

Newborn Definition

- A newborn includes from the first few minutes of life to hours post birth. AV accepts the first 24 hours to allow for completion of the lung and cardiovascular transition (this may still take longer than 96 hours)

Preterm Infant (24 – < 37 weeks gestation)

- Gestational age has an effect on the development of lung and pulmonary circulation and therefore influences how well these newborns establish effective respiration
- The primary focus in pre-hospital management is establishing and maintaining effective ventilation and preventing hypothermia
- Newborns of <34 weeks gestation require transport to a Level 2 Hospital (paediatrician and midwife staff on site 24/7)

Transport

- Where available, MICA assistance should be sought early when pre-term birth is considered a possibility.
- Exeditious transport to the nearest most appropriate hospital should occur without delay

Emergency Contacts

**NETS / PERS 1300 137 650 for birth and up to 7 kg weight
For all advice and assistance in newborn care and management
Contact any time (or via clinician)**

The Newborn Baby: Normal Values

CPG N0101

Weight:

- Average full term weight = 3.5 kg

Normal Blood Volume:

- 80 ml/kg

Heart Rate:

- 120 – 160 per minute
- HR is the most important indicator for resuscitation

Respiration:

- 40 – 60 per minute

Skin:

- Colour – usually dusky and peripherally cyanosed.
- It may take 7 to 10 minutes post birth for SpO₂ to reach > 90 % and for colour to become pink.

Conscious State:

- Active motion, grimace and/or crying

Temperature:

- Aim for normothermia (36.5 – 37.2 °C per axilla)
- Newborn infants lose heat via the large surface area of the head and by evaporation from their wet body once outside the uterus.

BGL:

- 2.6 – 3.2 mmol/L

Body Temperature:

- Maintain normothermia (per axilla temperature of 36.5 – 37.2°C). Place the newborn naked, skin to skin with the mother to maintain warmth and cover them both with warm blankets.
- If resuscitation is required, place the newborn on a warm, flat surface, cover with bubble wrap and warm wraps. Place a woollen hat on the newborn's head to maintain warmth.
- Preterm newborns < 28 weeks should be placed immediately (without drying body) into a polyethylene (Glad™ zip lock) bag with the head (dried) outside and then placed against the mother and covered with warm blankets.

Cutting the cord:

- Cutting the cord in the vigorous newborn is not urgent. Apply general care and cut cord when the cord stops pulsating.
- The cord must be cut in the non vigorous newborn earlier to allow effective resuscitation. This would be usually after initial basic tactile efforts and commencement of IPPV

Position:

- Place head and neck in a neutral position avoiding neck flexion and head extension.

Suctioning:

- The vigorous newborn does not require suctioning unless born through meconium stained amniotic fluid and is showing signs of respiratory difficulty i.e. intercostal retraction. They usually clear their own airway very effectively.
- Newborns who are not vigorous at birth (not breathing and poor muscle tone) only require airway suctioning if born through meconium stained liquor.
- The mouth should be suctioned followed by the nose. The newborn is a nasal breather and may gasp pharyngeal fluid if the nose is cleared first.
- Intubation and suction of their trachea (if a person with the expertise to intubate is present) should follow where necessary in management of the non vigorous newborn.
- Pharyngeal suctioning can cause laryngospasm and bradycardia through vagal stimulation, thus suctioning must be gentle and brief (5 – 6 seconds) to avoid compromising the newborn further.
- A 10 or 12 FG catheter is the usual size for suctioning the newborn



Newborn Resuscitation: Advanced Airway

CPG N0201

Oropharyngeal Airway:

- size 00, 0
- Only use for airway obstruction or airway abnormality.
- Not recommended for routine use in newborns with a normal airway as it can cause obstruction and vagal reactions

Laryngoscope Blade:

- Straight Miller blade. Size 1 for term. Size 00 pre-term

LMA:

- Portex size 1 for baby > 1500g
- Indicated for failed BVM and failed intubation.

End Tidal CO₂:

- An end tidal CO₂ detector (Pedi- Cap™) is recommended to verify successful tracheal intubation in the newborn.
- Paediatric EtCO₂ is to be continuously monitored via the paediatric MRx attachment where available.

	ETT size mm	Lip Length (wt in kg + 6 cm)	ETT suction catheter	Nasogastric Tube
<1 kg or < 28/40 'small'	2.5	6–7 cm	6 FG	6 FG
1 – 3 kg or 28 – 36/40 'medium'	3	8–9 cm	6 FG	6 FG
> 3 kg or > 36/40 'large'	3.5	9–10 cm	6 FG	6 FG

Ventilation:

- The majority of newborns needing resuscitation at birth are apnoeic and bradycardic but rarely asystolic. Hypoxia eventually depresses respiratory drive and causes bradycardia. Effective ventilation is the key to newborn resuscitation. Pulmonary pressure changes are integral in effecting necessary foetal circulation changes.
- Prompt improvement in HR > 100 per minute (assessed using a stethoscope over the apex of the heart) is the primary indicator of adequate ventilation.
- Increased pressure may be required for initial breaths.

