

TIERS IN BRIEF
TIERS IN FULL

CHILDREN & CRITICAL CARE SERVICES

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childhealthbc.ca



Children & Critical Care Services: Tiers to Support System & Operational Planning

1.0	Tiers of Service.....	2
1.1	Tiers of Service Framework and Approach.....	2
1.2	BC's Child Health Tiers of Service Modules	3
2.0	Children & Critical Care Tiers of Service	3
2.1	Module Development.....	3
2.2	Module Scope	4
2.3	Recognition of the Tiers.....	4
3.0	Responsibilities & Requirements by Tier of Service	5
3.1	Clinical Services.....	6
3.1.1	Responsibilities	6
3.1.2	Requirements.....	18
3.2	Knowledge Sharing & Transfer/Training	25
3.3	Quality Improvement/Research	27
4.0	References.....	28
	Appendix 1: Glossary.....	30
	Appendix 2: Change Log.....	31

HOW TO CITE CHILDREN & CRITICAL CARE SERVICES MODULE:

We encourage you to share these documents with others and we welcome their use as a reference. Please cite each document in the module in keeping with the citation on the table of contents of both of the documents. If referencing the full module, please cite as:

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Children & Critical Care Services: Tiers to Support System & Operational Planning

1.0 Tiers of Service

1.1 Tiers of Service Framework and Approach

Planning and coordinating children's¹ health services is a major area of focus for Child Health BC and its collaborators (health authorities, ministries, non-profit organizations, school boards, etc). The Tiers of Service framework provides a tool to define and plan such services.

Utilizing a common language and methodology, the Tiers of Service framework:

- Recognizes that health services, while important, are one of several factors that contribute to child and youth well-being overall.
- Is informed by a review of frameworks/tools in other jurisdictions around the world.
- Facilitates system planning for clinical services, knowledge sharing/training and quality improvement/research. The responsibilities and requirements for each of these three areas are defined within the Tiers framework.

Child Health BC is leading the use of the Tiers of Service approach to system planning for children's services. This is being done through:

Creation of a series of modules: For each of the major areas of health services - such as children's medicine, children's surgery, children's emergency care, children & critical care services and mental health services for children and youth - a Tiers of Service module has or is being created.

Self-assessment based on the modules: Once a module is finalized and accepted by the key partners in the province, a self-assessment is completed. Child Health BC works with health authority partners as necessary to get this work completed.

System planning and service planning based on self-assessment results: Using the self-assessment analysis, CHBC is committed to supporting provincial, regional and local planning in collaboration with other entities.

¹ Throughout this document "children" refers to children and youth unless otherwise stated.

1.2 BC's Child Health Tiers of Service Modules

Below are the Tiers of Service modules. Some have been completed and some are in development.

Clinical Services modules:

- Children's Medicine
- Children's Surgery
- Children's Emergency Department
- **Children & Critical Care Services**
- Child Development, Habilitation & Rehabilitation
- Children's Home-based Services (future)
- Mental Health Services for Children and Youth
- Substance Use Services for Children and Youth (future)

Clinical Diagnostic & Therapeutic Service modules:

- Children's Laboratory, Pathology & Transfusion Medicine
- Children's Medical Imaging (future)
- Children's Pharmacy Services (future)

Collectively, the modules and their components provide the foundation for provincial and health authority (HA) planning of child health services.

2.0 Children & Critical Care Tiers of Service

2.1 Module Development

The Children & Critical Care (CC) Tiers of Service module is made up of two components:

1. Setting the Stage for Tiers Development (provides the context)
2. Tiers to Support System and Operational Planning (***this document***)

The Children & Critical Care Tiers of Service module was developed by an interdisciplinary working group comprised of representative(s) from each of BC's HAs (various combinations of pediatric and adult intensivists, pediatricians, pediatric subspecialists, nurses, allied health, directors/managers and planners), Child Health BC and a meeting facilitator. The document was informed by work done in other jurisdictions, mostly notably Queensland,¹ New South Wales,² Australia/New Zealand,³ the United Kingdom⁴⁻⁸ and the United States.⁹ BC data was used where it was available, as were relevant BC and Canadian standards and guidelines (e.g., Critical Care Medicine Provincial Privileging document¹⁰ and the Royal College of Physicians and Surgeons Objectives of Training documents for Critical Care Medicine¹¹).

In addition to the working group, representatives from all BC HAs and other constituent and topic-specific groups were invited to provide feedback on the draft module. The final version was accepted by the Provincial Critical Care Working Group and Child Health BC Steering Committee.

2.2 Module Scope

The Children & Critical Care Tiers of Service module focuses on services provided by *specialist* and *subspecialist* health care providers to children up to 17 years old (16.9 years) who have *highly acute* and often *highly complex* illnesses, injuries and complications. It builds on and is intended to be used in conjunction with the *Children's Emergency Department, General Medicine and Surgery Tiers* modules.

All facilities providing pediatric services (T1-T6) should have capacity to provide resuscitation and initial stabilization of critically ill children while awaiting transport to a higher tier (in ED, on an inpatient unit &/or in ICU). This module focuses on critical care services which are provided **beyond** the resuscitation and initial stabilization period.

"Critical care services" refer to services which are **above and beyond those usually available on a pediatric inpatient unit** (refer to children's medical and surgical modules for details of what is usually provided on a pediatric inpatient unit). Provision of these services requires **specialized skills** and **enhanced staffing levels**. In BC, such services are usually provided in a pediatric-specific or a general intensive care unit.

The Children & Critical Care Tiers of Service module does not include:

- Services provided in Emergency Departments (EDs) (discussed in Children's ED Services module).
- Services provided in Neonatal Intensive Care Units (refer to Levels of Perinatal Care document at: www.perinatalservicesbc.ca/health-professionals/professional-resources/system-planning/tiers-of-service).

2.3 Recognition of the Tiers

The *Child Health Tiers of Service Framework* includes 6 tiers of service. The Children & Critical Care Tiers of Service module recognizes 3 of the 6 tiers: T4, T5 and T6.

Tier	Child Health Framework Tiers of Service	Children & Critical Care Tiers of Service
T1	Prevention, Primary & Emergent Service	
T2	General Health Service	
T3	Child-Focused Health Service	
T4	Children's Comprehensive Health Service	Children's Limited Critical Care Service
T5	Children's Enhanced & Regional Subspecialty Health Service	Children's Regional Subspecialty Critical Care Service
T6	Children's Provincial Subspecialty MH Service	Children's Provincial Subspecialty Critical Care Service

Children & Critical Care Tiers of Service

T4 provides a limited range of critical care services and is typically available to children in more populated geographic areas in **facilities which also have children's T4 medicine services**. T4 critical care services focus on older children (ages 14 - 16.9 years old) who were previously healthy who have new onset "adult" conditions (i.e., disease processes/injuries & management strategies are the same as for adults). T4 services outside the Lower Mainland/Victoria also provide critical care services to children of all ages with conditions which are expected to resolve quickly (within 24 - 48 hrs).

T5 and T6 provide a full range of critical care services for children, with T5 providing primarily a regional service and T6 providing a provincial service which includes an extended range of monitoring and therapeutic interventions.

