Guideline 13.3 – Assessment of the Newborn

Summary

ANZCOR Guidelines 13.1 to 13.10 and the Newborn Life Support algorithm are provided to assist in the resuscitation of newborn infants. Differences from the adult and paediatric guidelines reflect differences in the anatomy and physiology and the causes of cardiorespiratory arrest for newborns, older infants, children and adults. These guidelines draw from Neonatal Life Support 2020 and 2015 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations (CoSTR) [1, 2] the development of which included representation from ANZCOR. The 2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Care [3] and local practices have also been taken into account.

To whom do these guidelines apply?

The term 'newborn' or 'newborn infant' refers to the infant in the first minutes to hours following birth. In contrast, the neonatal period is defined as the first 28 days of life. Infancy includes the neonatal period and extends through the first 12 months of life.

ANZCOR Guidelines 13.1 to 13.10 and the Newborn Life Support algorithm are mainly for the care of newborns. The exact age at which paediatric techniques and in particular, compression-ventilation ratios, should replace the techniques recommended for newborns is unknown, especially in the case of very small preterm infants. For term infants beyond the first minutes to hours following birth, and particularly in those with known or suspected cardiac aetiology of their arrest, paediatric techniques may be used (refer to Paediatric Advanced Life Support ANZCOR Guidelines 12.1 to 12.7).

Who is the audience for these guidelines?

ANZCOR Guidelines 13.1 to 13.10 and the Newborn Life Support algorithm are for health professionals and those who provide healthcare in environments where equipment and drugs are available (such as a hospital). When parents are taught CPR for their infants who are being discharged from birth hospitals, the information in Basic Life Support Guidelines (ANZCOR

Guidelines 2 to 8) is appropriate.

Recommendations

The Australian and New Zealand Committee on Resuscitation (ANZCOR) makes the following recommendations:

1. 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 and heart rate. Subsequent assessment throughout the resuscitation is based on the newborn's heart rate, breathing, tone and oxygenation, (which is preferably assessed using pulse oximetry). [Good Practice Statements] A prompt increase in heart rate remains the most sensitive indicator of resuscitation efficacy. [Extrapolated evidence]
2. Most newborns will commence movement of all extremities, start breathing and their heart rates will rise to over 100 beats per 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 newborn to breathe. The wet towel should then be replaced with a warm, dry one to prevent inadvertent heat loss. For preterm or very low birth weight infants who are placed in/under a polyethylene bag/sheet to prevent evaporative heat loss (refer to ANZCOR Guideline 13.8), only the newborn'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. [Good Practice Statements]
3. 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 newborn's head and neck are supported in a neutral position, especially if muscle tone is low. [Good Practice Statements]
4. If the newborn has good tone and can maintain a heart rate >100 beats per 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 at >100 beats per min or if the newborn is not breathing, positive pressure ventilation is required. [Good Practice Statement]
5. ANZCOR suggests that continuous positive airway pressure (CPAP) can be used in the newborn who has begun regular respiratory effort but has recession, retraction or indrawing of the lower ribs and sternum, or onset of persistent expiratory grunting. [Weak recommendation, moderate certainly of evidence]
6. Persistent apnoea, particularly associated with hypotonia (floppiness), and a heart rate <100 beats per min is a serious sign and the newborn urgently requires positive pressure ventilation. [Good Practice Statement]
7. Prompt use of pulse oximetry should be implemented when the need for resuscitation is anticipated, when persistent cyanosis is suspected, when CPAP, positive pressure ventilation or supplemental oxygen is used, because it can give information about both heart rate and oxygenation. The device should be switched on and the sensor should be placed on the newborns right hand or wrist before connecting the sensor to the cable instrument. Heart

rate monitored using an oximeter should be checked intermittently during resuscitation by ECG or auscultation. [Good Practice Statements]

8. 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 certainty of evidence]

Abbreviations

Abbreviation	Meaning/Phrase
ANZCOR	Australian and New Zealand Committee on Resuscitation
CoSTR	International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations
CPR	Cardiopulmonary resuscitation
CPAP	Continuous positive airway pressure
ECG	Electrocardiography

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 newborn's heart rate, breathing, tone and oxygenation, (which is preferably assessed using pulse oximetry). [Good Practice Statements] A prompt increase in heart rate remains the most sensitive indicator of resuscitation efficacy. [4] [Extrapolated evidence]

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.

