning difficulties**

Continue resuscitation until a senior member of staff advises stopping

ONGOING MANAGEMENT

Saturation monitoring

- Oxygen monitoring is activated when paediatrician/2nd pair of hands arrives. In the meantime, the person initiating resuscitation carries out all the usual steps in resuscitation
- Do not stop resuscitation for a saturation probe to be attached
- Attach saturation probe to the right hand and connect to the monitor once 5 inflation breaths have been given
- SpO₂ should spontaneously improve as **Table 3**

Table 3

Time (min)	Acceptable productal SpO ₂ (%)
2	65
5	85
10	90

Heart rate monitoring

- Best by listening with stethoscope
- Pulse oximetry
- ECG monitoring, if available, can give rapid accurate and continuous heart rate reading. However it does not indicate the presence of a cardiac output and should not be the sole means of monitoring

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Air to oxygen

- Titrate the oxygen to saturation levels once SpO₂ trace has been obtained
- If chest compressions required following chest movement with inflation breaths, increase oxygen to 100%
- If SpO₂ above levels in **Table 3** or >95% at 10 min of life, reduce oxygen

Meconium deliveries

- Do not attempt to suction nose and mouth whilst head is on perineum
- In non-vigorous babies born through meconium, immediate laryngoscopy with/without suction after delivery not recommended
- Only intubate if suspected tracheal obstruction, routine intubation is not necessary

Preterm deliveries

- Nasal CPAP rather than routine intubation may be used to provide initial respiratory support of all spontaneously breathing preterm babies with respiratory distress. Give PEEP at 5 cm H₂O via mask ventilation with oxygen supplementation as appropriate on the resuscitaire and continue PEEP support during transfer to NICU
- If respiratory effort is poor at any point, or baby's condition deteriorates, intubate and ventilate

DOCUMENTATION

- Make accurate written record of facts (not opinions) as soon as possible after the event
- This should be recorded on the **BadgerNet** system. In babies where resuscitation has been unsuccessful, a new baby episode of 'labour ward death' should be created and resuscitation documentation completed
- **Record:**
 - when you were called, by whom and why
 - condition of baby on arrival
 - what you did and when you did it
 - timing and detail of any response by baby – time of first HR, first HR >100, first gasp if any, and when spontaneous breathing resumed
 - date and time of writing your entry

COMMUNICATION

- Inform parents what has happened (the facts)

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Newborn life support algorithm

Preterm <32 weeks

- Place undried in plastic wrap + radiant heat
- Inspired oxygen
- 28–31 weeks: 21–30%
- <28 weeks: 30%
- If giving inflations, start with 25 cm H₂O

Acceptable preductal SpO₂

2 min	65%
5 min	85%
10 min	90%

(Antenatal counselling)
Team briefing and equipment check

Birth
Delay cord clamping if possible

Start clock or note time
Dry/wrap, stimulate, keep warm

Assess
Colour, tone, breathing, heart rate

Ensure an open airway
Pre-term: consider CPAP

If gasping/not breathing
Give 5 inflations (**30 cm H₂O – start in air**)
Apply PEEP 5–6 cm H₂O, if possible
Apply SpO₂ +/- ECG

Reassess
If no increase in heart rate, look for chest movement during inflation

If chest not moving
Check **mask, head and jaw** position
2-person **support**
Consider **suction, laryngeal mask/tracheal tube**
Repeat inflation breaths
Consider increasing inflation pressure

Reassess
If no increase in heart rate look for chest movement

Once chest moving continue ventilation breaths

If heart rate not detectable or <60/min after 30 sec of ventilation
Synchronise 3 chest compressions to 1 ventilation
Increase oxygen to 100%
Consider intubation if not already done or laryngeal mask if not possible

Reassess heart rate and chest movement every 30 sec

If heart rate remains not detectable or <60 bpm
Vascular access and drugs
Consider other factors e.g. pneumothorax, hypovolaemia, congenital abnormality

Update parents and debrief team

APPROX 60 SEC

MAINTAIN TEMPERATURE

AT ALL TIMES ASK " IS HELP NEEDED"

Titrate oxygen
To achieve target saturations