3.0 Responsibilities & Requirements by Tier of Service

This next section describes the **responsibilities** and **requirements** at each tier to provide a **safe, sustainable** and **appropriate** level of critical care services.

The tier identified for a given service represents the highest tier of that service which is available at that facility under **usual** circumstances (i.e., minimum expectations). Occasional exceptions may occur, usually due to geography and transportation, in which children may be managed and/or interventions performed on a case-by-case basis by services that would not normally care for such children. These exceptions are appropriate where the resources (trained personnel, equipment, etc) are available and deferring the treatment/procedure would be detrimental to a child's outcome. Another circumstance in which exceptions may occur is in **unique, planned** situations where children with chronic conditions are supported to remain living in their home community (e.g., children with chronic ventilators). These special situations are **not** the focus of this module.

Responsibilities and requirements are divided into the following sections:

- 3.1 Clinical Service
- 3.2 Knowledge Sharing & Transfer/Training
- 3.3 Quality Improvement & Research

3.1 Clinical Services

3.1.1 Responsibilities

This document differentiates between the responsibilities of T4 facilities within the Lower Mainland/Victoria ("close sites") and facilities outside the Lower Mainland/Victoria ("distant sites"). The rationale for the differing expectations is that the obligations on "distant sites" are higher as critical care services must be maintained for longer periods (hours to days) while awaiting arrival of the transport team. In addition, there are situations where it does not make sense to transport a critically ill child with a condition which is expected to resolve quickly to the Lower Mainland/Victoria from a "distant" site.

		Children's Limited Critical Care Service		Children's Regional Subspecialty Critical Care Service	Children's Provincial Subspecialty Critical Care Service
		T4			
		Close Site (≤2 hrs by road from T5/T6)	Distant Site (>2 hrs by road from T5/T6)	T5	T6
1.0	Service reach	Health service delivery area/health authority	Health service delivery area/health authority	Health authority	Province
2.0	Service description	CC service primarily for adults.	CC service primarily for adults with a limited capacity to serve children.	Regional CC service for children.	Provincial CC service for children which includes an extended range of monitoring & therapeutic interventions.
3.0	Service focus/target population				
	3.1	Children of all ages	Provides resuscitation & initial stabilization of critically ill children (in ED, on an inpatient unit &/or in ICU).	Provides resuscitation & initial stabilization of critically ill children (in ED, on an inpatient unit &/or in ICU).	Provides resuscitation & initial stabilization of critically ill children.

			Children's Limited Critical Care Service		Children's Regional Subspecialty Critical Care Service	Children's Provincial Subspecialty Critical Care Service
			T4			
			Close Site (≤2 hrs by road from T5/T6)	Distant Site (>2 hrs by road from T5/T6)	T5	T6
Service focus/target population	3.2	Children ages 14 - 16.9 yrs	<p><i>Previously healthy children with new onset "adult" conditions</i> (i.e., conditions in which disease processes/injuries & management strategies are the same as for adults):²</p> <ul style="list-style-type: none"> Provides the full range of critical care services.³ Examples: Pneumonia with aspiration; overdose; & endocarditis. <p><i>All other children in this age group:</i></p> <ul style="list-style-type: none"> Consults ASAP with T5/T6 provider re transfer. While awaiting arrival of the transport team (brief duration expected), provides a limited range of critical care services (see Table 1). Consults with T5/T6, as required. 	<p>Same as T 4 close site plus:</p> <p>Provides a limited range of critical care services (see Table 1) for a <i>broader range of conditions</i> than would be expected at T4 close sites.</p> <ul style="list-style-type: none"> Conditions are expected to resolve quickly (within 24 - 48 hrs). If condition does not resolve as expected, consults ASAP with T5/T6 provider re transfer. Examples: Asthma; prolonged seizures, including brief period of intubation; & extended post-operative intubation period. <p><i>All other children in this age group:</i></p> <ul style="list-style-type: none"> Consults ASAP with T5/T6 provider re transfer. While awaiting arrival of the transport team (hours to days), provides a limited range of critical care services (see Table 1). Consults with T5/T6, as required. 	<p><i>Children with a wide range of conditions & medical complexities:</i></p> <ul style="list-style-type: none"> Provides the full range of critical care services. Disease processes/injuries &/or management strategies may be unique to children. 	<p><i>Children with a wide range of conditions & multiple medical complexities:</i></p> <ul style="list-style-type: none"> Provides an extended range of monitoring & therapeutic interventions. Disease processes/injuries &/or management strategies often require the services of multiple pediatric subspecialists.

² Assumes availability of adult or pediatric specialists/subspecialists comfortable/willing to provide consultative &/or surgical care to children ages 14 - 16.9 yrs, as required (e.g., neurosurgery, cardiac surgery).

³ The remainder of this document does not delineate specific responsibilities and requirements for serving this group of *previously healthy children with new onset "adult" conditions*. It is assumed that the full range of critical care assessment, monitoring & treatment services will be available to these children as it is for adults.

			Children's Limited Critical Care Service		Children's Regional Subspecialty Critical Care Service	Children's Provincial Subspecialty Critical Care Service
			T4			
			Close Site (≤2 hrs by road from T5/T6)	Distant Site (>2 hrs by road from T5/T6)	T5	T6
Service focus/target population	3.3	Children under 13.9 yrs	<p><i>All children in this age group:</i></p> <ul style="list-style-type: none"> • Consults ASAP with T5/T6 provider re transfer. • While awaiting arrival of the transport team (brief duration expected), provides a limited range of critical care services (see Table 1). 	<p><i>Children with conditions which are expected to resolve quickly (within 24 - 48 hrs):</i></p> <ul style="list-style-type: none"> • Provides a limited range of critical care services (see Table 1). • If the condition does not resolve as expected, consults ASAP with T5/T6 provider. • Examples: Asthma; prolonged seizures, including brief period of intubation; & extended post-operative intubation period. <p><i>All other children in this age group:</i></p> <ul style="list-style-type: none"> • Consults ASAP with T5/T6 provider re transfer. • While awaiting arrival of the transport team (hours to days), provides a limited range of critical care services (see Table 1). 	Same service as for children ages 14 - 16.9 yrs as described above (T5). See Table 1.	Same service as for children ages 14 - 16.9 yrs as described above (T6). See Table 1.
	4.0	Critical care (CC) monitoring & therapeutic interventions	While awaiting arrival of the transport team (brief duration expected), provides a limited range of CC monitoring & therapeutic interventions. See Table 1.	Provides a limited range of CC monitoring & therapeutic interventions (1) while awaiting arrival of the transport team (hours to days); & (2) to treat conditions which are expected to resolve quickly (i.e., within 24 - 48 hrs). See Table 1.	Broad range of CC monitoring & therapeutic interventions. See Table 1.	Same as T5 plus: Extended range of monitoring & therapeutic interventions. See Table 1.

