Neonatal Intensive Care Unit (NICU) Levels of Care

Guidance Document

Version 1.0

Critical Care Services Ontario
Updated March 2021

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CCSO is funded by the Government of Ontario.

Levels of Care Guidance Document for the Neonatal Intensive Care Unit	
Version 1.0	Developed February 2021
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Introduction to Critical Care Services Ontario

Established in 2005, Critical Care Services Ontario (CCSO) was initially responsible for the early implementation of Ontario's Critical Care Strategy. Today CCSO continues to function with a provincial focus coordinating and developing integrated system solutions for Ontario's critical care system and associated specialty programs. CCSO's work is the result of an ongoing collaboration between critical care providers, hospital administrators, and regional and provincial health system partners including the Ministry of Health.

CCSO has been an instrumental component in the evolution of an integrated critical care system for Ontario. Working closely with system partners, CCSO's implementation of improvement initiatives has facilitated a stronger networked system of care, the development of knowledge translation and educational opportunities, and data analytics to support performance management and system standards.

CCSO provides leadership to facilitate system change and provincial alignment to advance critical care services underpinned by a framework for system improvement. This has been applied across all CCSO program areas including Adult, Paediatric and Neonatal Critical Care, as well as specialty programs in Neurosurgery, Trauma and Burns, and the Life or Limb Policy. (https://criticalcareontario.ca/about/#overview).

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Acknowledgments

The purpose of the Neonatal Intensive Care Unit (NICU) Levels of Care Task Force was to develop revised levels of care document applicable to current practice and service within level 2 and level 3 NICUs in Ontario. This document contains criteria that are based on evidence-informed practiceand input from key stakeholders. The goal is to ensure that neonates have access to a consistent and appropriate level of care close to home and when required. This work has been undertaken by a task force comprised of clinical and operational representatives from both level 2 and level 3 NICUs from across Ontario. The task force also used data provided through a system-level evaluation that was completed in the fall of 2018. This work also takes into account previous work to establish the Maternal and Neonatal Levels of Care completed by the Provincial Council for Maternal and Child Health (PCMCH) in 2011 and updated in 2013.

NICU Levels of Care Task Force Members:

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We would like to thank the NICU Levels of Care Task Force Members for their work and commitment to ensuring that neonates in Ontario have access to a consistent and appropriate level of care.

1. Introduction

1.1 Introduction to the Guidance Document

The purpose of this guide is to outline the expected service level of care to be provided to neonates based on a NICU's level of care. The goal of these levels of care recommendations is to update the Levels of Care definitions for neonatal critical care units to reflect a consistent standard of unit capabilities and expectations, and to operationalize the revised levels to support the following objectives:

- Establish a common standard/understanding regarding unit level capacity and capability;
- Provide a mechanism to ensure units are accountable for providing the Level of Care based on the updated defining criteria; and
- Facilitate efficient patient flow across NICU levels of critical care.

2. Enhancing NICU Critical Care Levels in Ontario

2.1 Background for the NICU Levels of Care

In 2008, the Provincial Council for Maternal and Child Health (PCMCH) created the Maternal-Newborn Advisory Committee Access Work Group to determine the optimal provincial system of care for maternal and newborn services. (PCMCH, 2010). The Access Work Group included representation from family medicine, midwifery, neonatology, pediatrics, and perinatology (PCMCH, 2010).

Following a system level evaluation completed by PCMCH for the maternal-newborn levels of care, it was determined that the existing criteria within the current NICU levels of care required updating to reflect evolving practices. Critical Care Services Ontario (CCSO) convened a group of system leaders from across the province to provide input and guidance reflecting evidence informed practice. This group, the NICU Levels of Care Task Force, represented the operational and clinical perspective from across Level 2 and Level 3 NICUs including representation from Neonatal Transport, neonatal networks and PCMCH

By strengthening the existing maternal-newborn levels of care and adding NICU-specific thresholds and targets when required, there will be more clarity around what is expected for specialized neonatal care in Ontario. The revised NICU levels of care will be reviewed by each organization with approval and sign back provided by the by the hospital Chief Executive Officers (CEOs). This will also establish accountability for the criteria and support of patient flow in the system.

