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1.0 Executive Summary

Approximately 90% of births 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%). 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.¹ The provision of timely, skilled assistance to a compromised newborn can impact a lifetime.¹

The 6th 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 contains fewer opinions from experts and more scientific evidence – reflecting the increasing number of research studies in neonatal resuscitation practices. In addition, NRP reflects evidence based changes in learning methodology, with new emphasis on communication, teamwork, simulation and debriefing. A high standard of resuscitation skills, knowledge, communication and team work are pivotal to success.

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.²

- 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 for each of the facilities.

- 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 newborn in transition, including the ability to provide positive pressure ventilation (PPV) and perform chest compressions.¹

- One person with the skills required to perform a complete resuscitation including intubation and delivery of medications should be available.¹

- Teams should follow the principles of family centered care while resuscitating a newborn.

- Every attempt should be made during the antenatal period to identify neonates at risk for requiring additional 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 Pediatric 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).

- Hospitals and/or regions should have multiprofessional 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.³

- Neonatal resuscitation workshops must include the following components:
  - successful completion of the online examination,
  - participation in a skills development/validation station,
  - successful completion of an integrated skills station (megacode), and
  - participation in simulation/debriefing exercises (recommended with use of video recording).

Each participant’s knowledge and performance should be objectively evaluated using the online examination and Canadian megacode checklist.³

- Skills drills or mock codes should be performed frequently at every perinatal designated facility delivering babies by a multiprofessional team to highlight systems and education needs.
The BC Provincial NRP Steering Committee recommends that Health Authorities support the initial and ongoing biennial (or more frequently) NRP renewal educational needs of the multiprofessional team (including physicians, nurses, midwives, respiratory therapists and paramedics) to ensure that the current neonatal resuscitation guiding principles and skills are consistently met.

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 obstetrical sites with equipment and supplies required for neonatal resuscitation.

2.0 Introduction

This document outlines the standards for neonatal resuscitation in BC. The clinical guidelines are described in the Neonatal Resuscitation Textbook, 6th Edition, 2011 and the Addendum to the NRP Provider Textbook 6th Edition: Recommendations for specific modifications in the Canadian context. NRP is an educational program primarily designed to teach the principles and techniques of resuscitation of babies undergoing transition to extrauterine life in the hospital, birth centre or home setting. These principles also apply to the resuscitation of babies during the time the newborn remains an inpatient following birth. Successful completion of NRP and registration with the CPS NRP database do not imply that an individual has the competence to perform neonatal resuscitation. Health Authorities or individual hospitals are responsible for determining the level of competence and qualifications required to assume clinical responsibility for neonatal resuscitation. Each facility should establish a standardized system by which each resuscitation is debriefed by the team to identify team knowledge and skill development needs and systems needs such as equipment, supply and policy issues.

3.0 Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AAP</td>
<td>American Academy of Pediatrics</td>
</tr>
<tr>
<td>ACoRN</td>
<td>Acute Care of at-Risk Newborns</td>
</tr>
<tr>
<td>BC</td>
<td>British Columbia</td>
</tr>
<tr>
<td>BCPDR</td>
<td>British Columbia Perinatal Data Registry</td>
</tr>
<tr>
<td>CPAP</td>
<td>Continuous positive airway pressure</td>
</tr>
<tr>
<td>CPS</td>
<td>Canadian Pediatric Society</td>
</tr>
<tr>
<td>ETT</td>
<td>Endotracheal tube</td>
</tr>
<tr>
<td>ILCOR</td>
<td>International Liaison Committee on Resuscitation</td>
</tr>
<tr>
<td>IPPV</td>
<td>Intermittent positive pressure ventilation</td>
</tr>
<tr>
<td>LMA</td>
<td>Laryngeal mask airway</td>
</tr>
<tr>
<td>NICU</td>
<td>Neonatal Intensive Care Unit</td>
</tr>
<tr>
<td>NRP</td>
<td>Neonatal Resuscitation Program</td>
</tr>
<tr>
<td>PEEP</td>
<td>Peak end expiratory pressure</td>
</tr>
<tr>
<td>PIP</td>
<td>Positive inspiratory pressure</td>
</tr>
<tr>
<td>PPV</td>
<td>Positive pressure ventilation</td>
</tr>
<tr>
<td>PSBC</td>
<td>Perinatal Services of British Columbia</td>
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<tr>
<td>UVC</td>
<td>Umbilical venous catheter</td>
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</table>
4.0 Clinical Significance

