



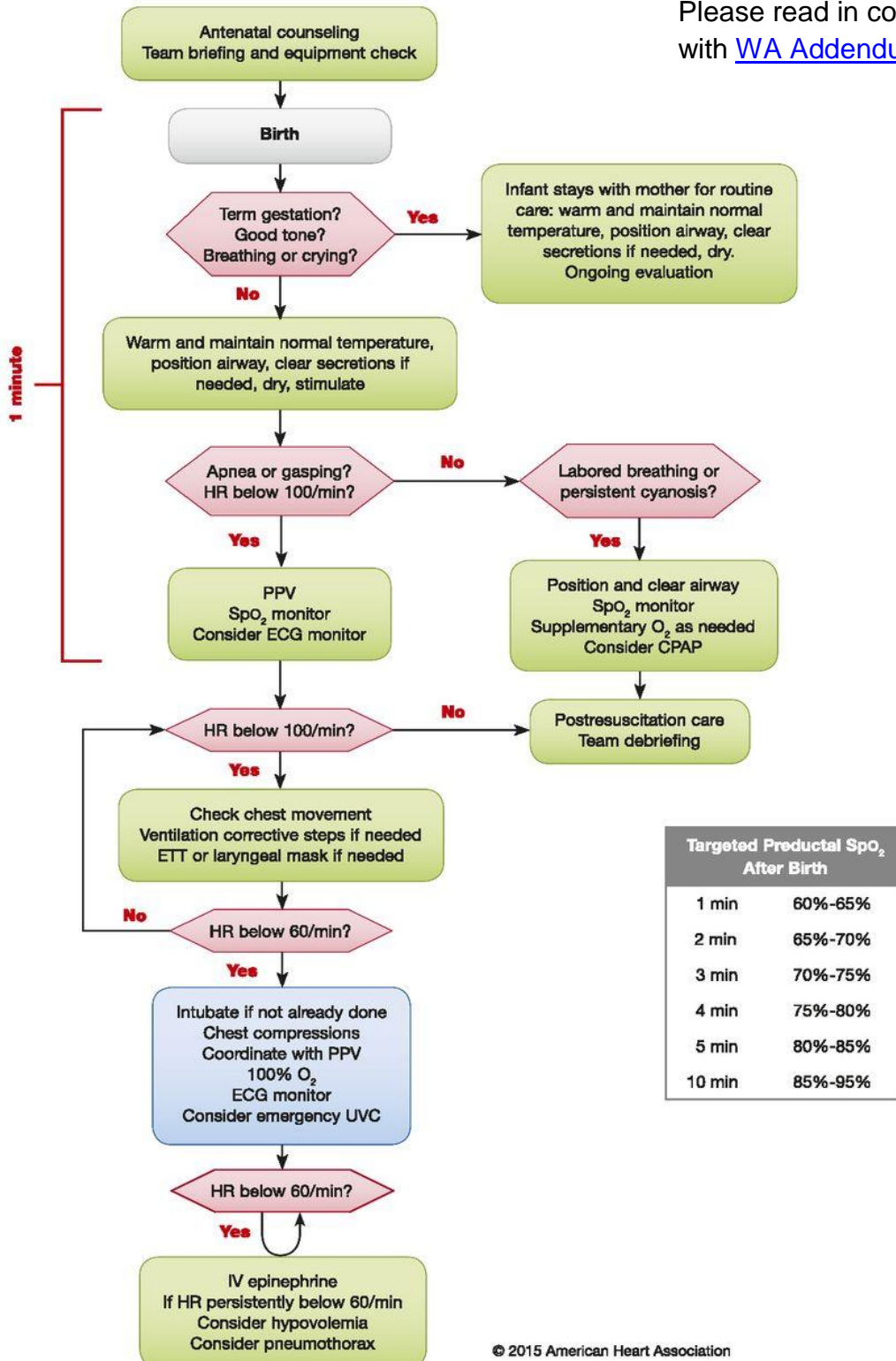
Clinical Practice Guideline
Guideline coverage includes NICU KEMH, NICU PMH and NETS WA

Resuscitation Algorithm for the Newborn

This document should be read in conjunction with the [Disclaimer](#)

Neonatal Resuscitation Algorithm—2015 Update

Please read in conjunction with [WA Addendum](#)




References

1. Wyckoff, M. H., et al. (2015). "Part 13: Neonatal Resuscitation: 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care (Reprint)." *Pediatrics* **136 Suppl 2**: S196-218.

