

Revised: March 2007

Addendum to the 2006 NRP Provider Textbook

## Recommendations for specific treatment modifications in the Canadian context

An ad hoc scientific subcommittee of the Canadian NRP Steering Committee was struck to review the changes in the new NRP 2006 textbook in a Canadian context, using the 2005 International Liaison Committee on Resuscitation (ILCOR) guidelines and worksheets as the primary documents. The scientific subcommittee had representation from the Fetus and Newborn Committee of the Canadian Paediatric Society (CPS), the Section of Perinatal Neonatal Medicine of the CPS, the Canadian NRP (Neonatal Resuscitation Program) Steering Committee, and invited scientific experts.

The scientific subcommittee's tasks were to:

- a) Review the ILCOR neonatal worksheets and guidelines. Review the American Academy of Pediatrics (AAP) NRP 2006 manual.
- b) Assess and determine if any of the content in the AAP NRP 2006 manual might be interpreted or adapted differently given the Canadian neonatal community and the content of the ILCOR documents.
- c) Recommend specific modifications to be communicated to NRP instructors and parent institutions as an addendum to the NRP textbook. These recommendations have been approved by the Canadian NRP Steering Committee and the Board of the Canadian Paediatric Society.

The scientific subcommittee met on February 26 and 27, 2006 in Ottawa Ontario, at the invitation of the Canadian Paediatric Society, and was chaired by Dr. Nalini Singhal.

### Scientific subcommittee:

Khalid Aziz, MD, Vice Chair, Canadian NRP Steering Committee  
Keith Barrington, MD, Chair, CPS Fetus & Newborn Committee  
Douglas McMillan, MD, Scientific expert  
Bruno Piedboeuf, MD, Scientific expert  
Nalini Singhal, MD, Chair, Canadian NRP Steering Committee  
Alfonso Solimano, President, Neonatal-Perinatal Medicine Section  
Robin Whyte, MD, CPS Fetus & Newborn Committee



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David Price, MD, CCFP,  
College of Family Physicians of  
Canada

Geneviève Piuze, MD, FRCPC,  
Quebec

Koravangattu Sankaran, MD,  
FRCPC, Saskatchewan

Avash Jeet Singh, MD, FRCPC,  
British Columbia

Dora Stinson, MD, FRCPC,  
Nova Scotia/PEI

### For more information on NRP in Canada or to order NRP materials:

Canadian Paediatric Society  
2305 St. Laurent Blvd  
Ottawa, Ontario K1G 4J8

Tel.: 613-526-9397  
Fax: 613-526-3332  
nrp@cps.ca  
www.cps.ca

*The recommendations in this document do not indicate an exclusive course of treatment or procedure to be followed. Variations, taking into account individual circumstances, may be appropriate.*

# Recommendations

These treatment recommendations reflect the ILCOR consensus as applied in the Canadian context<sup>1</sup>. They are limited to changes that narrow, broaden, or further clarify management options.

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## A. Temperature management in the preterm baby (Lesson 8)

ILCOR commentary: Very low birth weight (<1500g) preterm babies are likely to become hypothermic despite use of traditional techniques for decreasing heat loss. For this reason it is recommended that additional warming techniques be used, such as covering the baby in plastic (food-grade, heat-resistant plastic).

AAP NRP 2006 commentary: Increase the temperature of the delivery room, pre-heat radiant warmer; if the baby is less than 28 weeks gestation, consider placing him, below the neck, in a re-closable polyethylene bag, and transport in pre-warmed transport incubator.

### Recommendations for preterm delivery:

1. Maintain the delivery room temperature around 25 to 26° C to diminish heat loss.
2. If the baby is born at less than 28 weeks gestation place him below the neck in a re-closable polyethylene, food-grade bag.
3. All babies (term and preterm) who remain under a radiant warmer by 10 minutes of age should have a servo control probe placed to avoid hypo- and hyperthermia.

## B. Laryngeal Mask Airway (Lesson 5, Appendix)

Laryngeal mask airway (LMA) was discussed and there was agreement with the NRP 2006 textbook.

### Recommendations for LMA:

1. Canadian NRP Instructors should be taught how to use a LMA. The Canadian NRP Steering Committee to decide how LMA placement should be taught given the paucity of experience in the Canadian neonatal community.

## C. Therapeutic use of oxygen (Lessons 1 to 8)

ILCOR commentary: Meta-analysis of 4 human studies showed a reduction in mortality rate and no evidence of harm in infants resuscitated with air versus 100% oxygen. However, these results should be viewed with caution because of significant methodological problems. In addition, some studies permitted crossover to 100% oxygen at 90 seconds.

The ILCOR statement concludes that there is currently insufficient evidence to specify the concentration of oxygen to be used for initiation of resuscitation. After initial steps at birth, if respiratory efforts are absent or inadequate, lung inflation/ventilation should be the priority. Once adequate ventilation is established, if the heart rate remains low, there is no evidence to support or refute a change in the oxygen concentration that was initiated. Rather the priority should be to support cardiac output with chest compressions and coordinated ventilation. Supplementary oxygen should be considered for babies with persistent central cyanosis. Some have advocated adjusting the oxygen supply according to pulse oximetry measurements to avoid hyperoxia, but there is insufficient evidence to determine the appropriate oximetry goal. Excessive tissue oxygen may cause oxidant injury and should be avoided, especially in the premature infant.