- Facilities that offer planned perinatal services must ensure their personnel are capable of neonatal resuscitation, post-resuscitation assessment and stabilization.\(^2\)
- 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 newborn in transition, including the ability to provide positive pressure ventilation (PPV) and perform chest compressions.\(^1\)
- One person with the skills required to perform a complete resuscitation including intubation and delivery of medications should be available.\(^1\)
- Teams should follow the principles of family centered care while resuscitating a newborn.

All facilities where planned births occur must be resourced for neonatal resuscitation training. Healthcare professionals who attend these births must have current knowledge of neonatal resuscitation and be capable of resuscitation, post-resuscitation assessment and initial stabilization.\(^6\)* Neonatal resuscitation is an area where team approach to education and training is used to develop collaboration across disciplines.\(^3\)

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.\(^1,\!) A person should be identified to lead the resuscitation. Ideally this will be the person with the most experience in neonatal resuscitation.

In all facilities an algorithm is essential 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 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 is frightening for the woman and her family. It is crucial that health care professionals offer information and support to the woman and her family and incorporate parental choices.

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* Accreditation Canada standards for obstetrics/perinatal care services (March 16, 2012) outlines within standard 4.0 “the team’s staff, service providers and volunteers are educated, trained, qualified and competent”\(^3\). Standard 4.6 states “the team establishes minimum requirements for specific education and training to deliver obstetrics services based on the scope of services it provides and the needs of its client population”.\(^3\)
4.0 Clinical Significance, cont’d

Identification of Newborns at Risk

- Early identification 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 newborns who will potentially require resuscitation can be identified before birth. 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 provincial antenatal form as well as on the Maternal Fetal Levels of Service Classification Tool. Planning will vary depending on the resources and designated level of care within an institution. The PSBC Levels of Care document can help institutions evaluate their designated level of care.

In all cases, clear communication and a close working relationship are required between various personnel providing care at home, in birth centres, in hospitals and in referral centres.

Neonatal Resuscitation Practices

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

References for table below:


The following items are no longer “optional” in the birth setting, and should be available for every birth:

- Compressed air source
- Oxygen blender to mix oxygen and compressed air with flowmeter
- Pulse oximeter for neonatal use and oximeter probe
- Laryngeal mask airway
Prior to initiating the steps in the NRP algorithm, ask these questions

- What is the gestational age?
- Is the fluid clear?
- How many babies are expected?
- Are there any additional risk factors?

At birth, answer 3 questions to determine the need for initial steps at the radiant warmer

- Is the newborn term?
- Is the newborn breathing or crying?
- Does the newborn have good muscle tone?

Babies born in the presence of meconium

- Suctioning the oropharynx at the perineum is no longer recommended.
- A newborn who is vigorous at birth does not need to receive initial steps at the radiant warmer. They should receive skin-to-skin care with the mother.
- The current practice of intubation and suction below the cords prior to drying, removing the wet linen and stimulating should be continued when a non-vigorous baby is born.

Thermal management

- Universal use of food-grade transparent bags in all births less than 29 weeks gestation or birth weight less than 1000 grams.
- Universal use of servo controlled temperature probes on all babies under radiant warmers for greater than 10 minutes.
- **Therapeutic hypothermia** should be considered within the first 6 hours of life in the stabilized baby ≥ 35 weeks gestation who suffered a perinatal asphyxial event and who develops moderate to severe hypoxic ischemic encephalopathy. It is not initiated during resuscitation or initial stabilization and must be initiated only after consultation with a neonatologist.

Suction as needed

- Routine suctioning of the mouth and nose is not recommended.
- Suctioning following birth should be reserved for babies who have obvious obstruction to spontaneous breathing or who require positive pressure ventilation (as per MR SOPA).

After clearing the airway as necessary, dry and remove wet linen, reposition to open the airway, stimulate, then evaluate respirations and heart rate (not color).

