

# Perinatal Services BC: Provincial Perinatal Guidelines Standards for Neonatal Resuscitation

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While every attempt has been made to ensure that the information contained herein is clinically accurate and current, Perinatal Services BC acknowledges that many issues remain controversial, and therefore may be subject to practice interpretations.

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## 1. Executive Summary

Approximately 90% of newborns make a smooth transition from intrauterine to extrauterine life. The remaining will require assistance to establish effective ventilation. Chest compressions and medications are rarely required (less than 1%).<sup>1</sup> To facilitate neonatal transition, anticipation and preparation help organize the appropriate healthcare team to deliver resuscitation as per the Neonatal Resuscitation Program (NRP). On occasion, unanticipated difficulties at birth are encountered.<sup>1</sup> The provision of timely, skilled assistance to a compromised newborn can impact a lifetime.<sup>1</sup>

The 7th Edition of the *Neonatal Resuscitation Textbook* and Neonatal Resuscitation Program (NRP) is based on the evidence presented by the neonatology subgroup of the International Liaison Committee on Resuscitation (ILCOR). This edition has been updated with more evidence as new information became available reflecting the increasing number of research studies in neonatal resuscitation practices. In addition, NRP reflects evidence based changes in learning methodology, with emphasis on communication, teamwork, simulation and debriefing. A high standard of resuscitation skills, knowledge, communication and team work are pivotal.

The following are key recommendations to support neonatal resuscitation in British Columbia (BC).

- Facilities that offer planned perinatal services must ensure their personnel are capable of neonatal resuscitation, post-resuscitation assessment and stabilization.<sup>2</sup>
- All facilities must have an algorithm / plan outlining the provision of neonatal resuscitation. In some facilities, the response team may include health care personnel from outside the usual perinatal team (e.g., emergency room, anesthesia, medicine, surgery, respiratory). The roles and responsibilities of each responder must be clearly identified.
- In addition to the primary care provider responsible for attending to the mother, every birth should be attended by a second health care provider whose primary role is to assist the baby during transition, including the ability to provide positive pressure ventilation (PPV) and perform chest compressions.<sup>1</sup>
- One person with the skills required to perform a complete resuscitation, including intubation and delivery of medications should be available.<sup>1</sup>
- Teams should follow the principles of family centered care while resuscitating a baby.
- Every attempt should be made during the antenatal period to identify at risk pregnancies to plan for additional neonatal support or higher level of care.
- Practice changes introduced by the American Academy of Pediatrics (AAP) Neonatal Resuscitation Program (NRP) and endorsed by the Canadian Paediatric Society (CPS) are to be implemented in order to provide evidence based neonatal resuscitation.
- Standardized neonatal resuscitation supplies and equipment should be present and functioning at all births ([Appendix 1](#) and [Appendix 2](#)).
- Hospitals and/or regions should have interprofessional neonatal resuscitation or perinatal committees to provide leadership and direction for the maintenance of NRP national standards.
- A team approach to education and training must be used to develop collaboration across professions and disciplines, including the definition of roles and responsibilities, scope of practice, improved teamwork, and enhanced communication.<sup>3</sup>
- Neonatal resuscitation workshops must include the following components:
  - pre-reading of the *Neonatal Resuscitation Textbook, 7th Edition*
  - successful completion of the online examination prior to attending the workshop,
  - participation in a skills development/validation station,
  - successful completion of an individual integrated skills station, and
  - participation in simulation/debriefing exercises (video recording recommended).

Each participant's knowledge and performance should be objectively evaluated using the online examination and Canadian Individual Integrated Skills Station Assessment Form Tool ([Appendix 3](#)).

- Interprofessional skills drills or mock codes should be performed regularly in sites with planned perinatal services to highlight systems and educational needs.

## 1. Executive Summary, *cont'd*

- The BC Provincial NRP Steering Committee recommends that Health Authorities support at least the initial and recurring every 2 years NRP renewal educational needs of the interprofessional team (including physicians, nurses, midwives, respiratory therapists and paramedics) to ensure that the current neonatal resuscitation guiding principles and skills are consistently met.
- Midwives and physicians attending out-of-hospital births and staff in non-designated perinatal facilities should be capable of providing initial neonatal resuscitation, ongoing stabilization and planning for transfer.
- Health Authorities should establish a method of supporting midwives and physicians attending out-of-hospital births and non-designated perinatal sites with equipment and supplies required for neonatal resuscitation.

## 2. Introduction

This document outlines the standards for neonatal resuscitation in BC. The clinical guidelines are described in the *Neonatal Resuscitation Textbook, 7th Edition, 2016*.

NRP is an educational program primarily designed to teach the principles and techniques of resuscitation of babies undergoing transition to extrauterine life in a hospital, birth centre or home setting. These principles also apply to the resuscitation of babies during the time the baby remains in hospital following birth.<sup>1</sup>

Successful completion of NRP and registration with the CPS NRP database do not imply that an individual has the competence to perform neonatal resuscitation. Professional regulating bodies, Health Authorities or individual hospitals are responsible for determining the level of competence and qualifications required to assume clinical responsibility for neonatal resuscitation.<sup>1,2</sup> Each facility should establish a standardized system by which each resuscitation is debriefed by the team to identify team knowledge and skill development needs along with system needs such as equipment, supply and policy issues.

### 3. Abbreviations

<b>AAP</b>	American Academy of Pediatrics
<b>ACoRN</b>	Acute Care of at-Risk Newborns
<b>BC</b>	British Columbia
<b>BCPDR</b>	British Columbia Perinatal Data Registry
<b>bpm</b>	beats per minute
<b>CPAP</b>	Continuous positive airway pressure
<b>CPS</b>	Canadian Paediatric Society
<b>ETT</b>	Endotracheal tube
<b>ILCOR</b>	International Liaison Committee on Resuscitation
<b>IO</b>	Intraosseous
<b>IPPV</b>	Intermittent positive pressure ventilation
<b>LMA</b>	Laryngeal mask airway
<b>NICU</b>	Neonatal Intensive Care Unit
<b>NRP</b>	Neonatal Resuscitation Program
<b>PEEP</b>	Peak end expiratory pressure
<b>PIP</b>	Peak inspiratory pressure
<b>PPV</b>	Positive pressure ventilation
<b>PSBC</b>	Perinatal Services of British Columbia
<b>UVC</b>	Umbilical venous catheter

### Definitions

**Neonate:** Birth to 28 days.

**Perinatal:** Pertaining to the period immediately before and after birth. The perinatal period is defined in diverse ways. Depending on the definition, it starts at the 20th to 28th week of gestation and ends 1 to 4 weeks after birth.

## 4. Clinical Significance

- Facilities that offer planned perinatal services must ensure their personnel are capable of neonatal resuscitation, post-resuscitation assessment and stabilization.
- All facilities must have an algorithm/plan outlining the provision of neonatal resuscitation. In some facilities, the response team may include health care personnel from outside the usual perinatal team (e.g., emergency room, anesthesia, medicine, surgery, respiratory). The roles and responsibilities of each responder must be clearly identified.
- In addition to the primary care provider responsible for attending to the mother, every birth should be attended by a second health care provider whose primary role is to assist the baby during transition, including the ability to provide positive pressure ventilation (PPV) and perform chest compressions.<sup>1</sup>
- One person with the skills required to perform a complete resuscitation, including intubation and delivery of medications, should be available.<sup>1</sup>
- Teams should follow the principles of family centered care while resuscitating a baby.

