



Critical Care
Services Ontario



Paediatric Levels of Care Guidance Document

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Information for Hospital and System Stakeholders

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About Critical Care Services Ontario

Established in 2005, Critical Care Services Ontario (CCSO) led the implementation of Ontario's first Critical Care Strategy and now centrally coordinates and develops integrated system solutions for critical care (Adult, Paediatric and Neonatal) and specialty programs aligned with critical care (Neurosurgery, Trauma and Burns, and the Life or Limb Policy). CCSO's work is the result of an ongoing collaboration between critical care providers, hospital administrators, partners from the Ministry of Health, Ontario Health, and other health system leaders.

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1.Introduction

The purpose of this guide is to outline the criteria and requirements that Paediatric Intensive Care Units (PICUs) are expected to meet in order to operate as a Level 3 (L3), Level 2 (L2) or Sub-specialty units, in consideration of 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 defining criteria; and
- Facilitate efficient patient flow across PICU levels of critical care.

2.Enhancing PICU Critical Care Levels in Ontario

2.1 Background for the PICU Levels of Care

Based on the advice from the Paediatric Critical Care Advisory committee (PCCAC), a PICU Levels of Care (PLOC) taskforce was convened in April 2022 to help develop an evidence and consensus based levels of care criteria applicable for Ontario PICUs.

The PLOC Task Force included the representation from operational and clinical leaders from across Level 2 and Level 3 PICUs. Additionally, one representative each from Adult ICUs, Neonatal ICUs, and PCMCH participated to ensure alignment across the system.

The PLOC criteria and associated requirements supported by the PLOC taskforce have been developed in alignment with the hospital based paediatrics' levels of care standards developed by Provincial Council for Maternal and Child Health (PCMCH)¹.

Establishing Paediatric Levels of Care Criteria provides clarity on the expectation of Level 3, Level 2 and Sub-specialty PICUs across Ontario. These levels of care criteria will be reviewed and approved by the PCCAC. Paediatric hospitals will then review the criteria and apply them against the current service capabilities of their PICUs and verify by hospital CEO sign back the level of care applicable for each PICU. The sign back on the level of care for the PICUs will also establish accountability for the criteria and support of patient flow in the system.

¹https://www.pcmch.on.ca/wp-content/uploads/PLC-Summary-Report_June-2021-FINAL.pdf

3. PICU Levels of Care Criteria

The levels of care criteria for Level 3, Level 2 and Sub-specialty Paediatric Intensive Care Units in Ontario is presented in the tables below. The criteria presented do not intend to describe admission and/or discharge criteria of individual patients. Rather, they seek to describe the expected structure and organization of PICUs, as well as the minimum clinical capabilities a unit must be able to provide. These PICU Levels of Care criteria include practices that are evidence-informed, where evidence is available, and are considered to be the standard for levels of care for paediatric intensive care units in Ontario.

3.1 Governance Criteria and Accountabilities for PICUs

The following table outlines the minimum governance criteria and accountabilities that are expected for Level 2, Sub-specialty and Level 3 PICUs.

Area of Focus	Level 2 PICU	Level 3 PICU	Level 2 Subspecialty PICU
Goal & objectives within the paediatric critical care system	<p>Provides an intermediate level of critical care</p> <p>Operates as a provincial bed/resource that is available for all appropriate paediatric critical care admissions</p> <p>Operates as a closed unit with admit / discharge decisions by a single unit most responsible physician (MRP)</p>	<p>Provides the highest level of critical care</p> <p>Operates as a provincial bed/resource that is available for all appropriate paediatric critical care admissions</p> <p>Operates as a closed unit with admit / discharge decisions by a single unit MRP</p>	<p>Provides component of advanced care that aligns to one or more paediatric sub-specialties often requiring critical care resources</p> <p>Operates mainly as a Children's Hospital resource with a goal of increasing accessibility into a local level 3 PICU</p>
Hospital capabilities	<p>Designated as "Level 2 Large" or higher for PLC Level & Peer Group in the Provincial Council for Maternal and Child Health (PCMCH) Hospital Levels of Care (LOC) report¹ (p. 4)</p> <p>The hospital has a level L2c or higher Neonatal Intensive Care Unit (NICU)</p>	<p>Designated as "Level 3 AHSC" for PLC Level & Peer Group in the PCMCH Hospital LOC report¹ (p. 4)</p> <p>The hospital has a L3 Neonatal Intensive Care Unit (NICU)</p>	
Partnership	Unit operates in partnership with a Level 3 PICU (L3 referral centre if at a separate facility) to	N/A	Operates in partnership with a local L3 PICU