		Children's Limited Critical Care Service		Children's Regional Subspecialty Critical Care Service	Children's Provincial Subspecialty Critical Care Service
		T4			
		Close Site (<2 hrs by road from T5/T6)	Distant Site (>2 hrs by road from T5/T6)	T5	T6
5.0	Pain & symptom management	<p><i>As per medical module:</i></p> <ul style="list-style-type: none"> Regularly assesses & documents pain using a validated & age & developmentally appropriate pain assessment tool(s). Develops & regularly reviews plan for pain & symptom management. Provides age & developmental stage appropriate pain & other symptom relieving interventions (e.g., minimize high-intensive light & noise, ensure rest periods, regularly reposition, support parental visitation). Administers weight-based doses of analgesics & other symptom management medications via topical, oral, enteral, intranasal, rectal, IM, SQ, intermittent IV & patient controlled IV routes to children of all ages. Administers via continuous IV to children ages 2 years & over. Range of IV medications administered is consistent with HA/site approved pediatric medication infusion profiles for a general pediatric unit. Consults/refers to Canuck Place, as required. 	<p>Same as T4 close sites plus:</p> <p>Range of IV medications administered is consistent with HA/site approved pediatric medication infusion profiles for an adult critical care unit.</p>	<p>Same as T4 distant sites plus:</p> <p>Manages pain & symptoms that require an extended & innovative range of options. Often involves multiple types of analgesics & other medications which may be provided by multiple routes of administration. Utilizes regional anesthetic techniques as required (e.g., nerve blocks).</p>	<p>Same as T5 plus:</p> <p>Manages acute spinal cord compression with medications &/or radiation therapy.</p>

		Children's Limited Critical Care Service		Children's Regional Subspecialty Critical Care Service	Children's Provincial Subspecialty Critical Care Service
		T4			
		Close Site (≤2 hrs by road from T5/T6)	Distant Site (>2 hrs by road from T5/T6)	T5	T6
6.0	Continuous sedation		<ul style="list-style-type: none"> Regularly assesses & documents level of sedation using a validated & age & developmentally appropriate sedation assessment tool(s). Identifies & regularly reviews desired level of sedation. Titrates & administers weight-based doses of sedative agents consistent with desired level of sedation (e.g., benzodiazepines, hypnotics, antihistamines). Manages ICU-related sedation medication withdrawal. 	Same as T4 distant sites plus: Provides palliative sedation.	Same as T5.
7.0	Procedural sedation/analgesia	<p><i>While awaiting arrival of the transport team (brief duration expected):</i> Administers weight-based doses of analgesics/sedatives/ dissociative anesthetics (e.g., ketamine) assuming availability of appropriate staffing,⁴ monitoring equipment & resuscitation equipment.</p>	Administers weight-based doses of analgesics/sedatives/ dissociative anesthetics (e.g., ketamine) assuming availability of appropriate staffing, ⁴ monitoring equipment & resuscitation equipment.	Same as T4 distant sites.	Same as T5.
8.0	Psychosocial & spiritual support	<p><i>While awaiting arrival of the transport team (brief duration expected):</i> Provides psychosocial/family & spiritual care support.</p>	Provides psychosocial/family & spiritual care support.	Same as T4 distant site plus: Provides specialized psychosocial/family support including structured therapeutic & diversional play, preparation & assistance during medical tests & procedures & support & short-term therapeutic counselling for families.	Same as T5.

⁴ MD with PALS or equivalent + MD/RN/RT familiar with pediatric resuscitation procedures must be present during the procedure, as well as a 3rd MD/RN/RT readily available to assist in the event of an emergency.

		Children's Limited Critical Care Service		Children's Regional Subspecialty Critical Care Service	Children's Provincial Subspecialty Critical Care Service
		T4			
		Close Site (≤2 hrs by road from T5/T6)	Distant Site (>2 hrs by road from T5/T6)	T5	T6
9.0	End-of-life (EOL) care	After determining EOL is near & making a decision in consultation with T5/T6 NOT to transfer a child, provides EOL care. Consults with T5/T6 ICU & other subspecialty services, including Canuck Place, as required.	Same as T4 close site.	Same as T4 plus: Manages withdrawal of life sustaining & other therapies (e.g., ventilatory/cardiac support, artificial hydration, nutritional support).	Same as T5.
10.0	Support for organ donation	<p>After making a decision in consultation with T5/T6 NOT to transfer a child:</p> <p><i>Neurological Determination of Death (NDD):</i> As directed by BC Transplant, arranges tests to determine suitability for organ donation. Maintains child until arrangements for organ donation are made. Prepares child & supports family for surgical recovery of the organs.</p> <p><i>Donor after Cardiac Death (DCD):</i> As directed by BC Transplant, arranges tests to determine suitability for organ donation. Maintains child until arrangements for organ donation are made. Prepares child & family for withdrawal of cardiac/ventilator support. If directed by BC Transplant, arranges transfer to T5/T6 prior to withdrawal of cardiac/ventilator support.</p>	Same as T4 close site.	Same as T4 plus: As directed by BC Transplant, receives children from T1-T4 sites & manages according to the provincial pediatric DCD protocol.	Same as T4 plus: As directed by BC Transplant, receives children from T1-T5 sites & manages according to the provincial pediatric DCD protocol.

		Children's Limited Critical Care Service		Children's Regional Subspecialty Critical Care Service	Children's Provincial Subspecialty Critical Care Service
		T4			
		Close Site (≤2 hrs by road from T5/T6)	Distant Site (>2 hrs by road from T5/T6)	T5	T6
11.0	Grief & bereavement support	Provides initial grief & bereavement support. Assesses need & refers families requiring ongoing support to local bereavement &/or counseling resources. Consults/refers to Canuck Place, as required.	Same as T4 close site.	Same as T4 plus: Creates opportunities for grieving families to connect with other grieving families (e.g., annual memorial service).	Same as T5 plus: Provides telephone bereavement support to families beyond the immediate period after the death of their child.
12.0	Deteriorating/emergency situations outside the critical care unit	Mechanism is in place for resuscitation of a hospitalized child outside the critical care unit. Stabilizes children while arranging & awaiting transfer. Determines most appropriate location within facility to maintain critically ill child while awaiting transfer (dependent on local resources).	Same as T4.	Same as T4 plus: Provides immediate <i>pediatric</i> critical care expertise in response to the clinical deterioration of a child outside the critical care unit. Assists staff to assess & stabilize the child & determine whether transfer to PICU is required or care can be provided safely on the pediatric unit +/- support from PICU staff. Educates & supports staff as they care for the child.	Same as T5.
13.0	Critical care transfer & transport	Makes requests for transfer to T5/T6 via BC Patient Transfer Network (PTN). Prepares patient/family for arrival of transport team.	Makes requests for transfer to T5/T6 via BC PTN. Prepares patient/family for arrival of transport team.	Makes requests for transfer to T6 via BC PTN. Prepares patient/family for arrival of transport team. Receives calls from BC PTN for transfer of children to T5 PICU. Makes arrangements within the T5 PICU/hospital for transfers. Most requests are for children living <i>within the HA</i> but, if bed availability is limited at T6 & the appropriate care can be provided at T5, requests may be for children living outside the HA.	Receives calls from BC PTN for transfer of children to T6 PICU. Makes arrangements within the T6 PICU/hospital for transfers. Requests for transfers may be for children living <i>throughout the province</i> . Receives & prioritizes requests from PTN about the transport of critically ill children <i>within BC</i> . Coordinates & provides medical supervision/consultation to specially trained air transport teams during transport. Provides coordination & consultation &, in some cases, medical supervision to other medical escort teams during transport.