3. Suggested Human Resource Requirements for NICUs

The following suggested Health Human Resource Requirements for NICUs do not specify staffing ratios and the recommendations are for consideration based on a specific NICU level of care, infant acuity and evidence informed information.

3.1 Physician

The provision of medical coverage may vary based on the level of neonatal care. For all level 2 NICUs it is suggested that Paediatricians are the medically responsible care provider with access to a Neonatologist at a Regional Tertiary unit for advanced consults as required. For the level 3 NICUs, Neonatologists are required to be the most responsible care provider due to the complexity and acuity of infants.

3.2 Nursing:

The provision of clinical skills of registered nurses within NICUs will vary depending on the level of care of the NICU. The neonatal nurse is also an advocate for both the infant and family, who works collaboratively with and leveraging family strengths to other members of the interprofessional team to achieve mutually agreed upon goals of care (NANN, 2013).

3.3 Allied health:

The suggested professional staff listed below is not meant to be all inclusive and the number and type of additional professional staff may vary depending on the NICU level of care within an organization. Additional professional staff not listed here may also be included such as Social Work, Pastoral Services, Physiotherapy and/or Occupational therapy.

- **Respiratory Therapists** should be available to support the NICU 24/7/365 for level 2a and 2b NICUs. For the level 2c NICUs, is it recommended to have a RT dedicated to the NICU. For the level 3s, the NICU will require dedicated RTs who have expertise in neonatal respiratory support and must be available 24/7/365.
- **Dieticians** should be available to the NICUs to support the provision of donor milk. Also, for Level 3 NICUs dietician support for neonatal nutritional expertise is a requirement.
- **Pharmacists,** in addition to providing expertise on relevant medications, dosing, routes of administration etc., should also be available to the NICUs to support the provision of standardized TPN solutions as needed. Also, for Level 3 NICUs the expectation is for 7 days a week coverage of staff with neonatal pharmacological expertise.
- **Lactation consultants** should be available for the initiation of early feeding and breast-feeding support in all NICUs across all levels of care.

4. Revised NICU Levels of Care (2021)

4.1 Gestational Age and Weight Criteria

The gestational age and birth weight criteria established by PCMCH in 2013, were discussed and deemed not in need of revision for this iteration of the NICU Levels of Care recommendations. However, the existing criteria were strengthened by the Task Force to define access to care for acute care infants (i.e., infants within the first 72 hours of life). It was also agreed by the Task Force that the maternal and neonatal levels of care would remain congruent to ensure that NICUs did not provide care that was not in alignment with existing maternal services.

In addition to the clarification of criteria for acute care infants, the Task Force also reviewed the criteria for "retro-transfers" that was established by PCMCH in 2013. (PCMCH, 2013). In order to facilitate the continuum of care and to foster the concept of appropriate care closer to home, the criteria for infants being transferred closer to home were revised to reflect current practice.

4.2 Required Standard Criteria for NICUs

The following tables reflect the updated criteria for neonatal levels of care for Ontario NICUs implemented in spring 2021. The revised criteria include practices that are evidence-informed and considered to be the standard level of care for neonatal intensive care units.

Required Standard Treatment for All NICUs: General Laboratory Testing	
Criterion	**Availability**
Bacterial and viral studies	24/365 or available via on-call within 30 minutes
Bacterial smear	24/365 or available via on-call within 30 minutes
Blood type and combs	24/365 or available via on-call within 30 minutes
Continuous O_2 saturation monitoring	24/365
Drug screening	Regional
Metabolic screening	Results available within 12-24 hours depending on the test requested
Micro technique for neonates – all routine blood work and newborn screening	24/365
Therapeutic drug monitoring	24/365 or available within 24 hours
Umbilical cord blood pH	24/365 or available via on-call within 30 minutes

Required Standard Criteria for all Neonatal Intensive Care Units:
Criteria for Level 2a NICUs

Acute Care Criteria: Gestational age ≥ 34 weeks and 0 days ***and*** a birth weight of > 1800 grams

Repatriation Criteria: Stable infants with a corrected age of > 32 weeks and 0 days ***and*** a weight of > 1500 grams and not requiring ventilator support or advanced treatments or investigations.