Area of Focus	Level 2 PICU	Level 3 PICU	Level 2 Subspecialty PICU
	ensure alignment in practices (e.g. escalation and de-escalation thresholds, referral/transfer process planning, patient/program advice)		
Unit medical administration	<p>Unit operation oversight is by a local paediatric intensivist² (medical director)</p> <p>Minimally the paediatric critical care medical director will review, update, and maintain:</p> <ul style="list-style-type: none"> • Admission/discharge/Transfer parameters; • Physician and multi-professional staff education/training on unit clinical operations; • Appropriate space (beds located in a defined space vs distributed beds) • Appropriate equipment; • Unit policies and procedures; • Patient safety / quality improvement (QI) activities; • Patient transport considerations; • Rapid and code blue response systems 	<p>Unit operation oversight is by a local paediatric intensivist² (medical director)</p> <p>Minimally the paediatric critical care medical director will review, update, and maintain:</p> <ul style="list-style-type: none"> • Admission/discharge/Transfer parameters; • Physician and multi-professional staff education/training on unit clinical operations; • Appropriate space; • Appropriate equipment; • Unit policies and procedures; • Patient safety / quality improvement (QI) activities; • Patient transport considerations; • Rapid and code blue response systems 	<p>Unit operation includes involvement of a paediatric intensivist² from a Level 3 PICU located at the same site</p> <p>Minimally the paediatric intensivist is involved with decision-making pertaining to unit admission and discharge parameters that are both safe, and meaningfully support local Level 3 PICU patient flow</p>
Most Responsible Physician (MRP)	On a day-to-day basis, a single unit MRP that is either a Paediatric Intensivist ² or Paediatrician	A single unit MRP that is a Paediatric Intensivist ²	A single unit MRP that is either a Paediatric Intensivist ² , Paediatrician, or Paediatric sub-specialist. MRP specialty and

² Please see section 3.3: "Suggested Human Resources requirements for PICUs" for the definition of Paediatric Intensivist

Area of Focus	Level 2 PICU	Level 3 PICU	Level 2 Subspecialty PICU
			training should appropriately match the clinical scope of the unit
High-level description of unit minimum clinical capabilities	<p>Non-invasive ventilation</p> <p>Single circulatory supportive infusion</p>	<p>Invasive and non-invasive ventilation</p> <p>Multiple/high dose/rapidly titrating circulatory supports</p> <p>Renal Replacement and other advanced therapies available</p>	<p>Unit is aligned with and supports a defined subspecialty clinical program at the Children's Hospital (e.g., transplant, neurosurgery, etc.)</p> <p>The unit provides a minimum of one critical care therapy or support only available in a PICU, and not available on general wards (See <i>Section 3.4: "Clinical requirements for PICUs" for additional details.</i>)</p>
Accountability	Patient and Unit data tracked in Critical Care Information System (CCIS) in accordance with HSAA or similar agreements		
Surge responsibilities	<p>Each unit will develop a Critical Care Surge Capacity Management Plan according to the principles and elements outlined in CCSO Critical Care Surge Capacity Management framework. This will be done in collaboration with the hospital to ensure alignment with the overall corporate Critical Care Surge plans.</p> <p>In times of system level demand approaching Moderate or Major Surge criteria, the unit will operate in a manner that maximizes access for in- and out-of-region patients (If the hospital's critical care program is in surge themselves, the hospital will be supported by Surge Capacity Management plans at the local, regional, and/or provincial levels).</p>		<p>In times of system level demand reaching Moderate or Major surge criteria, the unit operate in a manner that maximizes local Level 3 unit accessibility for provincial patients, consistent with the hospital's Critical Care Surge Capacity Management Plan</p>

3.2 Hospital Services Expectations for Facilities with PICUs

All hospitals with a PICU are expected to be capable of providing hospital services as outlined in the PCMCH Hospital Paediatric Levels of Care (PLC) report. The laboratory, imaging, and graphic services listed below must also be available to all paediatric patients regardless of age or size and be conducted and interpreted with paediatric expertise.

Area of Focus	Hospital with Level 2 PICU	Hospital with Level 3 PICU +/- L2 Subspecialty PICU
PCMCH Hospital Paediatric Levels of Care (PLC) Document	Meets the mandatory (p.10-13) and highly recommended (p. 16-17) criteria for Level 2 designated hospitals as per PCMCH Hospital PLC report ¹	Meets the mandatory (p.12-15) and highly recommended (p. 16-17) criteria for Level 3 designated hospitals as per PCMCH Hospital PLC report ¹
NICU Capabilities	Minimum Level 2c NICU on site (Please refer to Level 2C NICU description and criteria in the NICU LoC guidance document ³)	Level 3 NICU on site (Please refer to Level 3 NICU description and criteria in the NICU LoC guidance document ³)
Laboratory Services	Standard hematology, biochemistry, and microbiology labs	Standard hematology, biochemistry, and microbiology labs Point-of-care gas analyzer (available to Level 3 PICU)
Imaging Services	<ul style="list-style-type: none"> • X-ray • CT • MRI • Ultrasound 	<ul style="list-style-type: none"> • X-ray • CT • MRI • Ultrasound • Echocardiography
Graphics Services	<ul style="list-style-type: none"> • 12-lead ECG • Routine EEG 	<ul style="list-style-type: none"> • 12-lead ECG • Routine EEG