All facilities where planned births occur must be resourced for neonatal resuscitation training including renewal courses. Healthcare professionals who attend these births must have current knowledge of neonatal resuscitation and be capable of resuscitation, post-resuscitation assessment and initial stabilization.\* Neonatal resuscitation is an area where a team approach to education and training is used to develop collaboration across disciplines.<sup>2</sup>

It is critical that personnel with NRP and teamwork skills be available for every birth. The size and composition of the multidisciplinary team will vary with designated level of care of the birth location and its birth rate.

Aside from the healthcare professional responsible for the birth (i.e., the physician or midwife), a second healthcare professional should be present whose primary responsibility is the baby and is capable of performing the initial steps of neonatal resuscitation, including effective ventilation and chest compressions. If this person cannot perform more extensive resuscitation (endotracheal intubation and administering medications), additional personnel with these skills should be available in the facility to assist immediately when called.<sup>1,2,3</sup> A person should be identified to lead the resuscitation. Ideally this will be the person with the most experience in neonatal resuscitation.

All facilities must have an algorithm to outline the response necessary to provide neonatal resuscitation. In some facilities, the response team may include health care personnel from outside the usual perinatal team (e.g., emergency room, anesthesia, medicine, surgery). The roles and responsibilities of each responder must be clearly identified for each of the facilities.

Until another member of the medical staff or more experienced provider takes over, care of the baby remains the responsibility of the primary care provider who attends the birth. To effectively exercise this responsibility, the primary care provider should have current NRP provider registration with the CPS.

Although the baby is the focus of everyone's attention, the needs of the family and health care team are important and should not be overlooked. Resuscitation can be frightening for the parents and their support people. It is crucial that health care professionals offer information and respect and incorporate parental choices.

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\* Accreditation Canada standards for obstetrics/perinatal care services (February 2016 version 11): Standard 3.10 states "minimum requirements for specific education and training to deliver obstetrics services are established based on the scope of services it provides and the needs of its client population. . . . A team approach to education and training is used to develop collaboration across disciplines".<sup>2</sup>

## 4. Clinical Significance, *cont'd*

### Identification of Newborns at Risk

- Early identification of risk factors is essential for planning best care at birth. The perinatal health care team must provide ongoing antenatal and intrapartum screening to ensure newborns receive the most appropriate level of care at birth.\*

With careful consideration of antenatal risk factors, the majority of babies who potentially require resuscitation can be identified before birth.<sup>1</sup> However, even after a healthy pregnancy, some babies may experience sudden, unexpected difficulties that require immediate intervention by skilled personnel. These criteria are based on maternal and fetal risk factors which are listed on the back of the British Columbia (BC) provincial antenatal form as well as on the Perinatal Services BC (PSBC) [Maternal Fetal Levels of Service Classification Tool](#). Planning will vary depending on the resources and level of care that can be provided within an institution. The PSBC Tiers of Service Framework has been used to determine what tier of service a facility can provide. Responsibility for the initiation of neonatal resuscitation and stabilization in preparation for transport is the same across all tiers of perinatal services. The tiers differ, however, in their capacity to manage varying levels of acuity and perinatal/neonatal medical complexity beyond the initial stabilization period.<sup>†</sup>

Clear communication and a close working relationship are required between various personnel providing care at home, birth centres, hospitals and referral centres.

### Neonatal Resuscitation Practices

- Practice changes introduced by the American Academy of Pediatrics (AAP) Neonatal Resuscitation Program (NRP) and endorsed by the Canadian Paediatric Society (CPS) are to be implemented in order to provide evidence based resuscitation.

Neonatal Resuscitation Practices <sup>1,4</sup>	
Preparation for the birth focuses on obtaining a history, team briefing, role assignment, and equipment check.	<ul style="list-style-type: none"><li>• History should include answers to 4 questions:<ol style="list-style-type: none"><li>1. What is the expected gestational age?</li><li>2. Is the amniotic fluid clear?</li><li>3. How many babies are expected?</li><li>4. Are there any additional risk factors?</li></ol></li><li>• Preparation also includes discussion regarding delayed cord clamping and assigning a team member to initiate the initial steps in the NRP algorithm (<a href="#">Appendix 4</a>) while waiting for the cord to be clamped.</li></ul>
At birth, answer 3 questions to determine the need for initial steps at the radiant warmer.	<ul style="list-style-type: none"><li>• Does the baby appear term?</li><li>• Does the baby have good muscle tone?</li><li>• Is the baby breathing or crying?</li></ul>
Not all babies between 34 <sup>0</sup> and 36 <sup>6</sup> weeks gestation must go to the radiant warmer for initial steps.	<ul style="list-style-type: none"><li>• Babies who are between 34<sup>0</sup> to 36<sup>6</sup> weeks gestation, have good muscle tone and are breathing or crying may have the initial steps completed while skin to skin (<a href="#">Appendix 5</a>) with their mother.</li></ul>

\* Accreditation Canada standards for obstetric services (February 2016 version 11): Standard 8.10 states “During the assessment and labour process, the types of expertise, capabilities, and resources required for care of the baby at birth are determined, in partnership with the client and family.”<sup>2</sup>

† [www.perinataleservicesbc.ca/health-professionals/professional-resources/system-planning/tiers-of-service](http://www.perinataleservicesbc.ca/health-professionals/professional-resources/system-planning/tiers-of-service)

#### 4. Clinical Significance, *cont'd*

### Neonatal Resuscitation Practices<sup>1,4</sup>

<p>Delay cord clamping for a minimum of 30 seconds while answering the above 3 questions and initiating the initial steps in the NRP algorithm.</p>	<ul style="list-style-type: none"><li>• Current evidence suggests that cord clamping should be delayed for at least 30–60 seconds for most vigorous term and preterm newborns.</li><li>• Whenever possible clear communication between providers must occur prior to the birth of the infant regarding cord clamping time.</li><li>• When there is a pulsatile cord, recommend delaying cord clamping for a minimum 30 seconds while initiating the initial steps in the NRP algorithm (<a href="#">Appendix 4</a>).</li><li>• Contraindications to delayed cord clamping include: placental circulation is not intact (such as placental abruption, bleeding placenta previa, bleeding vasa previa) or cord avulsion.</li></ul>
<p>Babies born in the presence of Meconium.</p>	<ul style="list-style-type: none"><li>• No routine suctioning of the oropharynx while at the perineum.</li><li>• Tracheal suctioning for non-vigorous (poor tone, not breathing or crying) babies born in the presence of meconium is not recommended.</li><li>• Meconium-stained amniotic fluid remains a risk factor for the need for resuscitation. A licensed practitioner with intubation skill should be identified and immediately available as these babies may require intubation for tracheal suction or positive pressure ventilation later in the algorithm.</li></ul>
<p>Thermal management</p>	<ul style="list-style-type: none"><li>• The room temperature should be increased to 23 to 25°C when the birth of a premature baby is expected.</li><li>• The baby's temperature should be maintained between 36.5 and 37°C.</li><li>• A baby who is vigorous at birth should receive skin-to skin care with the mother (<a href="#">Appendix 5</a>). The initial steps can occur while skin-to-skin.</li><li>• Use prewarmed hats for all babies. Ensure the head is dried before applying the hat.</li><li>• Use servo controlled temperature probes as soon as possible on all babies positioned under radiant warmers for more than a few minutes.</li><li>• For babies less than 32 week gestation:<ul style="list-style-type: none"><li>■ Put the baby in a food-grade transparent plastic bag or wrap. Do not use zip-lock bags due to their sharp edges.</li><li>■ Consider using the bag or wrap with or without a thermal mattress. If using a thermal mattress, ensure it is placed under a pre-warmed blanket so the baby is not in direct contact with the thermal mattress. The thermal mattress should be activated approximately 5 minutes before birth.</li></ul></li><li>• Therapeutic hypothermia should be considered within the first 6 hours of life in the stabilized baby who is 35 weeks gestation or more, who suffered a perinatal asphyxial event, and develops moderate to severe hypoxic ischemic encephalopathy. It is not initiated during resuscitation or initial stabilization and can be initiated only <b>after consultation with a neonatologist</b>.</li></ul>

