

# ANZCOR Guideline 13.3 – Assessment of the Newborn Infant

## Guideline

Evaluating the need to initiate and continue resuscitation should begin immediately after birth and proceed throughout the resuscitation.

The initial assessment should address:

- tone
- breathing
- heart rate.

Subsequent assessment throughout the resuscitation is based on the infant's heart rate, breathing, tone and oxygenation, (which is preferably assessed using pulse oximetry). A prompt increase in heart rate remains the most sensitive indicator of resuscitation efficacy (extrapolated evidence).<sup>1</sup>

Evaluation and intervention are simultaneous processes, especially when more than one resuscitator is present. However, for clarity, this process is described as a sequence of distinct steps shown in the algorithm.

## 1 Tone and Response to Stimulation

The assessment of tone is subjective and dependent on gestation, but an infant with good tone (moving the limbs and with a flexed posture) is unlikely to be severely compromised whereas an infant who is very floppy and not moving is very likely to need active resuscitation.

Most newborn infants will commence movement of all extremities, start breathing and their heart rates will rise to over 100 beats/minute soon after birth. They do not require any assistance and should not be separated unnecessarily from their mothers.

If these responses are absent or weak, brisk but gentle drying with a soft warmed towel should be used to stimulate the infant to breathe [Class A, expert consensus opinion]. The wet towel should then be replaced with a warm, dry one to prevent inadvertent heat loss. Note that for preterm or very low birth weight infants who are placed in/under a polyethylene bag/sheet to prevent evaporative heat loss (see Guideline 13.8), only the infant's head needs drying. Drying the body and limbs beforehand is unnecessary and potentially counterproductive, but tactile stimulation can be provided through the bag or sheet, if needed. In non-vigorous, meconium-exposed infants if a decision to intubate and suction meconium from the trachea has been made, the intubation should be done immediately and stimulation should be withheld until suction is completed (see Guideline 13.4) [Class B, expert consensus opinion].

**Slapping, shaking, spanking, or holding the newborn upside down are potentially dangerous and should not be used. During all handling, care should be taken to ensure that the infant's head and neck are supported in a neutral position, especially if muscle tone is low** [Class A, expert consensus opinion].

If the infant does not breathe, assisted ventilation should be started (see Guideline 13.4) [Class A, expert consensus opinion].

## 2 Breathing

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The newborn infant initial should establish regular breaths sufficient to maintain the heart rate more than 100 per minute within 1-2 minutes after birth. Breathing may be difficult to assess well in the first minute or two after birth.<sup>2</sup> Of term and near term infants 85% start breathing within 30 seconds of birth and 95% within 45 seconds.<sup>3</sup> If the infant has good tone and can maintain a heart rate >100/min, immediate intervention may not be required, apart from ensuring that the head is in or near the midline and in a neutral position to maintain airway patency. If the tone is low and the heart rate is not maintained >100/min, if the baby is not breathing positive pressure ventilation is required, while CPAP can be used in the baby who has begun regular respiratory effort [Class A, expert consensus opinion].

Recession, retraction or indrawing of the lower ribs and sternum, or onset of persistent expiratory grunting are important signs that the baby is having difficulty expanding the lungs. If they persist, the infant will benefit from continuous positive airway pressure (CPAP) or positive pressure ventilation [Class B, expert consensus opinion].

Persistent apnoea, particularly associated with hypotonia (floppiness), and a heart rate <100/min is a serious sign and the infant urgently requires positive pressure ventilation.

## 3 Heart Rate

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Heart rate can be determined by listening to the heart with a stethoscope (more reliable than cord palpation) or in the first few minutes after birth, by feeling for pulsations at the base of the umbilical cord [Class A, expert consensus opinion]. The base of the umbilical cord is preferable to other palpation locations, but if a pulse is not felt at the base of the cord this is not a reliable sign that the heart rate is absent. Other central and peripheral pulses are difficult to feel in newborn infants making the absence of these pulses an unreliable sign.<sup>4,6</sup> Pulse oximetry can provide a continuous display of the heart rate within about a half a minute of application<sup>7,8</sup>, and electrocardiography (ECG) even more quickly. Prompt use of pulse oximetry is recommended in any baby needing resuscitation because it can also give information about oxygenation. (Class A, expert consensus opinion)

ANZCOR suggests that ECG monitoring can also be used to more rapidly and accurately display heart rate in the first 3 minutes of life (CoSTR 2015, weak recommendation; very low quality of evidence).<sup>9</sup> Therefore it has the potential to reduce inappropriate interventions that might be implemented based on falsely low estimates of heart rates as assessed by pulse oximetry or auscultation. However there is as yet no evidence whether outcomes are improved by early initiation of ECG monitoring.<sup>9</sup>

Normal newborn infants have a heart rate soon after birth of about 130/min, varying between 110 and 160/min.<sup>10</sup> Heart rate should be consistently more than 100/min within two minutes of birth in an uncompromised newborn infant.<sup>10</sup> An increasing or decreasing heart rate is the best sign that the infant's condition is improving or deteriorating [extrapolated evidence<sup>11</sup>].

If the heart rate is persistently less than 100/min, CPAP or assisted ventilation should be commenced.

## 4 Colour

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Colour is difficult to assess accurately and is a poor means of judging oxygenation.<sup>12</sup> Normal babies are blue at birth but start to look pink soon after the onset of breathing. Cyanosis can be difficult to recognise and is determined by examining the gums and mucous membranes in good ambient light. Bluish hands and feet are a normal finding after birth. If a baby appears persistently blue, it is important to check oxygenation with a pulse oximeter [Class A, expert consensus opinion].

Extreme pallor, especially if it persists after ventilation, can indicate severe acidosis, hypotension due to poor cardiac output with or without hypovolaemia, or sometimes, severe anaemia.

## 5 Pulse Oximetry

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For babies requiring resuscitation and/or respiratory support, pulse oximetry is recommended<sup>11</sup> both to monitor heart rate and to assess oxygenation. The device should be switched on and the sensor should be placed on the infant's right hand or wrist before connecting the sensor to the cable instrument [Class A, LOE IV <sup>8,13</sup>]. Heart rate monitored using an oximeter should be checked intermittently during resuscitation by ECG or auscultation. [Class B, expert consensus opinion].<sup>11</sup>

Modern pulse oximeters, with probes designed specifically for newborns can provide readings of heart rate in less than a minute of application and saturations by 90 seconds, as long as there is sufficient cardiac output and peripheral blood flow for the oximeter to detect a pulse.<sup>2,7,8</sup> Oximetry is recommended when the need for resuscitation is anticipated, when CPAP or positive pressure ventilation is used, when persistent cyanosis is suspected, or when supplemental oxygen is used [Class A, expert consensus opinion]. In babies resuscitated using supplemental oxygen, oximetry can play an important role in avoiding hyperoxaemia.

## References

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