³ https://criticalcareontario.ca/wp-content/uploads/2021/10/NICU-Levels-of-Care-Update_Guidance-Documents_FINAL-2021.pdf

3.3 Health Human Resource Expectations for PICUs

The following table lists Health Human Resource expectations for PICUs. It is expected that staffing ratios are dynamically assessed based on the patients' needs and acuity, clinician's capabilities, and the care environment.

Level 2 and Level 3 PICU	
Health Human Resource Expectations	Physicians The provision of medical coverage varies based on the level of PICU. Please refer to the Medical Administration and MRP segment in section 3.1. Paediatric Intensivist is defined as a physician competent in practicing paediatric critical care medicine, and meets any one of the following requirements : <ul style="list-style-type: none"> • Completion of a paediatric critical care fellowship and Royal College of Physicians and Surgeons Canada (RCPSC) or equivalent certification. • Completion of a paediatric critical care fellowship and eligible for certification by RCPSC (or equivalent). • Has trained and practiced paediatric critical care medicine, prior to RCPSC recognized fellowship training or certification, and continues to commit a minimum 6 weeks per year to practice of paediatric critical care medicine.
	Paediatric critical care trained Registered Nurses (RNs)* <ul style="list-style-type: none"> • At least 70% of PICU (L2 & L3) RNs should be trained to CCSO's Critical Care Practice Standards⁴
	Registered Respiratory Therapists (RRTs) with paediatric expertise*
	Occupational Therapist with paediatric expertise
	Social Worker with paediatric expertise
	Spiritual support
	Child Life Specialist
	Dietician with paediatric expertise
	Physiotherapist with paediatric expertise
	Pharmacist with paediatric expertise [^]
	Clinical Educator with paediatric critical care expertise

*Staff to be available 24/7/365 on site

[^]Staff to be available 24/7/365 (remote availability outside of business hours is permitted)

Level 2 Subspecialty PICU Health Human Resources

The nature and scope of clinical activities within L2 Subspecialty PICUs are specific to the subspecialty needs of those patients admitted to the existing subspecialty units. The L2 Subspecialty PICUs should have health human resource plans for recruitment and / or training that match the clinical activities

⁴ <https://criticalcareontario.ca/wp-content/uploads/2020/10/2018-Practice-Standards-for-Critical-Care-Nursing-in-Ontario-English-Final.pdf>

performed. Health human resource models should be monitored and optimized using a lens of continuous quality improvement and patient safety.

3.4 Minimum Clinical Operational Capability Expectations for PICUs

The following table outlines the minimum clinical care capabilities that are expected for Level 2 and Level 3 PICUs. A description of minimum capability requirements for Level 2 Subspecialty PICUs follows the table.

Area of Focus	Level 2 PICU	Level 3 PICU
Respiratory Supports	<ul style="list-style-type: none"> Any FiO₂ High flow nasal cannula of any flow rate Acute and chronic non-invasive positive airway pressure support (e.g., CPAP/BiPAP) Short term nasopharyngeal airway management Tracheostomy care (following first exchange and airway clearance by surgeon) Chronic ventilation via tracheostomy of patients on their usual/planned home settings 	<p>Same as level 2 plus:</p> <ul style="list-style-type: none"> All modes of non-invasive ventilation Invasive ventilation including high frequency oscillation (HFO) or Jet ventilation (HFJV) Ability to administer surfactant Ability to support prone positioning of ventilated/unstable patient Inhaled Nitric Oxide (iNO) including initiation, monitoring, and weaning
Circulatory Supports	<ul style="list-style-type: none"> Single antihypertensive infusion Single inotropic/vasoactive infusion in an otherwise stable patient and with appropriate vascular access Chemical & electrical cardioversion 	<p>Same as Level 2 plus:</p> <ul style="list-style-type: none"> Pharmacological circulatory support by one or more agents with different mechanisms of action One or more antihypertensive infusion(s) One or more antiarrhythmic infusion(s) Transcutaneous or transesophageal pacing
Other Pharmacological Specific Support	<p>Initiation, ongoing monitoring and weaning (if applicable) for all of the following:</p> <ul style="list-style-type: none"> Heparin infusion Insulin infusion Opioid infusion 	<p>Same as Level 2 plus:</p> <ul style="list-style-type: none"> Benzodiazepine infusion