1.0 | Tone and Response to Stimulation

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

Most newborns will commence movement of all extremities, start breathing and their heart rates will rise to over 100 beats per minute soon after birth. They do not require any assistance and should not be separated unnecessarily from their mothers. [Good Practice Statement]

If these responses are absent or weak, brisk but gentle drying with a soft warmed towel should be used to stimulate the newborn to breathe. [Good Practice Statement] The wet towel should then be replaced with a warm, dry one to prevent inadvertent heat loss. For preterm or very low birth weight infants who are placed in/under a polyethylene bag/sheet to prevent evaporative heat loss, only the newborn's head needs drying if not covered with plastic (refer to ANZCOR Guideline 13.8). Drying the body and limbs beforehand is unnecessary and potentially counterproductive, but tactile stimulation can be provided through the bag or sheet, if needed. [Good Practice Statements] For infants born under meconium-stained amniotic fluid, (refer to ANZCOR Guideline 13.4).

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 newborn's head and neck are supported in a neutral position, especially if muscle tone is low. [Good Practice Statements]

If the newborn does not breathe, assisted ventilation should be started (refer to ANZCOR Guideline 13.4).

2.0 | Breathing

The newborn should establish regular breaths sufficient to maintain the heart rate more than 100 beats per minute within 2 minutes after birth. Breathing may be difficult to assess well in the first minute or two after birth.[5] 85% of term and near term newborn infants start breathing within 30 seconds of birth and 95% within 45 seconds of birth.[6] If the newborn 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 at >100 beats per min or if the newborn is not breathing, positive pressure ventilation is required. ANZCOR suggests that continuous positive airway pressure (CPAP) can be used in the newborn who has begun regular respiratory effort. [1, 2] [Weak recommendation, moderate certainty of evidence]

Recession, retraction or indrawing of the lower ribs and sternum, or onset of persistent expiratory grunting are important signs that the newborn is having difficulty expanding the lungs. If they persist, the newborn may benefit from CPAP rather than positive pressure ventilation. [7, 8]

Persistent apnoea, particularly associated with hypotonia (floppiness), and a heart rate <100 beats per min is a serious sign and the newborn urgently requires positive pressure ventilation. [Good

Practice Statement]

3.0 | Heart Rate

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 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 newborns making the absence of these pulses an unreliable sign.[9-11] Pulse oximetry can provide a continuous display of the heart rate within about a half a minute of application [12, 13], and electrocardiography (ECG) even more quickly. Prompt use of pulse oximetry should be used in any newborn needing resuscitation because it can also give information about oxygenation. [Good Practice Statement]

ANZCOR suggests that ECG monitoring can also be used to more rapidly and accurately display heart rate in the first 3 minutes of life.[2] [CoSTR 2015, weak recommendation; very low certainty of evidence] 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. [1, 2]

Heart rate should be consistently more than 100 beats per min within two minutes of birth in an uncompromised newborn.[5] An increasing or decreasing heart rate is the best sign that the newborn's condition is improving or deteriorating. [2] [Extrapolated evidence] If the heart rate is persistently less than 100 beats per min, CPAP or assisted ventilation should be commenced.

4.0 | Colour

Colour is difficult to assess accurately and is a poor means of judging oxygenation.[14] Normal newborns 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 newborn appears persistently blue, it is important to check oxygenation with a pulse oximeter. [Good Practice Statement]

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.

5.0 | Pulse Oximetry

For newborns requiring resuscitation and/or respiratory support, pulse oximetry is recommended both to monitor heart rate and to assess oxygenation. [2] The device should be switched on and the sensor should be placed on the newborns right hand or wrist before connecting the sensor to the cable instrument. [13, 15] Heart rate monitored using an oximeter should be checked intermittently during resuscitation by ECG or auscultation. [2] [Good Practice Statement]

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.[5, 12, 13] 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. [Good Practice Statement] In newborns resuscitated using supplemental oxygen, oximetry can play an important role in avoiding hyperoxaemia.

References

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About this Guideline

Search date/s	ILCOR literature search details and dates are available on the CoSTR page of the ILCOR website (https://costr.ilcor.org) and the relevant CoSTR documents. [1, 2]
Questions/PICOs:	Are described in the CoSTR documents (https://costr.ilcor.org)
Method:	Mixed methods including ARC NHMRC methodology before 2017 and ILCOR GRADE methodology described in ILCOR publications since 2017.
Main changes:	Updating of review evidence, references, and terminology to increase consistency with GRADE terminology.
Principal reviewers:	Helen Liley, Lindsay Mildenhall, Marta Thio, Callum Gately
Approved:	April 2021

Referencing this guideline

When citing the ANZCOR Guidelines we recommend:

ANZCOR, 2026, Guideline 13.3 – Assessment of the Newborn , accessed 29 September 2026, https://www.anzcor.org/home/neonatal-resuscitation/guideline-13-3-assessment-of-the-newborn