- Begin positive-pressure ventilation if the newborn is apneic or gasping, or the heart rate is less than 100 bpm.
- Consider CPAP, especially for preterm newborns, if respirations are labored and the heart rate is more than 100 bpm.

Subsequently, evaluation and decision-making are based on respirations, heart rate and oxygenation (per pulse oximetry).
Use pulse oximetry applied preductally to monitor lung function and avoid hyperoxemia for:

- preterm babies less than 32 weeks gestation,
- newborns who appear cyanotic at 5 minutes, or you need to confirm your perception of central cyanosis
- babies who require positive pressure ventilation
- babies who require supplemental oxygen in order to obtain oxygen saturation levels as per targeted pre-ductal SpO2 table.

- The pulse oximeter should be set to the manufacturer’s specified mode for neonatal resuscitation.
- The appropriately sized probe should be applied on the right hand first and then attached to the pulse oximeter in order to achieve the fastest readings.
- A compressed air source and oxygen blender must be available in the delivery room to enable titration of the oxygen dose.
- 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.¹

<table>
<thead>
<tr>
<th>Targeted Pre-ductal SpO2 After Birth</th>
</tr>
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<tbody>
<tr>
<td>1 minute</td>
</tr>
<tr>
<td>2 minutes</td>
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<tr>
<td>3 minutes</td>
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<tr>
<td>4 minutes</td>
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<tr>
<td>5 minutes</td>
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<tr>
<td>10 minutes</td>
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<tr>
<td>60 to 65%</td>
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<td>65 to 70%</td>
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<td>70 to 75%</td>
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<td>75 to 80%</td>
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<td>80 to 85%</td>
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<td>85 to 95%</td>
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</tbody>
</table>

Administer 100% oxygen with chest compressions

Initiate resuscitation with 21% oxygen

- Use 21% oxygen at initiation of positive pressure ventilation for all term and preterm babies.

Administer CPAP with 5 cmH₂O pressure for newborns with laboured breathing or persistent cyanosis and a heart rate greater than 100 beats per minute.

- CPAP may be considered as a post-resuscitation care strategy for infants with persistent cyanosis (as evidenced by oxygen saturations less than targeted levels) and/or laboured respirations.
- A difficult clinical question is the definition of “persistent cyanosis” in a spontaneously breathing newborn. The difficulty arises from the inability of observers to agree on when natural, central cyanosis is no longer present. Observational studies suggest that the average age at which central cyanosis is no longer detected in a healthy baby is approximately 5 minutes, however the range is very wide. Unfortunately the appreciation of cyanosis correlates poorly with oximetry, reinforcing the need to apply a saturation monitor when supplemental oxygen is considered.
- Mask or endotracheal ventilation must be considered for all newborns who have persistent cyanosis (as evidenced by oxygen saturations, measured by pulse oximetry, less than targeted levels) despite supplemental oxygen and/or CPAP. Consider consultation with local experts and/or protocols.

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

- Use a pressure gauge in order to administer controlled PEEP and PIP on all self-inflating and flow-inflating bagging systems.
- Initial inflation pressures of 20 cmH₂O are recommended for term and preterm newborns.
- Use PEEP (5 cmH₂O) in all babies needing ongoing positive pressure ventilation.
The most important interventions in NRP, inflation and ventilation of the lungs, have not changed, and are, in fact, being reinforced in the 2011 program with the addition of the mnemonic MR SOPA to the algorithm (modified by the BC Provincial NRP Advisory Committee, January 2013 to improve clarity).

- On initiating PPV, assess for rising heart rate and improving oxygen saturation (per pulse oximetry). If not evident (after 10 breaths), ask an assistant to assess bilateral breath sounds and chest movement. If these are not immediately evident, perform as many of the ventilation corrective steps as needed to achieve bilateral breath sounds and chest movement, with the goal of increasing the heart rate. NOTE: It is possible to provide adequate ventilation without visible chest movement, especially in preterm newborns.

- Note that the timeline down the side of the NRP Flow Diagram stops here, but it may take longer than 30 seconds to establish effective positive-pressure ventilation (defined as rising heart rate and audible bilateral breath sounds).