		Children's Limited Critical Care Service		Children's Regional Subspecialty Critical Care Service	Children's Provincial Subspecialty Critical Care Service
		T4			
		Close Site (≤2 hrs by road from T5/T6)	Distant Site (>2 hrs by road from T5/T6)		
14.0	Children with home tracheostomies &/or ventilators	Provides care to children with a stable airway & stable ventilator requirements who require an inpatient stay (e.g., child with cellulitis requiring IV antibiotics).	Same as T4 close site.	Same as T4 plus: Plans & supervises out-of-hospital care for children living <i>within the HA</i> requiring long-term airway &/or ventilation support. Builds capacity in local communities to care for these children.	Same as T5 plus: Plans & supervises out-of-hospital care for children living <i>throughout the province</i> requiring long-term airway &/or ventilation support. Builds capacity in local communities to care for these children (Home Tracheostomy & Ventilation Program).
15.0	Pandemic & emergency preparedness planning	Works with MOH & BC's HAs to develop hospital-based critical care related pandemic & emergency preparedness plan(s).	Same as T4 close site.	Same as T4.	In collaboration with the MOH & BC's HAs, coordinates hospital-based critical care related pandemic & emergency preparedness plan(s) for children <i>throughout BC</i> .
16.0	Serves as resource for providers			<i>Pediatric-focused</i> critical care physician, nurse(s) & respiratory therapist(s) available as resources to health professionals <i>within the HA</i> by telephone &/or Tele-PICU 24/7. Allied health & other team members available days, M-F.	<i>Pediatric-focused</i> critical care physician, nurse(s) & respiratory therapist(s) available as resources to health professionals <i>throughout BC</i> by telephone &/or Tele-PICU 24/7. Allied health & other team members available days, M-F.

Table 1: Critical Care Skill Expectations by Tier¹⁰⁻¹⁴

Table 1 describes critical care services expected to be available at each tier. Delivery of the service will be dependent upon the needs of individual children (see section 3.0 Service Focus/Target Population for criteria).

Critical Care Skill					Children's Limited Critical Care Service		Children's Regional Subspecialty Critical Care Service	Children's Provincial Subspecialty Critical Care Service
					T4			
					Close Site	Distant Site	T5	T6
1.0	Respiratory	Airway/lung maintenance	Chest tubes	Insert chest tube while awaiting transfer	Y	Y		
				Insert, maintain & manage chest tube, expected resolution <48 hrs		Y		
				Insert, maintain & manage chest tube PRN			Y	Y
		Pharmacologic therapy & oxygen	Continuous nebulization	Initiate continuous nebulization while awaiting transfer (>6 mos old)	Y	Y		
				Initiate, maintain & manage continuous nebulization, expected resolution <48 hrs (>6 mos old)		Y		
				Initiate, maintain & manage continuous nebulization PRN			Y	Y
			Oxygen therapy	Initiate O2 up to 40% while awaiting transfer	Y	Y		
				Initiate, maintain & manage O2 up to 40%, expected resolution <48 hrs	Y	Y		
				Initiate, maintain & manage O2 flow PRN			Y	Y
			IV bronchodilators	Initiate IV bronchodilator therapy (> 6 mos old)	Y	Y		
				Initiate, maintain & manage IV bronchodilator therapy, expected resolution <48 hrs (> 6 mos old)		Y		
				Initiate, maintain & manage IV bronchodilator therapy PRN			Y	Y
		Pulmonary vasodilators	Initiate, maintain & manage pulmonary vasodilators PRN			Y	Y	
		Airway management	Nasal/pharyngeal/oral airways	Insert nasal/pharyngeal/oral airway while awaiting transfer	Y	Y		
				Insert, maintain & manage nasal/pharyngeal/oral airway, expected resolution <48 hrs		Y		
				Insert, maintain & manage nasal/pharyngeal/oral airway PRN			Y	Y
			High flow therapy	Initiate flow up to 2 L/kg/min (up to 10 kg) & O ₂ up to 40% while awaiting transfer.	Y	Y		
				Initiate, maintain & manage flow up to 2 L/kg/min (up to 10 kg) & O ₂ up to 40%, expected resolution <48 hrs	Y	Y		
				Initiate, maintain & manage flow up to 2 L/kg/min (up to 10 kg) & O ₂ as required PRN			Y	Y
			Tracheostomy	Establish tracheostomy in emergency situation while awaiting transfer	Y	Y		
				Establish, maintain & manage new tracheostomy PRN		Y	Y	Y
Maintain & manage established, stable tracheostomy +/- chronic ventilator PRN	Y			Y	y	Y		

Critical Care Skill					Children's Limited Critical Care Service		Children's Regional Subspecialty Critical Care Service	Children's Provincial Subspecialty Critical Care Service	
					T4				
	Respiratory cont'd	ETT + mechanical ventilation		Establish ETT + mechanical ventilation while awaiting transfer	Y	Y			
				Establish, maintain & manage ETT + mechanical ventilation, expected resolution <48 hrs (e.g., treatment for prolonged seizure requiring brief period of intubation)		Y			
				Establish, maintain & manage ETT + mechanical ventilation PRN			Y	Y	
			High frequency ventilation		Establish, maintain & manage high frequency ventilation PRN			Y	Y
		Non-invasive ventilation	BIPAP/CPAP		Initiate acute BIPAP/CPAP while awaiting transfer	Y	Y		
					Initiate, maintain & manage acute BIPAP/CPAP, expected resolution <48 hrs		Y		
					Initiate, maintain & manage acute BIPAP/CPAP PRN			Y	Y
					Maintain & manage chronic BIPAP/CPAP PRN	Y	Y	Y	Y
			ECLS/ECMO		Initiate, maintain & manage ECLS/ECMO				Y
		2.0	Cardio-vascular	Invasive hemodynamic monitoring	Arterial pressures	Establish, maintain & manage arterial pressures & waveforms PRN			Y
Venous pressures	Establish, maintain & manage CVP pressures & waveforms PRN						Y	Y	
Gases, O2 sats, O2 extraction	Monitors mixed venous blood gases, central venous O2 saturation, O2 extraction PRN						Y	Y	
Pharmacologic or other therapy	Anti-arrhythmic infusions				Initiate anti-arrhythmic infusion while awaiting transfer	Y	Y		
					Initiate, maintain & manage anti-arrhythmic infusion PRN			Y	Y
Vasoactive infusions					Initiate vasoactive infusion (inotropes, vasopressors, vasodilators) while awaiting transfer	Y	Y		
					Initiate, maintain & manage vasoactive infusion PRN			Y	Y
IV high concentration electrolytes					Initiate IV high concentration electrolytes (Ca, Mg, K) while awaiting transfer	Y	Y		
					Initiate, maintain & manage IV high concentration electrolytes (Ca, Mg, K), resolution expected <48 hrs		Y		
					Initiate, maintain & manage IV high concentration electrolytes (Ca, Mg, K) PRN			Y	Y
IV prostaglandins					Initiate IV prostaglandin while awaiting transfer (pre cardiac surgery)	Y	Y		
					Initiate, maintain & manage IV prostaglandins PRN			Y	Y
IV diuretics					Initiate IV diuretics (e.g., lasix) while awaiting transfer	Y	Y		
					Initiate, maintain & manage IV diuretics, expected resolution <48 hrs		Y		
					Initiate, maintain & manage IV diuretics PRN			Y	Y
IV thrombolytics					Initiate IV thrombolytics (tPA, streptokinase), anticoagulants, antiplatelets for systemic purposes while awaiting transfer		Y		
			Initiate, maintain & manage IV thrombolytics (tPA, streptokinase), anticoagulants, antiplatelets for systemic purposes PRN			Y	Y		