Ventilation Rate:

- 40 – 60 per minute

Tidal Volume:

- 5 -10 ml / kg initially with room air
- If HR remains < 100 per minute after 30 seconds, supply high concentration oxygen
- Ventilator Bag:
- Use a ~250 ml newborn self inflating bag

PEEP:

- Where available use 5 cm PEEP valve attached to BVM during IPPV
- PEEP is important in improving lung volume and establishing and maintaining FRC

Chest Compressions

- Chest compressions are rarely required unless the heart rate is below 60 beats per minute despite effective ventilation for at least 30 seconds.
- The first minute of resuscitation should not compromise airway techniques and ventilation where the HR < 100 per minute.
- If after one minute the HR remains < 60 per minute, compressions should be commenced.

CPR:

- 3 : 1 compression : ventilation ratio
- Achieve 90 compressions and 30 breaths per minute with 0.5 second pause in ventilation. There is no pause post intubation

Heart Rate:

- Reassess heart rate each 30 seconds until HR > 60 per minute where compressions may be ceased.
- Continue IPPV/APPV until HR >100 per minute

Cardiac Monitor:

- Attaching electrodes for routine cardiac monitoring to pre-term babies may result in skin trauma due to its soft and fragile nature. ECG electrode attachment should be saved for the emergency resuscitation circumstance.
- It is most unlikely the patient will be in VF or pulseless VT. If these rhythms are observed, defibrillate as for other age children using 4 J/kg at 2 minute intervals as required.

Pulse Oximeter:

- Where available, attach newborn oxygen saturation probe to right hand to allow continuous evaluation of heart rate and SpO₂. This negates need to stop chest compressions to evaluate heart rate.

Compression Method:

Hand Encircling 2 thumb method



Alternative 2 finger method



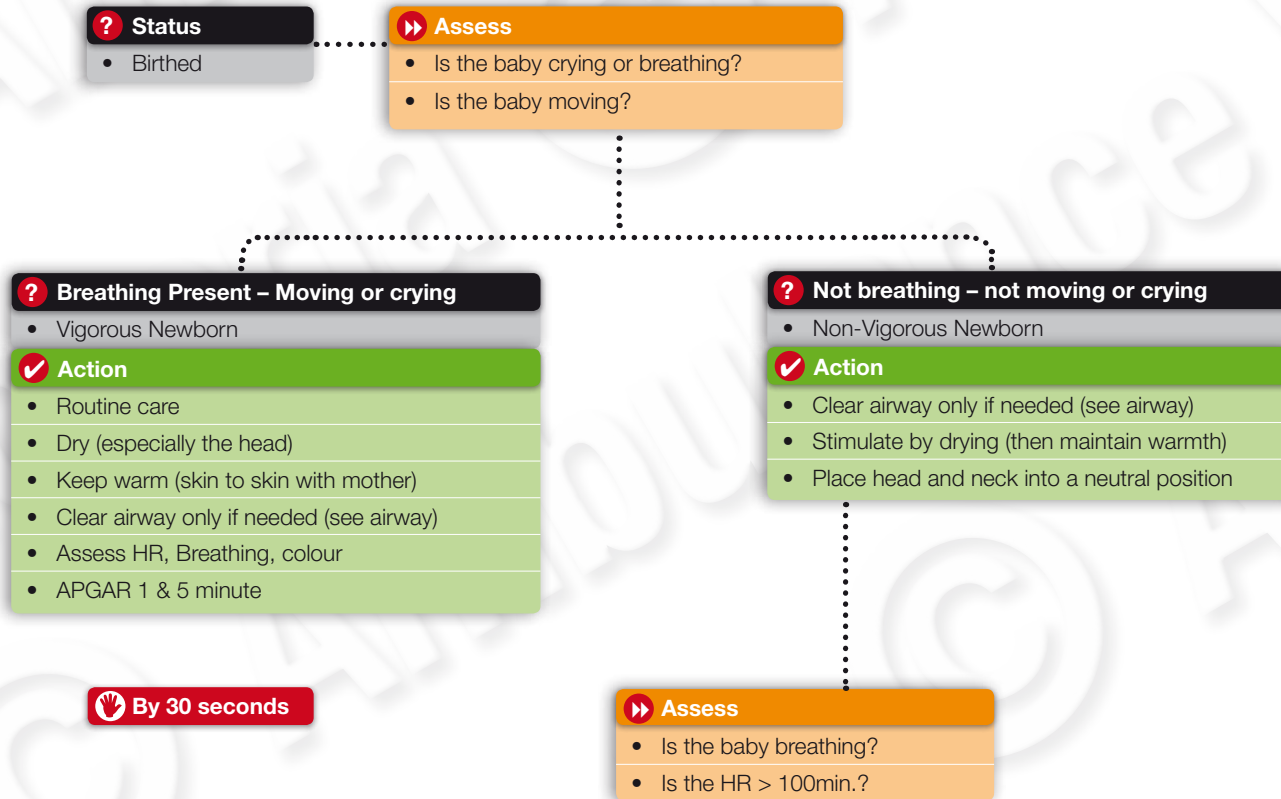
- The 2 thumb method is preferred in the 2 rescuer setting
- The 2 finger alternative preferred in single rescuer situations to minimise transition time