Related WNHS policies, procedures and guidelines

Neonatology Clinical Guidelines - [Resuscitation: Neonatal](#)
[Resuscitation: Medications and Fluids](#)
[Resuscitation: Who attends the Birth?](#)

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Neonatal Resuscitation Textbook

6th edition (Updated for 2015 ILCOR)

Addendum for WA

Neonatal Resuscitation Program (NRP) courses taught in WA follow very closely the accompanying textbook provided. There are, however, a few specific issues where local teaching varies – these are listed below and an explanation for variations is given in the following pages.

1. Timing of resuscitation. The initial steps should be completed within 60 seconds of birth. Other steps should be completed before proceeding through the algorithm. The 30 second recommendation has been withdrawn from the current 2015 ILCOR guidelines.
2. The Flow inflating (anaesthetic bags) are generally not available in WA. Resuscitation is with either a T-piece resuscitator or neonatal self-inflating bag. The recommended initial standard settings for the T-piece resuscitator are.

Near Term (>33 completed weeks) infants -	30 / 5 mmHg
Prem infants <2 Kg <34/40	25 / 5 mmHg

Max pressure valve - 45-50 mmHg

Remember that these pressures may need adjustment to provide adequate ventilation. Always ensure adequate chest movement. Premature infants can have the stiffest lungs but remember to back off again on pressures once the lungs are moving well.

3. Suctioning meconium on the perineum.
We currently recommend suctioning on the perineum when this does not interfere with the progress of delivery. We also suggest that if personnel are sufficiently skilled that tracheal aspiration continues to be practiced providing it does not interfere with other resuscitative efforts. Where this skill is not available T-piece ventilation should commence.
4. Adrenaline.
The following schedule for adrenaline administration should replace that given in the textbook.

WA Protocol

Route

ETT or UVC

Dose

1ml of 1:10,000 per dose for >33 completed weeks infants

0.5ml of 1:10,000 per dose <2 Kg <34/40

5. Administration of N. Saline
The textbook suggests that boluses of N. Saline should be given slowly over 5 – 10 minutes. In an acute resuscitation setting we believe this is too slow and would recommend an initial 10 ml/KG be given rapidly (1– 2 minutes). If a second bolus is given this can be administered more slowly – over 5 minutes. The UVC is the preferred route.
6. Oxygen concentration.
This is still an area of hot debate and to a large extent predetermined by the equipment available. Where a blender is available we recommend starting in 30%

oxygen. This concentration should be increased if the infant is not responding. 100% oxygen is unlikely to be beneficial.

7. ECG monitoring.

Where practical ECG monitoring of heart rate during a resuscitation should be used to determine heart rate and hence the initiation of chest compressions.

8. Cardiac compressions

We recommend that there is at least 60 seconds of well-coordinated chest compression and ventilation before pausing briefly to check the heart rate.

The rationale for changes:

1. Resuscitation timing.

Although the 30 second epochs were introduced to try and push resuscitators more rapidly through the algorithm, in practice they introduced a greater focus on timings than on technique. These timings have been withdrawn from the current guidelines.

2. Resuscitation equipment.

Although the anaesthetic bag is a very useful ventilation instrument it is not as easy to use and in incompetent hands is capable of delivering very high pressures. The T piece settings are a guide only and will require adjusting during the resuscitation process. Remember the whole object of ventilation is to obtain gas exchange by moving the chest. If there is insufficient chest excursion the pressure should be increased, if the chest excursion is excessive pressure should be reduced. The 2015 ILCOR recommendations fail to clearly recommend PEEP in the delivery room as the quality of RCT evidence to support its use is of very low quality. From all physiological principles and PEEP underpins neonatal ventilation we therefore recommend a T piece ventilation device over a self-inflating bag.

3. Suctioning meconium on the perineum.

The textbook is silent on this subject however a paper by Wiswell and others describing a large series of meconium associated deliveries in South America concluded that there was no advantage obtained from suctioning meconium on the perineum. This study has led some to abandon the practice. We have chosen to interpret this information a little differently and maintain that suctioning of meconium from the oropharynx before delivery could potentially prevent post natal meconium aspiration. This is similar to the collapsed adult patient presenting with an oropharynx full of vomit; the initial response is to clear the airway. We, however, agree that suctioning on the perineum should not be a goal in its own right and should not interfere with the normal course of delivery – don't delay delivery so you can apply suction.