#### 4. Clinical Significance, *cont'd*

### Neonatal Resuscitation Practices <sup>1,4</sup>

<p>Suction as needed.</p>	<ul style="list-style-type: none"> <li>• Routine suctioning of the mouth and nose is not recommended.</li> <li>• Suction the oropharynx (insertion depth measured from the tip of the nose to the ear tragus) if there are obvious secretions, known and/or suspected airway obstruction secondary to secretions, meconium, and/or before initiating positive pressure ventilation (PPV).</li> <li>• Suctioning beyond the oropharynx should be avoided as stimulation beyond this area could trigger a vagal response causing or worsening bradycardia.</li> </ul>
<p>After clearing the airway (if necessary), dry and remove wet linen, reposition to open the airway, stimulate, then evaluate respirations and heart rate (not colour).</p>	<ul style="list-style-type: none"> <li>• Begin positive-pressure ventilation if the baby is apneic or gasping, or the heart rate is less than 100 beats per minute (bpm).</li> <li>• Consider continuous positive airway pressure (CPAP) for preterm babies if their breathing is laboured and the heart rate is more than 100 bpm.</li> </ul>
<p>Subsequently, evaluation and decision-making are based on respirations, heart rate and oxygen saturation (per pulse oximetry).</p>	<ul style="list-style-type: none"> <li>• Auscultation or use of a cardiorespiratory monitor are the two recommended methods to assess the heart rate. Pulse oximeter can also be used to monitor the heart rate.</li> </ul>
<p>Indications for preductal pulse oximetry include:</p> <ul style="list-style-type: none"> <li>• preterm babies less than 34 weeks gestation,</li> <li>• babies who appear cyanotic at 5 minutes, or the perception of central cyanosis needs to be confirmed,</li> <li>• babies who require positive pressure ventilation while supplemental oxygen is being administered.</li> </ul>	<ul style="list-style-type: none"> <li>• The pulse oximeter should be set to the manufacturer's specified mode for neonatal resuscitation.</li> <li>• The appropriately sized probe should be applied on the right hand or wrist first and then attached to the pulse oximeter in order to achieve the fastest readings.</li> <li>• A compressed air source and oxygen blender must be available in the delivery room to enable titration of the oxygen dose.</li> <li>• To avoid hyperoxemia, administration of supplemental oxygen should be titrated to achieve target oxygen saturation levels as per the table below for term and preterm babies.<sup>1</sup></li> </ul>

## 4. Clinical Significance, *cont'd*

### Neonatal Resuscitation Practices <sup>1,4</sup>

Initiate resuscitation with 21% oxygen.

- For simplicity, the recommended initial oxygen concentration should be 21% for all babies.
- For babies less than 35 weeks gestation, some facilities may choose to set the initial oxygen concentration between 21 and 30% as per their local guideline and/or team discussion.
- Oxygen concentration should be titrated based on pulse oximetry and target SpO<sub>2</sub>.

**Target Pre-ductal SpO<sub>2</sub> After Birth**

1 min	60%–65%
2 min	65%–70%
3 min	70%–75%
4 min	75%–80%
5 min	80%–85%
10 min	85%–95%

Administer CPAP with 5 cmH<sub>2</sub>O pressure to preterm babies with labored breathing or persistent central cyanosis and a heart rate greater than 100 bpm.

- The T-piece resuscitator is recommended as the device of choice to provide consistent CPAP during neonatal resuscitation.
- CPAP pressure should not exceed 8 cmH<sub>2</sub>O.
- Persistent central cyanosis is defined as oxygen saturations less than the targeted level despite 40% or higher oxygen concentration.
- Mask or endotracheal positive pressure ventilation (PPV) must be considered for all babies who have persistent central cyanosis despite 100% oxygen and/or CPAP. Consider consultation with local experts and/or protocols.
- Normally transitioning term babies can present with transient labored breathing, tachypnea and/or grunting that do not require CPAP.
- Consider CPAP for babies demonstrating signs of moderate respiratory distress. The modified ACoRN Respiratory Score could help guide the clinician. See [Appendix 6](#).

All positive-pressure ventilation (PPV) devices, including the self-inflating bag, should have an integral pressure gauge, or be attached to one.

- The T-piece resuscitator is recommended as the main device to provide controlled PIP and PEEP in neonatal resuscitation.
- Use a pressure gauge to administer controlled PIP and PEEP on all PPV systems.

Consider using an electronic cardiac monitor when initiating PPV.

Recommend using an electronic cardiac monitor when initiating chest compressions.

- The use of a cardiorespiratory monitor facilitates rapid and accurate heart rate measurement when resuscitation is required.
- The cardiorespiratory monitor does not replace the use of a pulse oximeter.

## 4. Clinical Significance, *cont'd*

### Neonatal Resuscitation Practices<sup>1,4</sup>

The most important interventions in NRP, inflation and ventilation of the lungs, have not changed, and are reinforced with the mnemonic MR SOPPA (modified by the BC NRP Regional Instructor Trainers, November 2016, to improve clarity).

- Initial peak inspiratory pressure (PIP) of 20 cmH<sub>2</sub>O is recommended for term and preterm babies.
- Term babies who are apneic at birth may require an initial PIP of 30 cmH<sub>2</sub>O for the first few breaths in order to inflate their lungs.
- Use PEEP (5 cmH<sub>2</sub>O) for all babies needing positive pressure ventilation.
- Ventilate at a rate of 40 to 60 breathes per minute. .
- Consider attaching a CO<sub>2</sub> detector to the facemask when initiating PPV as it may provide a visual cue that the lungs are inflated.
- After 15 seconds of initial PPV, assess for chest movement, bilateral air entry then rising heart rate. If an increase in heart rate does not occur, initiate ventilation corrective steps (MR SOPPA).
- Effective ventilation has been established if the heart rate has increased despite perceived inadequate breath sounds or chest movement.
- NOTE: It is possible to provide adequate ventilation without apparent chest movement, especially in preterm babies.

#### MR SOPPA

- 1 M** Mask adjustment (consider 2-hand technique)  
**R** Reposition (head neutral or slightly extended)  
Once seal achieved, evaluate chest movement, air entry, then heart rate.
- 2 S** Suction mouth (depth = nose tip to ear tragus)  
**O** Open mouth  
Once seal achieved, evaluate chest movement, air entry, then heart rate.
- 3 P** Pressure increase to 25/5 cm H<sub>2</sub>O  
Once seal achieved, evaluate chest movement, air entry, then heart rate.
- 4 P** Pressure increase to 30/5 cm H<sub>2</sub>O  
Once seal achieved, evaluate chest movement, air entry, then heart rate.
- 5 A** Airway alternative (ETT or LMA)  
Evaluate chest movement, air entry, CO<sub>2</sub> detector, then heart rate.
  - Continue pressures at 30/5 and assess the need for decreasing pressures when the heart rate is above 100 bpm.
  - Consider the need to increase pressures incrementally to a maximum 40/5.

**Provide 30 seconds of effective ventilation before progressing through NRP algorithm.**

## 4. Clinical Significance, *cont'd*

### Neonatal Resuscitation Practices<sup>1,4</sup>

The endotracheal intubation procedure ideally should be completed within 30 seconds.