- If an increase in heart rate does not occur following initiation of positive pressure ventilation, implement **MR SOPA as a reminder of the corrective steps to achieve effective ventilation.** Assess heart rate in addition to breath sounds and chest movement after each corrective step. Effective ventilation has been established if the heart rate has increased despite inadequate breath sounds or chest movement.

**MR SOPA**

| Step 1. M | Mask adjustment  
| R | Reposition, open airway, jaw thrust  
| Provide 10 breaths (once mask to face seal achieved)  
| Evaluate air entry and heart rate  
| Step 2. S | Suction mouth (depth = nose tip to earlobe)  
| O | Open mouth  
| Provide 10 breaths (once mask to face seal achieved)  
| Evaluate air entry and heart rate  
| Step 3. P | Pressure increase to 25/5 cm H2O  
| Provide 10 breaths (once mask to face seal achieved)  
| Evaluate air entry and heart rate  
| Step 4. P | Pressure increase to 30/5 cm H2O  
| Provide 10 breaths (once mask to face seal achieved)  
| Evaluate air entry and heart rate  
| Step 5. A | Airway alternative (ETT or LMA)  
| Evaluate air entry and heart rate  
| Continue pressures at 30/5 and assess the need for decreasing pressures as the heart rate rises.  
| NOTE: The choice of alternative airway will depend on the experience of the practitioner, and should not unduly delay the institution of chest compressions.  
| Provide 30 seconds of effective ventilation before progressing through NRP algorithm.  

- NOTE: Working through the 5 steps of MR SOPA may take up to 3 minutes.
Establishing effective ventilations is the highest priority in neonatal resuscitation. **Do not start chest compressions without first establishing effective ventilation** (defined here by audible bilateral breath sounds and chest movement).

- If heart rate is still below 60 bpm despite 30 seconds of effective positive pressure ventilation, increase the oxygen concentration to 100% and begin chest compressions.
- When the heart rate is below 60 bpm, the pulse oximeter may not function. When chest compressions begin, increase the oxygen concentration to 100% until the oximeter is giving a reliable signal and can guide the appropriate adjustment of supplemental oxygen.
- The two thumb technique is the preferred method to administer chest compressions.
- 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 at least 45 to 60 seconds before stopping briefly to assess the heart rate.

**The intubation procedure ideally should be completed within 30 seconds** (not 20 seconds)

- Do not administer free-flow oxygen during the intubation procedure to an apneic newborn.
- **Intubation is strongly recommended when chest compressions begin** to help ensure effective ventilation.

The laryngeal mask airway (LMA) has been shown to be an effective alternative for assisting ventilation.

- 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.
- Newborns with a complex airway and respiratory distress should be considered for an LMA as the primary strategy, particularly when the resuscitator is not skilled at advanced airway support.

Universal use of CO₂ detectors for all intubations and LMA insertions for the purpose of ventilation.

- The CO₂ detector should be used as the primary method for confirming endotracheal tube and laryngeal mask airway placement.

Epinephrine is indicated when the heart rate remains below 60 bpm after 30 seconds of effective assisted ventilation (preferably via endotracheal tube) and 45 to 60 seconds of coordinated chest compressions and effective ventilation with 100% oxygen.

- The preferred route for epinephrine is via an umbilical venous catheter. The intratracheal route is associated with unreliable absorption and is likely to be ineffective.
- The Canadian recommended dose of epinephrine (1:10,000 solution) is 1 mL/kg (maximum 3 mL) per ETT (first dose while preparing for insertion of an umbilical venous catheter) and 0.1 mL/kg per IV. Prepare the endotracheal dose in a 3 mL syringe and the intravenous dose in a 1 mL syringe to reduce the chances of a medication error.

**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.
Availability and Maintenance of Equipment, Supplies and Medications

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

Equipment required in neonatal resuscitation areas in perinatal designated facilities now includes a t-piece resuscitator, CO₂ detector, pulse oximetry, oxygen analyzer, the ability to administer blended air-oxygen from 21% to 100% oxygen, and laryngeal mask airway. This equipment 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
- to upgrade or replace equipment
- for preventative maintenance
- for 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 7.0 Special Considerations.