The 2015 guidelines also question the merit of tracheal suctioning in the non-vigorous infant again because of lack of good quality RCT evidence for effectiveness. First principles would support tracheal toilette where possible when this can be performed without delaying resuscitation. Tracheal toilette should therefore only be performed by experienced staff who are confident of a rapid intubation and suctioning at delivery.

4. Adrenaline.

The ILCOR dosage schedule for adrenaline has always seemed unnecessarily complicated. In an acute situation it is confusing to be presented with a range of 0.1 to 0.3 ml/Kg for an infant whose weight is unknown. We have chosen to simplify this to 1ml for a term infant and 0.5ml for a preterm (≤ 34 weeks or < 2 Kg).

Later iterations of the International Liaison Committee for Resuscitation (ILCOR)

have further complicated adrenaline administration by suggesting that ET administration may be less effective and that a higher dose may be required by this route. This is a theoretical interpretation based on plasma levels in animal studies and is somewhat countered by the clinical impression that many babies improve following the administration of a standard dose via the ET tube. We have again opted for simplicity and recommend 1ml (0.5ml for preterm) as the standard dose for all routes. We do however teach that if the first dose is given via the ET tube subsequent doses, if required, should preferably be given via the umbilical vein. The giving of adrenaline via the ET tube should therefore be considered as an indication for placement of a UVC in case subsequent doses are required.

5. Administration of N. Saline.

We recommend slightly more liberal use of volume in resuscitation than currently advocated in the NRP. Any baby not responding to an initial dose of adrenaline should be considered functionally hypovolaemic. An umbilical venous catheter (UVC) should be placed and a bolus of N. Saline given. The NRP further recommends that such a bolus should be given slowly. We advocate that the initial bolus be given rapidly (1 to 2 minutes). In practice infants often do not respond to adrenaline until a bolus of N. Saline is given. Where the need for a UVC can be anticipated the equipment should be prepared and primed prior to delivery.

6. Oxygen concentration.

There is growing international work suggesting that infants can be adequately resuscitated in room air. There is also increasing evidence that 100% oxygen is harmful both from the destructive effects of oxygen radicals and from the mechanical effects of absorption atelectasis. At KEMH we have opted to commence resuscitation in 30% oxygen. This can be increased if required. We also advocate the early use of pulse oximetry and recommend that this should determine oxygen requirements.

The 2015 ILCOR statements again advocate the use of 100% oxygen if cardiac massage is required but recognise there is no evidence to support this. The guidelines also mention a failure to escalate oxygen a common problem in resuscitation; this would strengthen our current starting point of 30% rather than room air.

7. ECG monitoring.

There is a growing body of work demonstrating the greater accuracy of ECG monitoring in determining heart rate with the suggestion that unnecessary cardiac compressions may be avoided. Although the 2015 ILCOR guidelines fail to recommend this due to a lack of RCT evidence of a change in outcome we feel that where practical this a reasonable approach. In practice this can only occur when a full resuscitation is anticipated and monitoring equipment made available.

8. Cardiac compressions

Studies have shown that return to spontaneous cardiac activity is dependent on sustained perfusion of the coronary arteries by an adequate diastolic blood pressure. Diastolic blood pressure builds slowly over a period of sustained cardiac compressions and then falls very rapidly once they cease. 30 second epochs are too short to achieve an adequate rise in diastolic BP.

We recommend that there is at least 60 seconds of well-coordinated chest compression and ventilation before a brief pause to check the heart rate, always being aware of changes in clinical condition. The use of an oximeter (placed in a pre-ductal position) will assist in determination of the heart rate without interruption of

compressions. The 2015 ILCOR guidelines remain silent on this matter though recognise there is considerable work in progress. They also recommend we stay with a 3:1 compression to breath ratio as there is no good evidence to change.

References.

Perlman, J.M., et al., Part 7: Neonatal Resuscitation: 2015 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations (Reprint). *Pediatrics*, 2015

Wyckoff, M.H., et al., Part 13: Neonatal Resuscitation: 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care (Reprint). *Pediatrics*, 2015.

Vain NE, Szyld E, Prudent LM, Wiswell TE, Aguilar AM, Vivas NI. Oropharyngeal and nasopharyngeal suctioning of meconium-stained neonates before delivery of their shoulders: multicentre randomised controlled trial *Lancet*. 2004; 364:597 - 602.