Criteria (category)	Detail of Criteria (as needed)	Availability
Neonatal resuscitation	A minimum of 1 person who attends every delivery must be current in the provision of neonatal resuscitation as per CPS Guidelines for Neonatal Resuscitation Program.	24/365
Administration of blood products		24/365 or available via on-call within 30 minutes
Catheterization of the umbilical vein		24/365 or available via on-call within 30 minutes
Drainage of pneumothorax		24/365 or available via on-call within 30 minutes
Enteral feeds	Gavage feeding available	24/365
	Use of pumps for enteral feeds – via slow bolus &/or continuous feeds	24/365
Lumbar puncture		24/365 or available via on-call within 30 minutes
Management of substance-exposed infants requiring oral pharmacologic management		24/365
Oxygen therapy	Short term for stabilization or management	24/365
Prostaglandin E1	Available for IV administration	24/365
Ventilation **Recommend consultation with tertiary centre if baby still requires CPAP at 4-6 hours of age.**	Surfactant is available for administration after consultation with tertiary site via CritiCall	24/365 or available via on-call within 30 minutes
	Intubation prior to transport	24/365 or available via on-call within 30 minutes
	Ability to initiate positive pressure ventilation with or without initiation of CPAP	24/365
	CPAP management – including ongoing evaluation and management of an infant for up to 4-6 hours or until transport team arrival.	24/365 or available via on-call within 30 minutes
IV management for up to 48 hours (short term)		24/365

Standard Treatment – All Level 2a Standards Plus Additional Items for Level 2b NICUs **Acute Care Criteria**: Babies born at a gestational age of ≥ 32 weeks *and* 0 days ***and*** a birth weight of > 1500 grams **Repatriation Criteria**: Stable infant with a corrected age > 30 weeks and 0 days ***and*** a weight > 1200 grams ***and*** not requiring any form of invasive or non-invasive ventilation, or advanced treatments or investigations.		
Criteria	**Detail Criteria**	**Availability**
Surfactant administration	Ability to intubate and administer surfactant, extubate to CPAP for short term (< 4 hours) management	24/365 or available via on-call within 30 minutes
CPAP duration and management **Recommend consultation with tertiary centre via CritiCall required if baby requires CPAP at 4-6 hours of age**	CPAP management can be provided for up to 48 hours of age NOTE: Maximum Parameters for CPAP (Must consult via CritiCall required if these are reached or exceeded at any time): $FiO_2 \geq 30\%$ and/or PEEP Pressure > 8 cm H_20 and/or rapidly increasing pressure requirements	24/365 or available via on-call within 30 minutes
Invasive Ventilation **Requires consultation via CritiCall with tertiary centre.**	Ability to initiate as a temporary intervention until transport team arrives. Non-invasive respiratory support using any form of high flow nasal cannula FiO_2 and noninvasive ventilation is not recommended	24/365 or available via on-call within 30 minutes
Central line maintenance - umbilical &/or peripheral or Percutaneous Intravenous therapy	Includes surveillance for Catheter-related bloodstream infection (CRBSI)	24/365 or available via on-call within 30 minutes
Intravenous Therapy	Able to provide IV therapy for greater than 1 week (long term)	24/365
Total Parenteral Nutrition (TPN)	Standard solutions available for administration	7 days/week or Dietician expertise required if patient-specific TPN to be ordered.
Use of Donor Milk	For information on eligibility requirements, please refer to the Rogers Hixon Ontario Human Milk Bank	Able to provide donor milk as required