Critical Care Skill					Children's Limited Critical Care Service		Children's Regional Subspecialty Critical Care Service	Children's Provincial Subspecialty Critical Care Service
					T4			
					Close Site	Distant Site	T5	T6
2.0	Cardio-vascular cont'd	Pacemakers	Temporary	Initiate temporary external pacing (e.g., transthoracic, transvenous, epicardial, transcutaneous) while awaiting transfer	Y	Y		
				Initiate, maintain & manage temporary external pacing (e.g., transthoracic, transvenous, epicardial, transcutaneous) PRN			Y (plan TF to T6)	Y
			Permanent	Insert, maintain & manage permanent pacemakers (e.g., DDDR, ICD's, biventricular)				Y
		Cardioversion		Perform emergency cardioversion while awaiting transfer	Y	Y		
				Perform cardioversion PRN			Y	Y
3.0	Neuro-logical/ Neuro-muscular	Pharmacologic therapy	IV benzodiazepines	Initiate IV benzodiazepines (e.g., midazolam, lorazepam, diazepam) while awaiting transfer	Y	Y		
				Initiate, maintain & manage IV benzodiazepines (e.g., midazolam, lorazepam, diazepam), resolution expected <48 hrs		Y		
				Initiate, maintain & manage IV benzodiazepines (e.g., midazolam, lorazepam, diazepam) PRN			Y	Y
			IV anticonvulsants	Initiate IV anticonvulsants (e.g., phenytoin) while awaiting transfer	Y	Y		
				Initiate, maintain & manage IV anticonvulsants (e.g., phenytoin), resolution expected <48 hrs	Y	Y		
				Initiate, maintain & manage IV anticonvulsants (e.g., phenytoin) PRN			Y	Y
			IV barbiturates	Initiate IV barbiturates (e.g., phenobarbital) while awaiting transfer	Y	Y		
				Initiate, maintain & manage IV barbiturates (e.g., phenobarbital), resolution expected <48 hrs		Y		
				Initiate, maintain & manage IV barbiturates (e.g., phenobarbital) PRN			Y	Y
		Pharmacological coma	Induces, maintain & manage pharmacological coma to treat status epilepticus PRN			Y	Y	
		Invasive ICP monitoring	Initiate, maintain & manage invasive ICP monitoring PRN			Y	Y	
		External ventricular drain management	Initiate, maintain & manage external ventricular drain PRN			Y	Y	
		Lumbar drain management	Initiate, maintain & manage lumbar drain PRN				Y	
		Continuous EEG monitoring	Initiate, maintain & manage continuous EEG monitoring				Y	
		4.0	Renal	Continuous renal replacement therapy (CRRT)	Initiate, maintain & manage CRRT			
Peritoneal dialysis	Initiate, maintain & manage acute PD						Y	
	Maintain & manage chronic PD			Y	Y	Y	Y	

Critical Care Skill				Children's Limited Critical Care Service		Children's Regional Subspecialty Critical Care Service	Children's Provincial Subspecialty Critical Care Service
				T4		T5	T6
				Close Site	Distant Site		
5.0	GI	Parenteral feeding	Initiate, maintain & manage parenteral feeding		Y	Y	Y
6.0	Hematological	Plasma filtration/ plasmapheresis	Initiate, maintain & manage plasma filtration/ plasmapheresis				Y
		Exchange transfusion (neonatal)	Initiate, maintain & manage exchange transfusions PRN (neonates)			Y	Y
7.0	Endocrine	Pharmacologic therapy	Initiate, maintain & manage children on provincial DKA protocol	Y	Y	Y	Y
8.0	MS & Skin	Burn care	Provides care for thermal, chemical, radiation & electrical burns while awaiting transfer	Y	y		
			Provides care for thermal, chemical, radiation & electrical burns PRN			Y, <20% BSA	Y
9.0	Pain management	Analgesics	Opiate infusions	Initiate continuous opiate infusions while awaiting transfer	See section 5.0 under responsibilities		
				Initiate, maintain & manage continuous opiate infusions, expected resolution <48 hrs			
				Initiate, maintain & manage continuous opiate infusions PRN			
		Epidurals	Initiate, maintain & manage epidurals PRN			Y	Y
			Initiate, maintain & manage inhalation analgesia PRN			Y	Y

3.1.2 Requirements

				T4		Children's Regional Subspecialty Critical Care Service	Children's Provincial Subspecialty Critical Care Service
				Children's Limited Critical Care Service			
				Close Site (<2 hrs by road from T5/T6)	Distant Site (>2 hrs by road from T5/T6)	T5	T6
1.0	Providers						
Providers	1.1	MDs	Pediatricians	Pediatrician on-call 24/7 & available on-site as needed. Maintains current PALS/APLS or equivalent certification.	Same as T4 close site.	Pediatrician (or designate) on-site 24/7. Maintains current PALS certification.	Pediatrician (or designate) on-site 24/7. Maintains current PALS certification.
			Critical Care Medicine (CCM) MDs	For children ages 14 - 16.9 yrs: Adult CCM MD on-call 24/7 & available on site as needed.	Adult CCM MD on-call 24/7 & available on-site as needed.	Pediatric CCM MD on-call 24/7 & available on-site as needed. Maintains current PALS/APLS certification.	Pediatric CCM MD or designate (i.e., CCM fellow) available on-site 24/7. Maintains current PALS/APLS certification.
			Most Responsible Physician (MRP)	Clearly describable process exists for identifying the MRP for each patient.	Same as T4 close site.	Pediatric CCM MD is MRP.	Pediatric CCM MD is MRP.
		Other MDs	See Table 2 for specialist/subspecialist physician interdependencies.	See Table 2 for specialist/subspecialist physician interdependencies.	See Table 2 for specialist/subspecialist physician interdependencies.	See Table 2 for specialist/subspecialist physician interdependencies.	
	1.2	RNs	RNs have completed critical care training in keeping with the requirements of adult ICUs. Access to RNs & educator(s) with pediatric expertise (e.g., pediatric unit RNs, pediatric educator, ED educator, critical care educator with current PALS certification).	RNs have completed critical care training in keeping with the requirements of adult ICUs or have completed a structured pediatric critical care course (external or in-house) or have equivalent knowledge, skills & experience.	Pediatric critical care RNs. RNs have completed a structured pediatric critical care course (external or in-house) or have equivalent knowledge, skills & experience. Formalized orientation & ongoing education focusing on pediatric critical care is available & includes familiarization with the critical care skills outlined on Table 1, T5 site. RNs maintain current PALS certification.	Pediatric critical care RNs. RNs have completed a structured pediatric critical care course or have equivalent knowledge, skills & experience. Formalized orientation & ongoing education focusing on pediatric critical care is available & includes familiarization with the critical care skills outlined on Table 1, T6 site. RNs maintain current PALS certification & have completed the Canadian Nurses Association (CNA) Pediatric Critical Care Certification.	