- Intubation is strongly recommended when chest compressions begin to help ensure effective ventilation.
- However, if intubation is not successful or not feasible, a laryngeal mask airway may be used.
- Recommended ETT sizes are:
  - 2.5 if less than 1000 grams or 28 weeks gestation
  - 3.0 if between 1000 and 2000 grams or 28 to 34 weeks gestation
  - 3.5 if greater than 2000 grams or 34 weeks gestation
  - 4.0 no longer recommended.
- The vocal cord guide on the ETT is an approximation for correct insertion depth. The use of 6 plus the baby's weight formula is a helpful formula for immediate assessment of insertion depth. This formula provides a good approximation for babies who weigh between 1,500 and 2,500 grams – it significantly overestimates the insertion depth for babies below and above this range. The depth of the oral ETT is determined by using the NRP “Initial endotracheal tube insertion depth” table below or by measuring the nasal septum to ear tragus length (NTL) plus 1 centimeter. The NRP table is a guide – for example, most babies who are 27 to 29 weeks gestation weigh more than 900 to 1,000 grams at birth.

Initial endotracheal tube insertion depth (“tip to lip”) for orotracheal intubation		
Gestation (wks)	Depth (cm)*	Baby's Weight (gm)
23–24	5.5	500–600
25–26	6.0	700–800
27–29	6.5	900–1,000
30–32	7.0	1,100–1,400
33–34	7.5	1,500–1,800
35–37	8.0	1,900–2,400
38–40	8.5	2,500–3,100
41–43	9.0	3,200–4,200

\*ETT insertion depth at lips

The laryngeal mask airway (LMA) has been shown to be an effective alternative for assisting ventilation for babies who are equal to or greater than 34 weeks gestation and 2,000 grams.

- The LMA should be considered in neonatal resuscitation when PPV with a face mask is ineffective and when attempts at endotracheal intubation are not feasible or have not been successful.
- Babies with a complex airway who have respiratory distress should be considered for an LMA as the primary strategy, particularly when the resuscitator is not skilled at advanced airway management.

## 4. Clinical Significance, *cont'd*

### Neonatal Resuscitation Practices<sup>1,4</sup>

<p>Use CO<sub>2</sub> detectors for all ETT and LMA inserted for ventilation.</p> <p>The CO<sub>2</sub> detector may be used for face mask ventilation.</p>	<ul style="list-style-type: none"> <li>• The CO<sub>2</sub> detector should be used as the primary method for confirming ETT and LMA placement.</li> <li>• The CO<sub>2</sub> detector may also be used for face mask ventilation to provide a visual cue that effective ventilation has been achieved.</li> <li>• NOTE: The detector may take up to 6 breaths before the cycling colour change will be seen. Cycling of colour change may not be seen if the baby is less than 1 kg.</li> <li>• CAUTION: Another detector may be required if cycling color change is no longer occurring (e.g., detector remains yellow).</li> </ul>								
<p>Sudden deterioration after intubation.</p>	<ul style="list-style-type: none"> <li>• The mnemonic DOPE is useful in the event of a sudden deterioration following intubation.</li> <li>• DOPE reflects possible causes: <table border="1" data-bbox="717 688 1334 856"> <tr> <td><b>D</b></td> <td><b>Displaced Endotracheal Tube</b></td> </tr> <tr> <td><b>O</b></td> <td><b>Obstruction of the Endotracheal Tube</b></td> </tr> <tr> <td><b>P</b></td> <td><b>Pneumothorax</b></td> </tr> <tr> <td><b>E</b></td> <td><b>Equipment Failure</b></td> </tr> </table> </li> </ul>	<b>D</b>	<b>Displaced Endotracheal Tube</b>	<b>O</b>	<b>Obstruction of the Endotracheal Tube</b>	<b>P</b>	<b>Pneumothorax</b>	<b>E</b>	<b>Equipment Failure</b>
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<b>P</b>	<b>Pneumothorax</b>								
<b>E</b>	<b>Equipment Failure</b>								
<p>Establishing effective ventilations is the highest priority in neonatal resuscitation. <b>Do not start chest compressions without first establishing effective ventilation</b> (defined here by chest movement and audible bilateral air entry because the baby may be too ill to have an increase in heart rate after performing <b>all the steps</b> of MR SOPPA).</p> <p>An LMA should be used with chest compressions if intubation is not feasible or is unsuccessful.</p>	<ul style="list-style-type: none"> <li>• The insertion of an ETT or LMA before the initiation of chest compressions is recommended because they: <ul style="list-style-type: none"> <li>■ are better tools to maintain a patent airway,</li> <li>■ remove the risk of inconsistent pressures due to loss of face mask seal, and</li> <li>■ decrease amount of air tracking to the stomach.</li> </ul> </li> <li>• <b>If the heart rate is still below 60 bpm despite 30 seconds of effective PPV, increase the oxygen concentration to 100% and begin chest compressions.</b></li> <li>• When the heart rate is below 60 bpm, the pulse oximeter may not function.</li> <li>• The two thumb technique is the preferred method to administer chest compressions.</li> <li>• Interruption of chest compressions to check the heart rate may result in a decrease of perfusion pressure in the coronary arteries. Therefore, continue chest compressions and coordinated ventilations for 60 seconds before stopping briefly to assess the heart rate, breath sounds and oxygen saturation.</li> <li>• The cardiorespiratory monitor is the preferred method for assessing the heart rate during chest compressions.</li> </ul>								
<p>The umbilical venous catheter (UVC) remains the preferred route for vascular access in the delivery room but the intraosseous needle (IO) is a reasonable alternative.</p>	<ul style="list-style-type: none"> <li>• All medications and fluids that can be infused into a UVC can be infused into an IO.</li> <li>• The IO can be used in term and late preterm babies greater than 34 weeks gestation.</li> </ul>								

#### 4. Clinical Significance, cont'd

### Neonatal Resuscitation Practices<sup>1,4</sup>

<p>Epinephrine is indicated when the heart rate remains below 60 bpm after 30 seconds of effective ventilation and another 60 seconds of coordinated chest compressions and effective ventilation with 100% oxygen.</p>	<ul style="list-style-type: none"> <li>• The preferred route for epinephrine is via a UVC or IO. The endotracheal route is associated with unreliable absorption and is unlikely to be effective.</li> <li>• The Canadian recommended dose of epinephrine (0.1 mg/mL concentration) is:             <ul style="list-style-type: none"> <li>■ ETT route: Dose is 0.1 mg/kg (1 mL/kg) of epinephrine 0.1 mg/mL (1: 10,000). Maximum dose is 0.3 mg (3 mL). Draw up dose in a 3 mL syringe and label “for ETT.” Administer rapidly. Do not follow with a flush.</li> <li>■ The first dose of epinephrine may be administered via ETT while the UVC is being inserted.</li> <li>■ UVC/IV/IO route (these are the preferred routes): Dose is 0.01 mg/kg (0.1 mL/kg) of epinephrine 0.1 mg/mL (1:10,000). Draw up dose in a 1 mL syringe and label “for IV/UVC.” Administer rapidly. Follow with a 3 mL 0.9% NaCl flush.</li> </ul> <p><i>The recommended flush volume of 0.5–1.0 mL (Canadian Medication Table) from the tip of the line is required to ensure the medication enters into the circulation. Therefore 3 mL of flush is recommended to account for line and valve dead space.</i></p> </li> <li>• Prepare the ETT dose in a 3 mL syringe and the UVC or IO dose in a 1 mL syringe to reduce the chances of a medication administration error.</li> </ul>
<p>A volume expander of 0.9% NaCl or unmatched type O Rh-negative packed red blood cells is indicated when the baby does not respond to resuscitation interventions and has signs of shock or history of acute blood loss.</p>	<ul style="list-style-type: none"> <li>• Volume expander can be administered IV or IO. The recommended dose is 10 mL/kg.</li> <li>• Ringers lactate is no longer recommended as a volume expander.</li> </ul>
<p>NaHCO<sub>3</sub> should not be administered to babies during resuscitation.</p>	<ul style="list-style-type: none"> <li>• There is no evidence to support this practice.</li> </ul>
<p>Naloxone is no longer recommended for babies who have respiratory depression after maternal opiate exposure.</p>	<ul style="list-style-type: none"> <li>• There is little knowledge of the pharmacology in the newborn and insufficient evidence to evaluate safety and efficacy.</li> <li>• Animal studies and case reports cite complications from naloxone, including pulmonary edema, cardiac arrest and seizures.</li> <li>• Ensure the baby’s airway and breathing are managed effectively. Consider inserting an endotracheal tube or laryngeal mask airway for ongoing respiratory support if the apnea is prolonged.</li> </ul>

## 4. Clinical Significance, *cont'd*

### Documentation

Use the British Columbia Newborn Resuscitation Record (PSBC 1583B) for documentation in all cases requiring resuscitation. Refer to British Columbia Newborn Resuscitation Record Guide for Completion.