Standard Treatment – Additional for Level 2c NICU **Acute Care Criteria:** Babies born at a gestational age of ≥ 30 weeks and 0 days ***and*** a birth weight of > 1200 grams **Repatriation Criteria**: Baby with a corrected gestational age of ≥ 28 weeks and 0 days ***and*** a weight of ≥ 1000 grams; stable on CPAP for a minimum of 48 hours and not requiring non-invasive or invasive ventilatory support.		
Criteria	**Detail Criteria**	**Availability**
Thoracentesis and/or chest tube initiation and maintenance		24/365
Echocardiography		On-call or alternate availability within 48 hours and remote reporting to cardiology.
Electroencephalogram (EEG)		On-call or availability within 48-72 hours Ability to have remote reporting to neurology
Invasive BP monitoring capabilities		24/365
Non-invasive ventilation	Must consult tertiary care via CritiCall if any of the following occur: • $FiO_2 \geq 30\%$ • PEEP > 8 cmH_2O **and/or** • Rapidly increasing pressure requirements May be able to provide non-invasive support for up to 14 days of age	24/365
Invasive Ventilation	Ability to initiate as a temporary intervention until transport team arrives Requires consultation via CritiCall with tertiary centre if baby requires invasive ventilatory support at 4-6 hours of age. If invasive ventilation is required it may be continued up to 48 hours of age in consultation with a tertiary centre.	24/365
Neonatal Follow up Clinic	Specific services offered by the Neonatal Follow-up Program vary by each program or region.	Access regionally or access Tertiary Care as necessary
PICC line maintenance		24/365

Standard Treatment – Additional for Level 2c NICU **Acute Care Criteria:** Babies born at a gestational age of ≥ 30 weeks and 0 days ***and*** a birth weight of > 1200 grams **Repatriation Criteria**: Baby with a corrected gestational age of ≥ 28 weeks and 0 days ***and*** a weight of ≥ 1000 grams; stable on CPAP for a minimum of 48 hours and not requiring non-invasive or invasive ventilatory support.		
Criteria	**Detail Criteria**	**Availability**
Retinopathy of Prematurity screening	Screening may be done by Ophthalmology or through the use of a RetCam™ if available.	Ability to provide screening 52 weeks/year and to do weekly screening when required May be done locally or Regionally
Use of Donor Milk	For information on eligibility requirements, please refer to the Rogers Hixon Ontario Human Milk Bank	Able to provide donor milk as required

Standard Treatment – Additional for Level 3a and 3b NICUs **Acute Care Criteria:** Babies born of any gestational age and birth weight		
Criteria	**Detail Criteria**	**Availability**
Amplitude integrated Electroencephalography (aEEG)		24/365
Echocardiography		24/365 or available within 30 minutes via on call
Unstable respiratory and cardiovascular systems	Long term management of high acuity infants and medically complex and fragile infants	24/365
Ventilation	All modalities, unlimited duration	24/365
Optional for 3a: Management of babies with Hypoxic Ischemic Encephalopathy (HIE) with the use of an active thermal device		24/365
Pathology	**Laboratory analysis**	
Additional Requirements Level 3b (optional for Level 3a)		
Management of babies with Hypoxic Ischemic Encephalopathy (HIE) with the use of an active thermal device		
Continuous EEG capabilities	Available within 12-24 hours	
On-site surgical and/or sub-specialty capabilities	24/365 or available on call within 30 minutes	

5. Conclusion

CCSO and partners have updated the NICU Level of Care to develop clear and measurable definitions, the scope of services and admission criteria according to the designations. All revisions and updates incorporate evidence-informed current practices where possible and consensus of the Task Force in circumstances when published evidence was not available. NICUs will determine their Level of Care by completing the self-assessment tool.

To ensure neonates are receiving appropriate care in NICUs with corresponding capabilities, all NICU's will be accountable for maintaining their self-identified Level of Care. The updated Levels of Care will allow better understanding of each NICU's capabilities and promote improved patient flow in the system. Using data analysis and a Performance Management framework, CCSO will work to ensure accountability of each NICU to its designation and ensure that Ontario's youngest patients and their families have access to the most appropriate level of care when required.

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