AAP NRP 2006 commentary: If the baby is breathing but appears blue, administration of supplemental oxygen is indicated. This program (NRP) recommends that 100% supplemental oxygen should be used when positive pressure ventilation is required during resuscitation of term babies. Some clinicians will elect to start resuscitation using less than 100% oxygen, including some that will start with no supplemental oxygen (i.e. room air). The evidence suggests that these approaches are reasonable in most circumstances.

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<sup>1</sup> Circulation: 2005;112:1V-188-IV-195 American Heart Assoc.

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NRP currently recommends that resuscitation of extremely preterm babies should be accomplished ideally with the capability to administer less than 100% oxygen. Therefore, a compressed air source, oxygen blender and pulse oximeter are recommended for the delivery area of any facility that electively delivers babies at less than approximately 32 weeks gestation.

#### **Recommendations for therapeutic use of oxygen during and after resuscitation:**

1. Positive-pressure ventilation should be initiated with 21% oxygen (room air).
2. Supplemental oxygen should be used if the baby remains cyanotic or the heart rate is less than 100 bpm at 90 seconds of age.
3. Blended gases should be available in the delivery room and during transport to the NICU.
4. To avoid hyperoxemia pulse oximetry should be available in rooms designated for delivery of babies less than approximately 32 weeks gestation. Even though there is no clear definition of hyperoxia for the preterm infant, it seems reasonable to avoid saturations above 95% when supplemental oxygen is used.

#### **D. Exhaled CO<sub>2</sub> detector for confirming endotracheal tube placement (Lesson 5)**

ILCOR commentary: Exhaled CO<sub>2</sub> detection is useful to confirm endotracheal tube placement.

AAP NRP 2006 commentary: An increasing heart rate and exhaled CO<sub>2</sub> detection are the primary methods for confirming endotracheal tube placement.

#### **Recommendations for the routine use of exhaled CO<sub>2</sub> detection to confirm endotracheal tube placement:**

1. Every baby that is intubated (other than for suction of meconium) should have tracheal tube placement confirmed by an exhaled CO<sub>2</sub> detector. The exhaled CO<sub>2</sub> detector should be used as the primary method for confirming endotracheal tube placement.

#### **E. Use of Positive End Expiratory Pressure (PEEP) and/or Continuous Positive Airway Pressure (CPAP) during resuscitation (Lesson 3)**

Neither ILCOR nor AAP NRP 2006 has specific recommendations regarding use of PEEP or CPAP during resuscitation (although references are made to PEEP in the use of flow-inflating bags and T-piece devices). The scientific subcommittee felt that PEEP of 0 cm of water is potentially harmful, so some guidance is provided.

#### **Recommendations for the use of PEEP during and after resuscitation in ventilated infants:**

1. If ongoing positive pressure ventilation is required, PEEP of 3-6 cm of water should be used.
2. PEEP may be given with a flow-inflating bag or a T-piece resuscitator. A self-inflating bag with a PEEP valve is also an acceptable alternative.

#### **F. Use of a T-piece resuscitator for positive pressure ventilation (Lesson 3)**

#### **The scientific subcommittee concurred with the ILCOR and AAP NRP 2006 positions, stating that:**

1. The T-piece resuscitator is an acceptable method to initiate and continue ventilation in the newborn infant, particularly the preterm infant.
2. There is a possible delay when modifying pressures during initial resuscitation with a T-piece resuscitator, consequently an alternate hand-bagging device should be available.

As a post-script, it is recommended that Canadian NRP Instructors be familiar with the use of T-piece resuscitators.

## G. Administration of epinephrine via endotracheal tube or umbilical vein (Lesson 6)

ILCOR commentary: Intravenous administration of 0.01 to 0.03 mg/kg per dose is the preferred route. While access is being obtained, administration of a higher dose (up to 0.1 mg/kg) through the endotracheal tube may be considered.

AAP NRP 2006 commentary: The recommended route is IV. The recommended IV dose is 0.1 to 0.3 mL/kg of 1:10,000 solution. (Consider 0.3 to 1 mL/kg if given endotracheally).

### Recommendations for the administration of epinephrine (adrenaline):

1. **Endotracheal Tube:** The first dose of epinephrine should be given via the endotracheal tube while preparing for insertion of umbilical venous catheter (UVC). Prepare a 3 mL syringe of 1:10,000 epinephrine (**dose of 1 mL/kg**) (Maximum endotracheal dose is 3ml of 1 in 10,000 epinephrine).
2. **Intravenous (Umbilical Venous Catheter):** Prepare a 1 mL syringe of 1:10,000 epinephrine (**dose of 0.1 mL/kg**). Flush with up to 5 mL of 0.9% NaCl.

## H. Post-resuscitation care (Lesson 7)

The scientific subcommittee stressed the importance of post-resuscitation care and make the following comments:

1. Communication between the referring and referral centres is an important part of regionalized care in Canada.
2. All facilities delivering babies must be capable of resuscitation, post-resuscitation assessment and initial stabilization.
3. Following extensive resuscitation or if an infant remains unwell after resuscitation, early consultation should be obtained. Therapies with potential efficacy to improve outcomes, especially when instituted in the first few hours of life, are becoming available.