Additionally, the Newborn Record part 1 and Section 3 – Transition to One Hour of Age need to be completed.

### Availability and Maintenance of Equipment, Supplies and Medications

- Standardized neonatal resuscitation supplies and equipment should be present and functioning at all births ([Appendix 1](#) and [Appendix 2](#)).

Equipment required in neonatal resuscitation should be checked regularly and prior to every birth.

Clear policies need to be established and communicated for:

- scheduling of equipment checks for operational fitness
- upgrading or replacing equipment
- preventative maintenance
- rotation of supplies such as medications prior to expiration

The pulse oximeter should be set to the manufacturer's specified mode for neonatal resuscitation. For non-designated perinatal facilities, refer to [7. Special Considerations](#).

## 5. Administration

- Hospital and/or regional based interprofessional neonatal resuscitation or perinatal committees provide leadership and direction for the maintenance of NRP national standards.

### Local/Regional/Health Authority Implementation of a Neonatal Resuscitation Program

Responsibilities of hospital-based and/or regional-based interprofessional neonatal resuscitation or perinatal committees include:

- Implement current neonatal resuscitation guidelines.
- Implement and support NRP as the ongoing educational program for healthcare professionals involved in neonatal resuscitation.
- Develop, implement and support policies related to the educational needs, roles and responsibilities of healthcare professionals involved in the resuscitation and care of newborns.
- Develop and implement an algorithm or plan outlining the response necessary to provide neonatal resuscitation.
- Identify and resolve administrative and clinical problems related to resuscitation.
- Consult regarding the purchase and maintenance of neonatal resuscitation equipment for clinical care and teaching.

### Provincial Neonatal Resuscitation Advisory Committee

Perinatal Services BC (PSBC) is the body through which BC stakeholders:

- Generate, discuss and support the provincial implementation of national and provincial policies regarding neonatal resuscitation.
- Plan and support the dissemination of NRP within the province.
- Review provincial neonatal resuscitation statistics annually as provided by PSBC.

### National NRP Steering Committee

- Manage, support and promote the AAP/AHA Neonatal Resuscitation Program (NRP) in the Canadian context.
- Establish guidelines for training.
- Ensure reciprocity of status intra-provincially and with the U.S.
- Encourage research in neonatal resuscitation.

### Canadian Paediatric Society (CPS)

- Coordinate and support the activities of the National NRP Steering Committee.
- Publish the Textbook of Neonatal Resuscitation in English and French for Canada.
- Distribute all NRP education materials.
- Communicate NRP updates and changes.
- Develop and maintain a national database to track instructor trainers, instructors, providers and courses.

## 6. Ongoing Education and Training Programs

- A team approach to education and training must be used to develop collaboration across professions and disciplines, including the definition of roles and responsibilities, scope of practice, improve teamwork, and enhance communication.<sup>2</sup>
- Neonatal resuscitation workshops must include the following components:
  - successful completion of the online examination prior to attending a workshop,
  - participation in a skills development/validation station where the focus is on individual technical skills,
  - successful completion of an integrated skills station evaluated objectively using the Canadian Individual Integrated Skills Station Assessment (ISSA) tool to assess individual performance (integration of knowledge and skill), and
  - participation in simulation/debriefing exercises (recommended with use of video recording).
- Recurrent training more frequently than every 2 years is recommended. Interprofessional skills drills or mock codes should be performed in sites that provide planned perinatal services to highlight systems and educational needs.
- The BC Provincial Neonatal Resuscitation Advisory Committee recommends that Health Authorities support the initial and ongoing biennial (or more frequently) NRP renewal educational needs of the interprofessional team (including physicians, nurses, midwives, respiratory therapists and paramedics) to ensure that the current neonatal resuscitation guiding principles and skills are consistently met.

Concepts and skills in neonatal resuscitation are obtained through NRP as endorsed and administered by the CPS. NRP is designed to teach individuals and teams to resuscitate newborn babies. The course content is evidence-based and is delivered across Canada in both English and French.

Completion of an NRP course does NOT mean that an individual is competent to perform neonatal resuscitation.<sup>4</sup> Each NRP provider should have ready access to the latest version of the NRP Textbook and the current version of all CPS NRP materials. It is also advised that Health Authorities should support the availability of a minimum of one set of functional equipment per hospital for neonatal resuscitation education and practice sessions. This equipment should be easily accessible to providers for practice use.

Registration with the CPS at either the provider level every 2 years (minimum) or instructor level every 3 years (minimum) are essential for all healthcare professionals who care for neonates.<sup>5</sup>

The BC Provincial Neonatal Resuscitation Advisory Committee recommends that Health Authorities support the registration costs of NRP instructors with the CPS. Institutions should be supportive in their efforts to provide on-site programs to achieve this goal.

Skills, knowledge, and individual and team roles should be practiced by the interprofessional team frequently using mock codes/simulation scenarios. These practice sessions facilitate reflective learning and teamwork, in addition to the identification of process and equipment deficiencies.

## 7. Special Considerations

### Guiding Principles for Home Births and Non-Designated Perinatal Facilities

- All midwives and physicians attending out-of-hospital births and staff in non-designated perinatal facilities should be capable of providing initial neonatal resuscitation, ongoing stabilization and plan for transfer.
- Health Authorities should establish a method of supporting midwives and physicians attending out-of-hospital births and non-designated perinatal sites with equipment and supplies required for neonatal resuscitation.

Emergency departments should have the capability to care for any unplanned event, including birth. The National NRP Steering Committee recommends that all emergency facilities be capable of providing newborn resuscitation and ongoing stabilization.

In an out-of-hospital birth environment where there may be only two licensed practitioners present, umbilical vein catheterization or insertion of an IO needle and administration of intravenous epinephrine may be delayed until the arrival of a third practitioner or paramedic services. It is strongly advised that Health Authorities provide midwives and physicians attending out-of-hospital births and non-designated perinatal sites with equipment and supplies needed for neonatal resuscitation as well as provide information and support in maintenance of this equipment.

Neonatal resuscitation equipment and supplies ([Appendix 1](#)) should be accessible in any emergency department. The training needs of healthcare professionals in facilities that do not provide planned perinatal services require discussion and planning.