5.0 Administration

- Hospital and/or regional based multi-disciplinary 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

Responsible of hospital-based and/or regional-based multiprofessional 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 NRP Steering 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.
5.0 Administration, cont’d

**National NRP Steering Committee**
- manages, supports and promotes the AAP/AHA Neonatal Resuscitation Program (NRP) in the Canadian context
- establishes guidelines for training
- ensures reciprocity of status intra-provincially and with the U.S.
- encourages research in neonatal resuscitation.

**Canadian Paediatric Society (CPS)**
- coordinates and supports the activities of the National NRP Steering Committee
- publishes the Textbook of Neonatal Resuscitation in English and French for Canada
- distributes all NRP education materials
- communicates NRP updates and changes
- develops and maintains a national database to track instructor trainers, instructors, providers and courses.

6.0 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.3
- Neonatal resuscitation workshops must include the following components:
  - successful completion of the online examination,
  - participation in a skills development/validation station,
  - successful completion of an integrated skills station evaluated objectively using the Canadian megacode checklist, and
  - participation in simulation/debriefing exercises (recommended with use of video recording).
- Skills drills or mock codes should be performed at every perinatal designated facility delivering babies by a multi-disciplinary team to highlight systems and education needs.
- The BC NRP Steering Subcommittee recommends that Health Authorities support the initial and ongoing biennial (or more frequently) NRP renewal educational needs of the multiprofessional 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.5 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.4

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.4

The Provincial NRP Steering 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.5
6.0 Ongoing Education and Training Programs, cont’d

Skills, knowledge, and individual and team roles should be practiced by the multiprofessional 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.

7.0 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. Consultation with the regional perinatal leads may be required to meet this standard of care.

In an out-of-hospital birth environment where there may only be two practitioners present, umbilical vein catheterization 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 which do not provide planned perinatal services require discussion and planning.

8.0 Clinical Performance Indicators

PSBC Perinatal Database - Clinical Data Variables

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

- Apgars at 1, 5 and 10 minutes
- 1st temperature within the 1st hour of life
- Suction: oropharynx, trachea, unspecific
- Oxygen administration (yes/no, days on oxygen)
- CPAP (days only – not specifically for resuscitation)
- IPPV by mask (yes/no)
- IPPV by ETT (yes/no)
- Chest compressions (yes/no)
- 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 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 for all babies that required resuscitation at birth will be monitored annually and presented to the Provincial NRP Steering Committee for discussion and identification of issues.

9.0 References

7. AHA/AAP (2012). NRP Instructor Update. Spring/Summer;21(1)

Websites

Perinatal Services BC (PSBC); http://www.perinatalservicesbc.ca
BC Perinatal Levels of Care/Service: http://www.perinatalservicesbc.ca/Guidelines/PerinatalLevelsOfCare/default.htm
Canadian Paediatric Society (CPS) NRP; http://www.cps.ca/en/nrp-prn
American Academy of Paediatrics (AAP); http://www2.aap.org/nrp
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Janet Walker, RN  Provincial Lead, Education and Quality, PSBC

Suggested Review September 2015
Appendix 1

Neonatal Resuscitation Supplies And Equipment

1. Thermoregulation
   - Food-grade transparent 1 gallon sized bags (for use at birth if less than 29 weeks gestation or birth weight less than 1000 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 straight endotracheal tubes: 2.5-, 3.0-, 3.5-mm internal diameter (ID)
   - Stylet 6F
   - Exhaled CO₂ 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
     - 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
   - 2% chlorhexidine with 4% alcohol solution or 2% chlorhexidine swab sticks
   - Umbilical tie tape
   - Umbilical catheters: 3.5F, 5F
   - 2 x three-way stopcocks
   - 0.9% NaCl 10 mL prefilled syringes
   - Sterile drape
   - Mosquito forcep or curved forcep
   - Needle driver
   - 3-0 silk suture
   - 2 x 2 gauzes
   - Syringes: 1, 3, 10, 30, and 60 mL
   - Umbilical vessel securing device or tape
   - Umbilical clamp