Area of Focus	Level 2 PICU	Level 3 PICU
	<ul style="list-style-type: none"> • Dexmedetomidine infusion • Ketamine infusion • Salbutamol infusion 	
Procedures/Anesthetics	<ul style="list-style-type: none"> • Able to care for regional anesthesia such as epidurals • Ability to provide procedural sedation for stable patients • Perform or arrange for the provision of basic critical care procedures, including: <ul style="list-style-type: none"> ○ Arterial Line ○ Chest tube ○ Lumbar puncture 	<p>Same as Level 2 plus:</p> <ul style="list-style-type: none"> • Availability of paediatric interventional radiology • Ability to provide procedural sedation for unstable patients • Perform or arrange for the provision of advanced critical care procedures, including: <ul style="list-style-type: none"> ○ Diagnostic & therapeutic bronchoscopy ○ Central venous line placement ○ External ventricular drain placement
Monitoring	<ul style="list-style-type: none"> • Continuous ECG • Continuous pulse oximetry • Continuous arterial line pressure and waveform monitoring 	<p>Same as Level 2 plus:</p> <ul style="list-style-type: none"> • Central venous pressure and waveform monitoring • End-tidal CO₂ monitoring • Transcutaneous CO₂ monitoring • Continuous EEG monitoring • Intracranial pressure monitoring via probe or EVD
Renal Interventions & Administration of Blood Products	<ul style="list-style-type: none"> • Transfusion of standard blood products 	<p>Same as Level 2 plus:</p> <ul style="list-style-type: none"> • Continuous renal replacement therapy • Intermittent hemodialysis • Peritoneal dialysis • Therapeutic plasma exchange/apheresis • Exchange transfusion • Massive transfusion protocol

Clinical Capability Requirements for Level 2 Subspecialty PICUs:

The Level 2 Subspecialty PICU originates from a concept practiced historically in which select subspecialties identified elements of care, otherwise only available in Paediatric Intensive Care Units (PICUs), to be provided in care areas outside the PICU. Although not physically collocated, this model of care offset demand for L3 capacity and it was determined that the interventions, therapies and care being delivered qualified as critical care and that the beds and associated clinical activity should be captured in CCIS as L2 capacity. Through the process of updating the Paediatric ICU Levels of Care, L2

Subspecialty PICU was adopted as a means of classifying this unit, one that is not a full scale L3 nor L2 PICU, yet acknowledges the subspecialty care being delivered and the additional resources required to accomplish this.

The Level 2 Subspecialty PICU routinely deliver one or more element(s) of care that would typically be delivered in a Paediatric critical care unit, and not on the general wards. The specific clinical capabilities are determined by the subspecialty with input from their Level 3 PICU partner, and should:

- 1) be required in sufficient volume over time to sustain a dedicated staffing complement able to ensure competency in knowledge and skills;
- 2) such that the quality and safety of care is equivalent to that of paediatric critical care units; and,
- 3) Meaningfully support the flow of patients into and/or out of the partner Level 3 PICU, thus increasing Level 3 capacity access for the province.

The level of care required by this cohort of patients would typically be delivered in a Paediatric critical care setting. Corporate capacity analysis for PICUs should include this delivery of care to accurately reflect the demands for Paediatric critical care capacity. If capacity outside a PICU needs to be considered for delivering an element of subspecialty care in order to offset demand for critical care capacity it is recommended that a proposal be submitted for review to the Paediatric Critical Care Advisory Committee of Critical Care Services Ontario, and the respective OH Region.

4. Conclusion

These PICU Levels of care criteria and associated requirements presented in this document incorporate evidence-informed current practices where possible, and consensus of the Task Force in circumstances where published evidence was not available.

All PICUs in Ontario are expected to complete the self-assessment tool provided by CCSO. The self-assessment tool is based on the PLOC criteria and requirements stipulated in section 3 of this document. Following the self-assessment, CCSO validation, and PCCAC approval, all PICU's will be accountable for maintaining their assessed Level of Care. PICUs are expected to be available to accept patients appropriate to the assessed levels and associated capabilities, and in consideration of surge expectations.

Acknowledgments

The purpose of the Paediatric Intensive Care Unit (PICU) Levels of Care Task Force was to develop levels of care document applicable to current and future practices and capabilities within level 2 and level 3 PICUs in Ontario. This document contains criteria that are based on evidence-informed practice and input from key stakeholders. The goal is to ensure that Paediatric patients 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 PICUs from across Ontario.

CCSO would like to thank the following members of Paediatric ICU Levels of Care Task force members for their time and advice in developing the levels of care criteria and associated components for Ontario PICUs.

Taskforce Members

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