## 8. Clinical Performance Indicators

### PSBC Perinatal Data Registry – Clinical Data Variables

The following indicators are currently collected at the time of discharge for all babies that required resuscitation at birth:

- Apgar scores at 1, 5 and 10 minutes
- 1st temperature within the 1st hour of life
- Suction: oropharynx, trachea, unspecific
- Oxygen administration (yes/no, start/stop times, days on oxygen)
- CPAP (days only – not specifically for resuscitation)
- IPPV by mask (yes/no)
- IPPV by ETT (yes/no)
- IPPV by LMA (yes/no)
- Chest compressions (yes/no) (start/stop times)
- Resuscitation/Stabilization medication(s) (yes/no – no details)
- Meconium (yes/no)
- Surfactant administration during admission (yes/no)
- NICU days, Level II
- NICU days, Level III

### PSBC Perinatal Data Registry – Reporting and Quality Improvement

PSBC collects the above standardized indicators through the British Columbia Perinatal Data Registry (BCPDR), a quality-controlled database containing clinical information on all births collected from facilities and home births throughout the province of British Columbia. The above indicators will be monitored annually and presented to the BC Provincial Neonatal Resuscitation Advisory Committee for discussion and identification of issues.

## 9. References

1. Weiner, G. (2015). Textbook of Neonatal Resuscitation (7th Ed.). American Academy of Pediatrics, Evanston, Illinois
2. Accreditation Canada (2016). Qmentum Program: Standards – Obstetric Services for Surveys Starting After January 01, 2017. February 01, 2016.
3. Health Canada (2000). Family-centered Maternal and Newborn Care: National Guidelines.
4. Canadian Paediatric Society (2016). 2016 Medications for Neonatal Resuscitation Program – Canadian Adaptation. [www.cps.ca/en/nrp-prn/provider-resources](http://www.cps.ca/en/nrp-prn/provider-resources) Accessed January 2017.
5. Canadian Paediatric Society. About NRP. <http://www.cps.ca/en/nrp-prn/about> Accessed January 24, 2017.
6. Kangaroo Mother Care. 2012-2017. Skin-to-Skin Contact: Support for Kangaroo Mother Care based on science and evidence. Skin-to-skin contact with SAFE Technique. [www.skintoskincontact.com/ssc-safe-technique.aspx](http://www.skintoskincontact.com/ssc-safe-technique.aspx) Accessed January 25, 2017.

## Websites

Perinatal Services BC (PSBC) [www.perinatalervicesbc.ca](http://www.perinatalervicesbc.ca)

BC Perinatal Levels of Care/Service

[www.perinatalervicesbc.ca/health-professionals/professional-resources/classifications](http://www.perinatalervicesbc.ca/health-professionals/professional-resources/classifications)

Canadian Paediatric Society (CPS) NRP [www.cps.ca/nrp-prn](http://www.cps.ca/nrp-prn)

American Academy of Paediatrics (AAP) [www2.aap.org/nrp](http://www2.aap.org/nrp)

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### Suggested Review September 2020

## Appendix 1: Neonatal Resuscitation Supplies and Equipment Quick Check for Radiant Warmer

This checklist includes only the supplies and equipment needed on the radiant warmer for most neonatal resuscitations and is checked *prior* to every birth. The list can be tailored to meet the specific needs of a unit. 1

Warm	<ul style="list-style-type: none"> <li>• Preheated warmer</li> <li>• Warm towels or blankets</li> <li>• Temperature probe and sensor cover</li> <li>• Hat</li> <li>• Plastic bag or wrap (less than 32 weeks gestation)</li> <li>• Thermal mattress (less than 32 weeks gestation)</li> </ul>
Clear airway	<ul style="list-style-type: none"> <li>• Mechanical suction (able to be set to 80 to 100 mmHg) and connector tubing</li> <li>• Suction catheters: 6F, 8F, 10F, 12F</li> <li>• Meconium aspirator or Kurtis meconium suction device (size 3.0)</li> </ul>
Auscultate	<ul style="list-style-type: none"> <li>• Stethoscope</li> </ul>
Ventilate	<ul style="list-style-type: none"> <li>• Flowmeter set to 10 lpm</li> <li>• Oxygen blender set to 21%</li> <li>• Positive pressure ventilation device</li> <li>• Term and preterm sized face masks</li> <li>• 8F feeding tube and large syringe</li> </ul>
Oxygenate	<ul style="list-style-type: none"> <li>• Equipment to administer free-flow oxygen</li> <li>• Pulse oximeter with sensor and posey</li> <li>• Target oxygen saturation table</li> </ul>
Intubate	<ul style="list-style-type: none"> <li>• Slim laryngoscope handle</li> <li>• Laryngoscope straight blades: No. 00 (very preterm – optional), No. 0 (preterm) and No. 1 (term)</li> <li>• Uncuffed endotracheal tubes: 2.5-, 3.0-, 3.5-mm internal diameter (ID)</li> <li>• Stylet 6F</li> <li>• End-tidal CO<sub>2</sub> detector</li> <li>• Measuring tape and/or endotracheal tube insertion depth table</li> <li>• Tape or securing device for endotracheal tube</li> <li>• Scissors</li> <li>• Laryngeal mask airway: size 1</li> <li>• Syringe: 5 mL (to inflate LMA cuff)</li> </ul>
Medicate	<p><b>Access to:</b></p> <ul style="list-style-type: none"> <li>• Epinephrine 0.1 mg/mL (1:10,000)</li> <li>• 0.9% NaCl</li> <li>• Supplies for inserting an umbilical catheter and preparing/administering medications</li> </ul>
Other	<p><b>Access to:</b></p> <ul style="list-style-type: none"> <li>• Electronic cardiac monitor and leads</li> <li>• Supplies for intra-osseous initiation</li> <li>• Supplies for needle aspiration of a pneumothorax</li> </ul>

## Appendix 2: Neonatal Resuscitation Supplies and Equipment

### 1. Thermoregulation

- Food-grade transparent 1 gallon sized bags (for use at birth if less than 32 weeks gestation or birth weight less than 1,000 grams)
- Radiant warmer with firm, padded resuscitation surface and servo temperature probe
- Thermal reflectors (gel backing) for servo temperature probe
- Alternative heat source for births outside of delivery rooms
- Warmed linens
- Chemically activated warming pad (optional in delivery rooms or for transport to nursery)
- Transport incubator to maintain baby's temperature during move to the nursery

### 2. Suction

- Mechanical suction (able to be set to 80 to 100 mmHg) and connector tubing
- Suction catheters: 6F, 8F, 10F, 12F
- Feeding tubes 5F, 8F
- 20-mL syringe
- Meconium aspirator or Kurtis meconium suction device (size 3.0)

### 3. Establishment of airway

- Slim handle laryngoscope
- Laryngoscope straight blades: No. 00 (very preterm – optional), No. 0 (preterm) and No. 1 (term)
- Extra bulbs and batteries for laryngoscope
- Uncuffed endotracheal tubes: 2.5-, 3.0-, 3.5-mm internal diameter (ID)
- Stylet 6F
- Exhaled CO<sub>2</sub> detector
- Scissors
- Tape or securing device for endotracheal tube
- Laryngeal mask airway: size 1
- Syringe: 5 mL (to inflate LMA cuff)

### 4. Positive pressure administration

- Device for delivering positive-pressure ventilation (in preferred order):
  - T-piece resuscitator
  - 240 mL self-inflating bag with reservoir, PEEP valve and pressure gauge (must be available as backup whenever gas dependent devices are used)
  - Flow inflating bag with pressure gauge
- Face masks: size 0 and 1 (newborn and premature) (cushioned-rim)

### 5. Oxygen

- Oxygen blender to mix oxygen and compressed air with flow meter (flow rate up to 10 L/min) and tubing
- Pulse oximeter
- Pulse oximeter probe/sensor
- Posey (for pulse oximeter sensor)