7. Medications
   - Epinephrine 1:10,000 (0.1 mg/mL): 3 mL or 10 mL ampoules
   - 0.9% NaCl for flushes
   - Isotonic crystalloid (0.9% NaCl or Ringer's lactate) for volume expansion: 100 mL or 250 mL bag
   - Dextrose 10% (NOTE: Not used for volume expansion): 250 mL bag

8. Needle aspiration
   - Sterile gauze 2 x 2
   - 23 g butterfly
   - IV catheter: 20G, 18G
   - 2% chlorhexidine with 4% alcohol solution or 2% chlorhexidine swabsticks
   - 3-way stopcock
   - 20 mL syringe (luer lock tip)
   - Transparent dressing (Tegaderm)

9. Miscellaneous
   - Gloves, goggles, mask, long sleeved gowns for personal protection
   - Timer
   - Stethoscope with neonatal or infant head
   - Tape: ½ or ¾ inch
   - Cardiac monitor and electrodes (optional)
   - Hats
   - Towels/warmed linen
## British Columbia Newborn Resuscitation Record

### 1 TIME

<table>
<thead>
<tr>
<th>ACTUAL TIME</th>
</tr>
</thead>
</table>

### 2 ASSESSMENT

<table>
<thead>
<tr>
<th>RESPIRATORY EFFORT</th>
<th>COLOUR</th>
<th>TONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Good breathing</td>
<td>P = Pink</td>
<td>✓ Good motion</td>
</tr>
<tr>
<td>✓ Hypoventilation</td>
<td>M = Mottled/Pale</td>
<td>Ø Absent</td>
</tr>
<tr>
<td>✓ Cyanosed</td>
<td>C = Cyanosed</td>
<td></td>
</tr>
</tbody>
</table>

### 3 INTERVENTIONS

- Interventions, e.g., suction/secrections, ETT and UVC insertion (tube/catheter size, insertion depth, inserted by, confirmation method) and infant response
- Medications and volume expander (dose/route/administered by)
- Transfer time and location

### 4 NOTES

- If more space is required, continue on back

<table>
<thead>
<tr>
<th>Device:</th>
<th>T-piece</th>
<th>Self Inflating</th>
<th>Flow Inflating</th>
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</thead>
</table>

### CHEST COMPRESSIONS

<table>
<thead>
<tr>
<th>Device:</th>
<th>1-place Self Inflating (cm H2O)</th>
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### O2 % ON BLENDER

<table>
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<tr>
<th>O2 %</th>
<th>ON BLENDER</th>
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</thead>
</table>

### VENTILATION

<table>
<thead>
<tr>
<th>RATE (per minute)</th>
<th>PIP</th>
<th>PEEP or CPAP</th>
</tr>
</thead>
</table>

### MASK (M)

- LMA (L)
- ETT (E)

### VOL EXP - IV

<table>
<thead>
<tr>
<th>10 mL / kg</th>
<th>1 mL / kg</th>
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</table>

### EPI - ETT

- ETT Size
- ETT Insertion Depth
- ETT Insertion Method

<table>
<thead>
<tr>
<th>1 kg</th>
<th>2 kg</th>
<th>3 kg</th>
<th>4 kg</th>
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### EPI - IV

- ETT Size
- ETT Insertion Depth
- ETT Insertion Method

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<th>1 mL / kg</th>
<th>0.1 mL / kg</th>
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### VOL EXP - IV

- ETT Size
- ETT Insertion Depth
- ETT Insertion Method

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<th>10 mL / kg</th>
<th>10 mL / kg</th>
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**Appendix 2**

**British Columbia Newborn Resuscitation Record**

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**Provincial Perinatal Guidelines: Standards for Neonatal Resuscitation**
# British Columbia Newborn Resuscitation Record

<table>
<thead>
<tr>
<th>1 TIME</th>
<th>2 ASSESSMENT</th>
<th>3 INTERVENTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTUAL TIME</td>
<td>AGE (in minutes)</td>
<td>RESP EFFORT</td>
</tr>
<tr>
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## 4 NOTES

**ADDITIONAL NARRATIVE NOTES**

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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 interpretation.
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