			T4		Children's Regional Subspecialty Critical Care Service	Children's Provincial Subspecialty Critical Care Service
			Children's Limited Critical Care Service			
			Close Site (<2 hrs by road from T5/T6)	Distant Site (>2 hrs by road from T5/T6)	T5	T6
Providers	1.2	RNs cont'd		<p>RN orientation & ongoing education includes a <u>pediatric-specific component</u> (see glossary for examples of pediatric-specific competencies) and familiarization with the critical care skills outlined on Table 1, T4-distant site. RN practice may be predominantly with critically ill adults but includes some children.</p> <p>Access to RNs & educator(s) with pediatric expertise (e.g., pediatric unit RNs, pediatric educator, ED educator, critical care educator with current PALS certification).</p>	Pediatric critical care educator/resource nurse is assigned to PICU.	Pediatric critical care educator(s)/resource nurse(s) is dedicated to PICU.
	1.3	Psychosocial professionals	<p>See medical module.</p> <p>Includes access to a Social Worker(s) with general pediatric knowledge & skills on days, M-F. General Social Worker on-call outside these hours & available on-site as required.</p>	Same as T4 close site.	<p>Social worker with pediatric knowledge & skills is assigned to cover PICU on days, M-F. Practice is exclusively or primarily with children or, if not, there is sufficient exposure to develop pediatric-specific expertise. Generalist social worker available outside these hours for crisis management (e.g., bereavement). May be on-site or on-call.</p> <p>Child life specialist(s) available to PICU on days, M-F.</p> <p>Spiritual care practitioner on-call 24/7 for the site & available on-site as needed.</p>	<p>Pediatric social worker(s) assigned & dedicated to PICU 12 hrs/day, 7 days/wk. Generalist pediatric social worker available outside these hours for crisis management (e.g., bereavement). May be on-site or on-call.</p> <p>Child life specialist(s) assigned & dedicated to PICU on days, M-F.</p> <p>Pediatric psychologist(s) available on request for specific patients on days, M-F.</p> <p>Spiritual care practitioner on-call 24/7 for the site & available on-site as needed.</p>

			T4		Children's Regional Subspecialty Critical Care Service	Children's Provincial Subspecialty Critical Care Service
			Children's Limited Critical Care Service			
			Close Site (<2 hrs by road from T5/T6)	Distant Site (>2 hrs by road from T5/T6)	T5	T6
Providers	1.4	Allied health	See medical module.	Same as T4 close site.	RT(s) with pediatric knowledge & skills available to PICU 24/7. Practice in pediatrics offers sufficient exposure for development & maintenance of pediatric-specific expertise. Maintains current PALS certification.	Pediatric specialists assigned & dedicated to PICU: <ul style="list-style-type: none"> • RT(s) available in PICU 24/7. Maintains current PALS certification. • PT(s) available on days, M-F. Available on request on weekend days. • OT(s) available on days, M-F. • Dietitian(s) available on days, M-F. Non-PICU-specific pediatric dietitian available on request for specific patients outside these hours (on-site or on-call). Pediatric SLP available on request for specific patients on days, M-F.
			Includes RT with general pediatric knowledge & skills available on-site 24/7. Practice may include both adults & children. Maintains current PALS certification. Consults T5/T6 as required.		PT, OT & dietitian with pediatric knowledge & skills are assigned to PICU on days, M-F. Practice is exclusively or primarily with children or, if not, there is sufficient exposure to develop pediatric-specific expertise.	
					SLP is available on request for specific patients on days, M-F. Practice may include both adults & children.	
				Clinical pharmacy specialist(s) (PhD) in pediatrics available to PICU on days, M-F. General pharmacist available outside these hours (on-site or on-call).	Clinical pharmacy specialist(s) (PhD) in pediatrics available in PICU on days, M-F. Pharmacist with pediatric expertise available outside these hours (on-site or on-call).	

			T4		Children's Regional Subspecialty Critical Care Service	Children's Provincial Subspecialty Critical Care Service
			Children's Limited Critical Care Service			
			Close Site (<2 hrs by road from T5/T6)	Distant Site (>2 hrs by road from T5/T6)	T5	T6
1.5	Pediatric resuscitation team	All resuscitation team members responding to pediatric patients maintain current PALS certification.	Same as T4 close site.	Same as T4.	Same as T5.	
1.6	Other <ul style="list-style-type: none"> • Wound/ostomy • Pain management • Breastfeeding support • Feeding & swallowing team • Complex feeding & nutrition service 	See medical module.	Same as T4 close site.	<p>Wound/ostomy RN on-site days, M-F (for adults & children).</p> <p>Pain management team on-site 7 days/wk (for adults & children).</p> <p>Access to breastfeeding support from inpatient area(s).</p> <p>Pediatric feeding & swallowing team with videofluoroscopy capabilities available on-site to provide oral motor & dietary assessment/consultation days, M-F.</p>	<p>Pediatric wound/ostomy RN on-site days, M-F.</p> <p>Pediatric pain mgt team available 24/7 (on-site or on-call & available to come to the site).</p> <p>Access to on-site Lactation Consultant 5 days/wk. Access to breastfeeding support from inpatient area(s) outside these hours.</p> <p>Pediatric feeding & swallowing team with videofluoroscopy capabilities available on-site to provide oral motor & dietary assessment/consultation days, M-F.</p> <p>Pediatric complex feeding & nutrition service available on-site.</p>	

		T4		Children's Regional Subspecialty Critical Care Service	Children's Provincial Subspecialty Critical Care Service	
		Children's Limited Critical Care Service				
		Close Site (<2 hrs by road from T5/T6)	Distant Site (>2 hrs by road from T5/T6)	T5	T6	
2.0	Facilities					
	2.1	Setting	Ages 14 - 16.9 yrs: Adult ICU. Documented process in place to manage critically ill children while awaiting arrival of transport team (brief duration expected). Process clearly outlines the role for the pediatric unit, ED & adult ICU.	Adult ICU or pediatric-designated ICU beds co-located or proximal to the adult ICU or neonatal ICU.	<p>Set-up within the facility:</p> <ul style="list-style-type: none"> Standalone PICU; OR Designated PICU beds in a general ICU with auditory & visual separation between the pediatric & general sections. <p>Within the PICU:</p> <ul style="list-style-type: none"> Capacity to care for children requiring negative pressure room. Capacity to care for a children requiring positive pressure room. Appropriate hand washing facilities, easy-to-clean surfaces & other physical structures which reduce infection. <p>Physical space within the PICU is consistent with the principles of a "healing environment." Examples include:^{15,16}</p> <ul style="list-style-type: none"> Appropriate lighting, acoustics, air quality & temperature. Facilities for parents (e.g., kitchen, quiet room, bathroom), including overnight stays. <p>If building a new ICU or renovating an existing ICU, single patient rooms (ideally with windows) are recommended.</p>	<p>Standalone PICU.</p> <p>Physical space as per T5.</p>
	2.2	Tele-PICU		Tele-PICU equipment in place in the ICU to receive <i>pediatric-focused</i> critical care consultation from T5/T6 providers (e.g., T5/T6 ICU &/or subspecialty providers).	Tele-PICU equipment in place in the PICU to (1) provide <i>pediatric-focused</i> critical care consultation to providers <i>within the HA</i> (e.g., EDs, adult ICUs & pediatric units); and (2) receive <i>pediatric-focused</i> critical care consultation from T6 facilities/providers (e.g., T6 ICU &/or subspecialty providers).	Tele-PICU equipment in place in the PICU to provide <i>pediatric-focused</i> critical care consultation to providers <i>throughout the province</i> (e.g., EDs, ICUs & pediatric units).
3.0	Minimum volumes ^{1,3,8}			Capacity to accommodate at least 4 ventilated children at a time.	Capacity to accommodate at least 6 ventilated children at a time.	
4.0	Other					

Table 2: Specialist/Subspecialist Physician Interdependencies

✓24/7 = on-call 24/7 & available for on-site consultation as needed.