### 6. Umbilical vessel catheterization supplies

- Sterile gloves (preferably latex-free)
- Face mask
- Scalpel
- Scissors

## Appendix 2, cont'd

- 2% chlorhexidine swab sticks
- Umbilical tie tape
- Umbilical catheters, single lumen: 3.5F, 5F
- 2 × three-way stopcocks or 1 × nanoclave extension set
- 0.9% NaCl 10 mL prefilled syringes
- Sterile drape
- Mosquito forceps or curved forceps
- Needle driver
- 3-0 silk suture
- 2 × 2 gauzes
- Syringes: 1, 3, 10, 30, and 60 mL
- Umbilical vessel securing device or tape
- Umbilical clamp

### 7. Intraosseous

- 2% chlorhexidine swab sticks
- drill or other driver
- IO needle: 15 mm
- Securement device
- Extension set

### 8. Medications

- Epinephrine 1:10,000 (0.1 mg/mL): 3 mL or 10 mL ampoules
- Rapid fill connector or three-way stopcock
- Syringes: 1, 3 mL
- 0.9% NaCl for flushes
- 0.9% NaCl for volume expansion: 100 mL or 250 mL bag
- Dextrose 10% (NOTE: Not used for volume expansion): 250 mL bag

### 9. Needle aspiration for pneumothorax

- Sterile gauze 2 × 2
- 23 g butterfly
- IV catheter: 20G, 18G
- 8 inch (20 cm) extension tubing
- 2% chlorhexidine swab sticks
- 3-way stopcock
- 20 mL syringe (luer lock tip)
- Transparent dressing (Tegaderm)

### 10. Miscellaneous

- Gloves, goggles, mask, long sleeved gowns for personal protection
- Timer
- Stethoscope with neonatal or infant head
- Tape: ½ inch
- Cardiac monitor and electrodes
- Hats
- Towels/warmed linen

# Appendix 3: Individual Integrated Skills Station Assessment tool

## Individual Integrated Skills Station Assessment Form - Canadian Adaptation

## BASIC ISSA



Learner:		Date:	Evaluator:	Brief:		
<p>SCORING: 0= Not done, 1= Done incorrectly, incompletely or out of order, 2= Done correctly in order.</p> <p>✓ Learners must perform each of the <b>6 bolded and shaded</b> items correctly.</p> <p>✓ <b>Bolded</b> (but not shaded) item is often missed clinically and instructors should emphasize its importance.</p> <p>✓ Learners will be evaluated according to their role and scope of practice. For example, if the skill is not within the learner's scope, he/she will be evaluated in the 'assist' role.</p> <p>✓ If the skill is not scored (i.e. consider intubation), the Instructor may provide additional feedback and instruction on these skills.</p>						
Lesson	Possible Points	Item	0	1	2	Comments
2	2	Asks 4 pre-birth questions ( <i>Expected GA, Fluid clear, #Fetuses, Risk factors</i> )				
2	2	Discusses plan and assigns roles to team members				
2	2	<b>Checks equipment to provide warmth, suction, ventilation and targeted oxygenation</b>				
2	2	Asks 3 assessment questions ( <i>Term, Tone, Breathing or Crying</i> )				
3	2	Positions head, clears airway if necessary				
2	2	Dries <sup>1</sup> , stimulates and removes wet towels and repositions head				
2	2	Assesses respirations +/- heart rate <sup>2</sup>				
4	2	<b>Indicates need for and initiates positive-pressure ventilation<sup>3</sup></b> ( <i>Apnea or gasping, heart rate &lt; 100 bpm</i> )				
2	2	Checks for rising heart rate after 15 seconds of PPV <i>*(Instructor note: Heart rate does not improve and chest is not moving)</i>				
2	2	<b>Takes corrective action when heart rate not rising &amp; chest not moving</b> ( <i>Mask readjustment, Reposition: Suction mouth &amp; nose, Open mouth, Pressure increase, Alternate airway</i> )				
No Score	No Score	If unable to ventilate through ET tube ('A' of MR.SOPA) indicates option to suction through ET tube or use ET to suction below the cords				
No Score	No Score	Confirms presence of chest movement, breath sounds and exhaled CO <sub>2</sub> if intubated or LMA in situ				
2	2	Initiates monitoring <sup>4</sup> ( <i>pulse oximeter probe to right wrist or hand +/- ECG</i> )				
2	2	Calls for help, if not already done				
2	2	<b>Provides effective positive pressure ventilation (40-60 bpm) for 30 seconds</b>				
2	2	Re-evaluates heart rate <i>*(Instructor note: Heart rate must remain &lt;60 bpm)</i>				
No Score	No Score	Consider intubation if not already done				
2	2	Demonstrates correct technique for intubation or assisting with intubation				
No Score	No Score	Confirms presence of chest movement, breath sounds/air entry and exhaled CO <sub>2</sub>				
2	2	<b>Identifies need to start chest compressions</b> ( <i>Heart rate &lt;60 bpm despite 30 seconds of effective positive pressure ventilation</i> )				
2	2	<b>Increases oxygen to 100% when initiating compressions</b>				
2	2	<b>Demonstrates correct compression technique for 60 seconds</b> ( <i>2-thumb method, compression depth 1/3 anterior-posterior diameter, complete recoil of chest</i> )				
2	2	Demonstrates correct rate and coordination with ventilation ( <i>Can ask student and assistant to switch positions</i> )				
2	2	Administers blended oxygen to meet targeted saturations using pulse oximeter during resuscitation sequence				Do not score if completing Advanced ISSA
2	2	Continues/discontinues positive-pressure ventilation appropriately or weans oxygen correctly				Do not score if completing Advanced ISSA
Learner's score subtotals						
Learner's total score (add subtotals)						
Total possible score BASIC ISSA (42)						
If learner is completing the ADVANCED ISSA maximum score is 38 as last 2 items of BASIC ISSA are not scored above						
Performed all <b>6 bolded &amp; shaded</b> items correctly? Yes <input type="checkbox"/> No <input type="checkbox"/> Re-evaluate <input type="checkbox"/>						
Learner attained minimum passing score?			Y	Pass		
<b>MINIMUM PASSING SCORE is 35/42</b>			N	Re-evaluate		