Compression Depth:

- 1/3 depth of chest diameter

Newborn Resuscitation

CPG N0201



? HR > 100 and breathing adequately

✓ Action

- Routine care
- If centrally cyanotic after 7 – 10 min. post birth
 - Commence O₂ @ 2 L/min via nasal cannula until pink

? HR < 100 and/or inadequate breathing

✓ Action

- IPPV in room air @ **40 – 60 min.** until HR > 100 and breathing adequately
- Re-assess after 30 seconds IPPV

By 60 seconds

Assess

- Evaluate HR and respiration

? HR 60 - 100 and inadequate breathing

✓ Action

- Continue **IPPV @ 40 – 60 min.** until HR > 100 and breathing adequately. Add supplemental **high concentration oxygen**
- Continue to re-assess after 30 seconds IPPV

? HR < 60 and inadequate breathing

✓ Action

- Continue **IPPV @ 40 – 60 min.** until HR > 100 and breathing adequately. Add supplemental **high concentration oxygen**
- Commence chest **compressions @ 3:1**
- Continue to re-assess after 30 seconds IPPV

By 90 seconds

Assess

- Evaluate HR and respiration

? HR > 100 and breathing adequately

✓ Action

- Manage as per HR > 100 and breathing adequately as above

? HR < 60

✓ Action

- Manage as **Newborn Advanced Resuscitation N0202**
- Continue to reassess @ 30 second intervals

Newborn Advanced Resuscitation

CPG N0202

? **Asystole or severe bradycardia persists**

✓ **Action**

- Continue CPR if pulseless or HR < 60 per minute
- Reassess every 30 seconds

⋮

? **Asystole or severe bradycardia persists**

✓ **Action**

- **IV / IO Adrenaline 10mcg/kg** repeated @ **3 min.** intervals

⋮

? **Asystole or severe bradycardia persists**

✓ **Action**

- Intubate
- If unable to obtain above venous access
 - **Adrenaline 100 mcg/kg ETT**

⋮

? **Asystole or severe bradycardia persists**

✓ **Action**

- **Normal Saline 0.9% 10 – 20 ml/kg IV or IO**
 - Repeat if necessary

⋮

? **If pulse returns**

✓ **Action**

- At early opportunity, assess BGL
- If BGL < 2.6 mmol/L, consult with NETS for administration of **10% Dextrose or Glucagon**

Newborn Advanced Resuscitation

CPG N0202

Adrenaline 1:10,000:

- 10 mcg / kg IV or IO (100 mcg / kg via ETT)
- Do not use 1:1000 unless diluted to 10ml

Normal saline:

- 10 - 20 ml / kg IV or IO. Repeat if necessary.

If BGL < 2.6 mmol:

- consult with NETS for drug and dose administration advice for management using **Dextrose 10%** or **Glucagon**

Sodium Bicarbonate:

- Not indicated / should not be administered

Atropine:

- Not indicated / should not be administered

Naloxone:

- Not indicated / should not be administered even in the setting of suspected narcotic overdose. It can lead to acute withdrawal and seizures in the newborn

Sedation:

- Not usually required to maintain ETT. Consult NETS for further advice if necessary

Newborn Baby: APGAR scoring system

CPG N0301

APGAR scores should not be used as a guide for resuscitation. The time intervals used for resuscitation are contained elsewhere within this guideline

The APGAR score should be conducted 1 min. after delivery and repeated at 5 minutes after delivery. Continue to score APGAR every 5 minutes until the score is 7 or greater.

A score of:

- 7 – 10** Satisfactory
- 4 – 6** Moderate depression and may need ongoing respiratory support (IPPV)
- 0 – 3** Newborn requiring ongoing resuscitation (including ETT and drug therapy)

	0 points	1 points	2 points
Appearance	Blue, pale	Body pink, extremities blue	Totally Pink
Pulse	Absent	< 100	> 100
Grimace	None	Grimaces	Cries
Activity	Limp	Flexion of extremities	Active motion
Respiratory effort	Absent	Slow and weak	Good strong cry