✓ M-F days = available days M-F for on-site consultation as needed.

Service	Availability			
	T4		T5	T6
	Close Site (≤2 hrs by road from T5/T6)	Distant Site (>2 hrs by road from T5/T6)		
Pediatrician	✓24/7	✓24/7	✓ Pediatrician or designate on-site 24/7 (excludes ED MD)	✓ Pediatrician or designate on-site 24/7; excludes ED MD
Pediatric allergy				
Anesthesiologist that provides care to children & adults	✓24/7	✓24/7	✓24/7	
Pediatric anesthesiologist				✓24/7
Pediatric biochemical/metabolic diseases				✓24/7
Pediatric bone marrow transplant				✓ M-F days
Pediatric cardiology			✓M-F days	✓24/7
Pediatric cardiovascular surgery				✓24/7
Adult critical care medicine	✓24/7 (for children ages 14 - 16.9 yrs)	✓24/7		
Pediatric critical care medicine			T5 PICU	T6 PICU
Pediatric dermatology				✓ M-F days
Developmental pediatrics/child development & rehab				✓ M-F days
Ear, nose & throat surgeon that provides care to children & adults		✓24/7	✓24/7	
Pediatric ear, nose & throat surgery				✓24/7
Pediatric emergency medicine				
Pediatric endocrinology				✓24/7
Pediatric gastroenterology				✓24/7
General surgeon that provides care to children & adults	✓24/7	✓24/7	✓Outside M-F days	
Pediatric general surgery			✓M-F days	✓24/7
Pediatric hematology/oncology				✓24/7
Pediatric immunology				✓24/7
Infectious diseases physician that provides care to children & adults			✓24/7	
Pediatric infectious diseases				✓24/7
Medical genetics				✓ M-F days
Neonatology			T3 NICU	T4 NICU
Pediatric nephrology				✓24/7
Neurologist that provides care to children & adults				
Pediatric neurology			✓M-F days	✓24/7

Service	Availability			
	T4		T5	T6
	Close Site (≤2 hrs by road from T5/T6)	Distant Site (>2 hrs by road from T5/T6)		
Neurosurgeon that provides care to children & adults			✓24/7	
Pediatric neurosurgery				✓24/7
Pediatric ophthalmology				✓24/7
Orthopedic surgeon that provides care to children & adults		✓24/7	✓24/7	
Pediatric orthopedic surgeon				✓24/7
Pediatric radiation therapy				✓ (off-site access)
Plastic surgeon that provides care to children & adults			✓24/7	
Pediatric plastic surgery				✓24/7
General psychiatrist		✓24/7	✓Outside M-F days	
Child & youth psychiatrist			✓ M-F days	✓24/7
Radiologist that provides care to children & adults	✓Diagnostics 24/7 ✓Interventional radiology (children 14-16.9 yrs): <ul style="list-style-type: none"> • Emergency procedures: 24/7 • Elective procedures: M-F days 	✓Diagnostics 24/7 ✓Interventional radiology (children 14 - 16.9 yrs): <ul style="list-style-type: none"> • Emergency procedures: 24/7 • Elective procedures: M-F days 	✓Diagnostics 24/7 ✓Interventional radiology: <ul style="list-style-type: none"> • Emergency procedures: 24/7 • Elective procedures: M-F days 	
Pediatric radiologist + pediatric interventional radiologist				✓Diagnostics 24/7 ✓Interventional radiology: <ul style="list-style-type: none"> • Emergency procedures: 24/7 • Elective procedures: M-F days
Pediatric respiratory medicine				✓24/7
Pediatric rheumatology				✓24/7
Pediatric urology				✓24/7
Pediatric child protection medical specialist (e.g., Pediatrician with enhanced training/experience)	✓	✓	✓	✓

Note: Chart above is consistent with the AAP Guidelines and Levels of Care for PICUs, Pediatrics, vol. 114, No 4 (2004). The only difference is that a pediatric cardiologist and pediatric neurologist are "desired" but not "required" for a Level II (equivalent of T5) service in the AAP Guidelines. The requirement for these subspecialists on days, M-F, is consistent with the medical module.

3.2 Knowledge Sharing & Transfer/Training

		Children's Limited Critical Care Service T4	Children's Regional Subspecialty Critical Care Service T5	Children's Provincial Subspecialty Critical Care Service T6
1.0	Student learning			
1.1	Medical students, residents & fellows		May provide educational opportunities in pediatric critical care for: <ul style="list-style-type: none"> • Family medicine residents. • Pediatric residents. • Emergency department residents. • Critical care medicine (CCM) residents (adult & pediatric streams). 	Same as T5 plus: Designated by UBC as a pediatric critical care training site for: <ul style="list-style-type: none"> • CCM residents (pediatric stream). In conjunction with UBC, develops model for training CCM residents (pediatric stream).
1.2	Nursing, allied health & other undergraduate, graduate & post-graduate students		May provide pediatric critical care training for nurses, allied health & other undergraduate, graduate & post-graduate students. Specific child health experiences/placements may be available & are negotiated between the site & applicable learning institution.	Provides pediatric critical care training for nurses, allied health & other undergraduate, graduate & post-graduate students.
2.0	Continuing education			
2.1	Physicians	Facilitates physician access to learning activities based on identified practice gaps, including the practice of pediatric critical care skills where limited opportunity exists in practice (e.g., simulation, off-site clinical experiences, Tele-PICU education sessions).	Mechanisms in place to regularly review physician education needs related to maintenance of pediatric critical care competencies. Facilitates physician access to learning activities based on identified practice gaps, including the practice of pediatric critical care skills where limited opportunity exists in practice (e.g., simulation, off-site clinical experiences, Tele-PICU education sessions).	Same as T5 plus: In collaboration with T5, organizes provincial learning activities that support the maintenance of physician competencies in pediatric care (e.g., pediatric rounds, conferences, Tele-PICU education sessions). Provides pediatric CCM experiences for T4 & T5 physicians (on-site &/or via simulation).