Individual Integrated Skills Station Assessment Form - Canadian Adaptation

ADVANCED ISSA

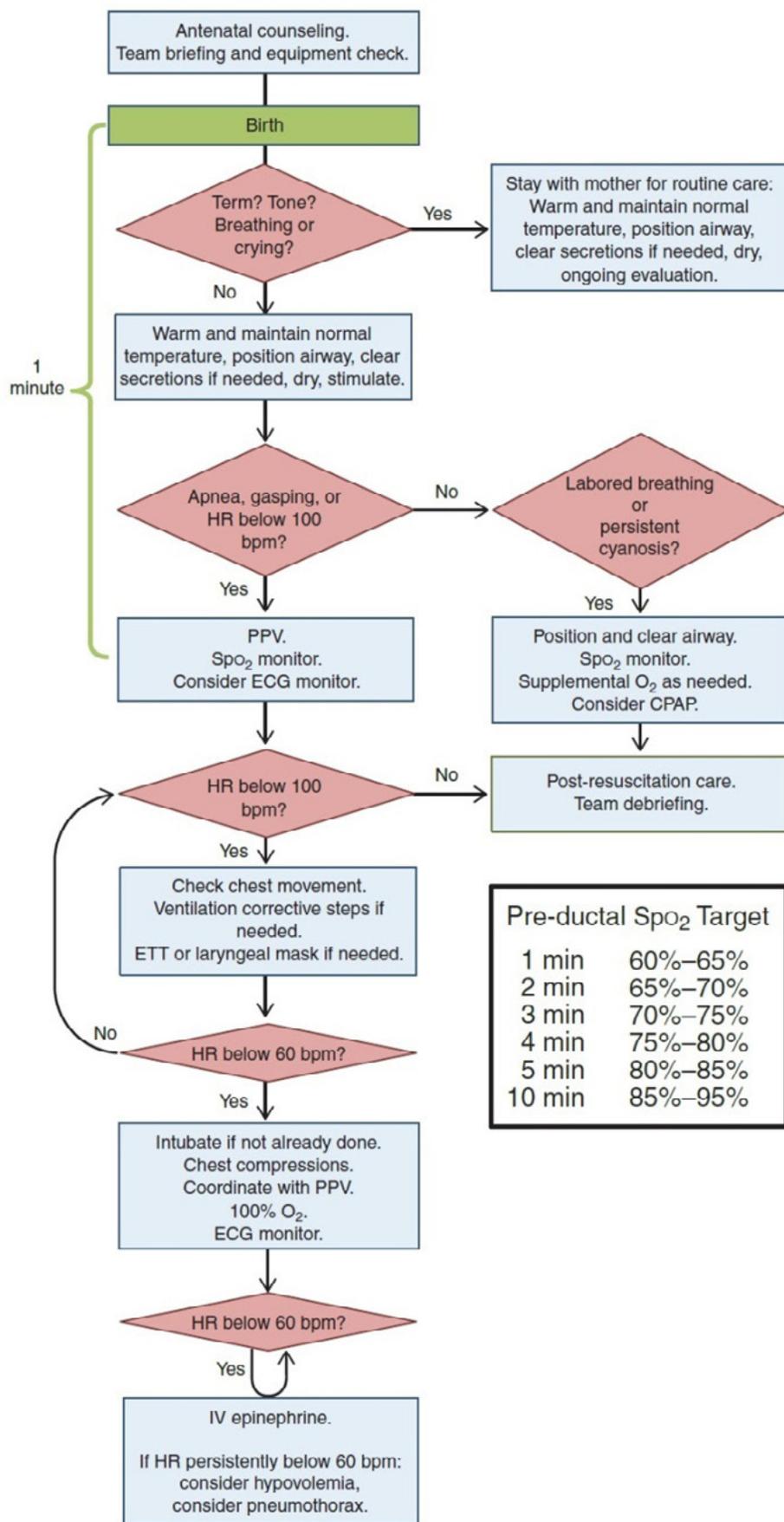
Lesson	Possible Points	Item	0 1 2			Comments
			0	1	2	
7	2	Identifies need for epinephrine <i>Heart rate &lt;60 bpm despite PPV and compressions for 60 seconds</i>				
	2	Identifies correct dose and route for epinephrine (0.1mL/kg IV and 1.0mL/kg ET to maximum of 3mL/dose)				
	No score	Administers ET dose while umbilical catheter being prepared Prepares or assists with preparation of umbilical catheter for insertion Inserts or assists with insertion of umbilical venous catheter Administers epinephrine via umbilical venous catheter Indicates option to insert intraosseous needle if unable to place an umbilical venous catheter	<b>No score</b>			
8-11	2 (optional)	Identifies need for volume administration and administers correct solution, volume and rate of infusion				
	2 (optional)	Identifies additional interventions indicated based on history and clinical response to resuscitation <i>(for example, care of an extremely preterm infant, infant with a pneumothorax, diaphragmatic hernia, etc.)</i>				
	2	Administers blended oxygen to meet targeted saturations using pulse oximeter during resuscitation sequence				
Closure	2	Continues/discontinues positive-pressure ventilation appropriately or weans oxygen correctly				
		Learner's score subtotals (page 2)				
		Learner's total score (add subtotals)				
		Total possible score (46 without optional skills; 48 with 1 optional skill or 50 with 2 optional skills)				
		Performed all <b>6 bolded &amp; shaded</b> items correctly? Yes <input type="checkbox"/> No <input type="checkbox"/> Re-evaluate <input type="checkbox"/>				
		Learner attained minimum passing score? Y Pass N Re-evaluate				
			<b>MINIMUM PASSING SCORE IS 39/46; 40/48 or 42/50</b>			
Learner Self Reflection <i>What went well in this resuscitation?</i>		Learner Self Reflection <i>What would you do differently?</i>				Instructor Feedback
Instructor Signature:		<input type="checkbox"/> Pass <input type="checkbox"/> Re-evaluate (x1 and pass) <input type="checkbox"/> Unsuccessful – advised to retry after review If re-evaluation by a different instructor, please indicate name, date and outcome: _____				

- 1) Drying the skin does not apply to babies <32 weeks; they should be placed wet into a food-grade polyethylene bag below the neck.
- 2) Heart rate may be assessed by auscultation or ECG; respirations may be assessed by chest movement or by auscultation.
- 3) For term infants, begin PPV with 21% oxygen; for infants <35 weeks GA, follow local protocols.
- 4) PPV and assessment of HR are the priority and should not be unduly delayed by the application of a pulse oximeter probe.

For use in Canada

Revised: November 15, 2016

# Appendix 4: Neonatal Resuscitation Algorithm<sup>1</sup>



## Appendix 5: Safe Skin to Skin Positioning<sup>6</sup>

### Skin to skin contact requires safe technique\*

#### Do...

- Place the baby 'tummy to mummy; chest to chest' in an expanded 'frog' position to allow for as much skin- to-skin contact as possible. The baby's limbs should be flexed.
  - In the operating room—as low on the mother's chest and as diagonally as possible without interfering with the surgical procedure
  - In the recovery room (PAR) – vertically between the mother's breasts
- Turn the baby's head so the face can be easily visualized and the airway is not obstructed by breast tissue or blankets.
- Head is in 'sniffing' position, neck is not bent
- Ensure the baby is in an upright position to allow gravity to assist the diaphragmatic breathing. Positioning the baby's abdomen in a soft or hollow spot such as the mother's cleavage or epigastric hollow also allows the abdomen to breath without work.
- Cover the baby's back with a warm towel and put a warm hat on the baby's head.
- Ensure the mother is comfortable – if not, adjust the positioning as needed.
- Ask the partner/support person to place a hand gently on top of the baby for additional support.

#### Do not...

- Position the baby in a side lying position as this limits full skin contact.
- Place the baby in a 'curled-up' position that might impede the airway.
- In the operating room, have the baby so high on the mother's chest that she feels crowded and the baby isn't near the breast.

#### Examples of safe positioning:



\* Adapted from: Interior Health: Royal Inland Hospital, Women's Health and Neonatal Service: Clinical Practice Standard and Procedure, November 2016

## Appendix 6: ACoRN Respiratory Score

ACoRN Respiratory Score			
SCORE	0	1	2
Respiratory rate	40–60 bpm	60–80 bpm	>80 bpm
Oxygen requirement*	None	≤50%	>50%
Retractions	None	Mild to moderate	Severe
Grunting	None	With stimulation	Continuous at rest
Breath Sounds on auscultation	Easily heard throughout	Decreased	Barely heard
Prematurity	>34 weeks	30–34 weeks	<30 weeks
*A baby receiving oxygen prior to the setup of oxygen analyzer should be assigned a score of “1”			
<b>Classification Criteria of the ACoRN Respiratory Score:</b> <ul style="list-style-type: none"> <li>• Mild respiratory distress: &lt;5</li> <li>• Moderate respiratory distress: 5–8</li> <li>• Severe respiratory distress: &gt;8</li> </ul>			
Adapted from Downes JJ, Vidyasagar D, Boggs TR Jr, Morrow GM 3rd, Respiratory Distress Syndrome of newborn infants. I. New clinical scoring system (RDS Score) with acid-base and blood-gas correlations. Clin Pediatr 1970; 9(6):325-31			

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While every attempt has been made to ensure that the information contained herein is clinically accurate and current, Perinatal Services BC acknowledges that many issues remain controversial, and therefore may be subject to practice interpretations.

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