		Children's Limited Critical Care Service	Children's Regional Subspecialty Critical Care Service	Children's Provincial Subspecialty Critical Care Service
		T4	T5	T6
2.2	Nurses, allied health & other care providers	Facilitates staff access to learning activities based on identified practice gaps, including the practice of pediatric critical care skills where limited opportunity exists in practice (e.g., simulation, off-site clinical experiences, Tele-PICU education sessions).	<p>Mechanisms in place to regularly review staff education needs related to maintenance of pediatric critical care competencies.</p> <p>Facilitates staff access to learning activities based on identified practice gaps, including the practice of pediatric critical care skills where limited opportunity exists in practice (e.g., simulation, off-site clinical experiences, Tele-PICU education sessions).</p>	<p>Same as T5 plus:</p> <p>In collaboration with T5, organizes provincial learning activities that support the maintenance of staff competencies in pediatric care (e.g., pediatric rounds, conferences, Tele-PICU education sessions).</p> <p>Provides pediatric ICU experiences for T4 & T5 staff (on-site &/or via simulation). Organizes provincial activities that support the maintenance of staff competencies in child health (e.g., pediatric rounds, conferences).</p> <p>Provides pediatric ICU experiences for T4 & T5 staff (on-site &/or via simulation).</p>

3.3 Quality Improvement/Research

		Comprehensive Critical Care Service	Children’s Regional Subspecialty Critical Care Service	Children’s Provincial Subspecialty Critical Care Service
		T4	T5	T6
1.0	Quality improvement (QI)	HA QI structures & processes are in place, including case reviews. If child involved, physicians & staff with pediatric expertise participate in the review, as appropriate.	HA QI structures & processes are in place to specifically review & improve the quality & safety of <i>children's CC care</i> , including case reviews.	Same as T5 plus: Provides subspecialty pediatric CC expertise for T4/T5 case reviews, if requested.
		Implements recommendations & evaluates the outcomes.	In collaboration with T6, establishes structures & processes to track pediatric-specific CC quality & safety indicators at a regional & provincial level. e.g., PICU volumes, illness severity & effectiveness & efficiency of care.	Consults with pediatric CC experts within or outside BC for T6 case reviews, as appropriate.
		Participates in regional & provincial CC quality improvement initiatives.	Leads pediatric CC improvement initiatives at a regional level to address quality/risk issues in hospitals <i>within HA</i> . Participates in provincial pediatric CC improvement initiatives.	In collaboration with T5, establishes structures & processes to track pediatric-specific CC quality & safety indicators at a local & provincial level. In collaboration with T4/T5, leads pediatric CC improvement initiatives at a provincial level to address quality/risk issues in hospitals <i>throughout the province</i> . Participates in provincial pediatric CC improvement initiatives.
		System supports are in place to enable health care providers to provide care that is consistent with current child health care guidelines.	Same as T4.	Same as T4 plus: In collaboration with CHBC & HAs, develops & disseminates guidelines on relevant pediatric CC topics.
2.0	Research		Participates in research related to pediatric CC.	Conducts & supports others to conduct research in pediatric CC.

4.0 References

1. Queensland Health. Clinical services capability framework. Intensive care services - Children's. <http://www.health.qld.gov.au/clinical-practice/guidelines-procedures/service-delivery/cscf/default.asp>. 2014 (Version 3.2).
2. NSW Department of Health. NSW health guide to the role delineation of clinical health services. <http://www.health.nsw.gov.au/services/pages/role-delineation-of-clinical-services.aspx>. 2016.
3. College of Intensive Care Medicine of Australia and New Zealand. Minimum standards for intensive care units. https://www.cicm.org.au/CICM_Media/CICMSite/CICM-website/resources/Professional%20Documents/IC-1-minimum-standards-for-intensive-care-units.pdf. 2011.
4. Paediatric Intensive Care Society. Quality standards for the care of critically ill children, 5th ed. <http://Picsociety.uk/about-pics/pics-standards/>. 2015:1-156.
5. Royal College of Nursing (UK). Defining staffing levels for children and young people's services. <https://www.rcn.org.uk/professional-development/publications/pub-002172>. 2013:11.
6. NHS England. Service specifications - level 2 paediatric critical care. <https://www.england.nhs.uk/commissioning/wp-content/uploads/sites/12/2015/01/eo7-sb-paed-hig-dep-care.pdf>. 2013.
7. NHS England. Service specifications - level 3 - pediatric critical care. <https://www.england.nhs.uk/commissioning/wp-content/uploads/sites/12/2015/01/e07-sa-paed-inten-care.pdf>. 2013.
8. NHS Wales. Caring for critically ill children: Standards. <http://www.cardiffpicu.com/pdf/Welsh%20PIC%20standards.pdf>. 2003.
9. Rosenberg DI, Moss MM, American Academy of Pediatrics Section on Critical Care, American Academy of Pediatrics Committee on Hospital Care. Guidelines and levels of care for pediatric intensive care units. *Pediatrics*. 2004;114(4):1114-1125.
10. BC Medical Quality Initiative. Critical care medicine clinical privileges; <http://Bcmqi.ca/mdocs-posts/criticalcare>. 2014.
11. Royal College of Physicians and Surgeons of Canada. Objectives of training in the subspecialty of pediatric critical care medicine. <http://www.royalcollege.ca/cs/groups/public/documents/document/y2vk/mdaw/~edisp/tztest3rcpsced000891.pdf>. 2014:1-24.
12. Interior Health Authority. Competency based practice framework. 2013.

13. Canadian Nurses Association. Exam blueprint for the CC pediatrics nursing certification exam. 2010.
14. BC Children's Hospital Learning & Development. CAPE tools for BC children's - child and youth health nursing. BC Children's Hospital Intranet Web site. <http://infosource.cw.bc.ca/ld/cape.html>. Updated 2008 - 2010. Accessed 07/11, 2015.
15. Huisman E, Morales E, Van Hoof J, Kort H. Healing environment: A review of the impact of physical environmental factors on users. *Build Environ*. 2012;58:70-80.
16. Sakallaris BR, Macallister L, Voss M, Smith K, Jonas WB. Optimal healing environments. *Global Advances in Health and Medicine*. 2015;4(3):40-45.
17. NSW Department of Health. Guidelines for care in acute care settings. http://www0.health.nsw.gov.au/policies/pd/2010/pdf/PD2010_034.pdf. 2010;PD2010_034.
18. BC Children's Hospital. Pediatric foundational competency E-learning course. Provincial Health Services Authority Web site. <https://learninghub.phsa.ca>. Updated 2012. Accessed 12/10, 2016.

Appendix 1: Glossary

Registered Nurse with "pediatric skills"

- Demonstrates a broad understanding of growth and development. Distinguishes between normal and abnormal growth and development of infants, toddlers, children and youth.
- Understands the psychological impacts of care provision (including hospitalization) at different developmental stages (infant, toddler, preschooler, school aged and youth).
- Understands how to provide a physically and psychologically safe environment appropriate to the age and condition of the child.
- Demonstrates understanding of the physiological differences between infants, children and adults and their implications for assessment and care.
- Assesses a child's normal parameters, recognizes the deviations from the normal and acts appropriately on the findings.
- Demonstrates knowledge of common pediatric conditions and their management.
- Demonstrates understanding of fluid management in an infant and child.
- Calculates and administers medications and other preparations based on weight based dosages.
- Assesses child and family's knowledge and provides teaching specific to the plan of care and condition or procedure.
- Communicates effectively and works in partnership with children and families (children and family-centred care).
- Aware of and accesses pediatric-specific clinical guidelines and protocols.
- Responds to patient deterioration/acute urgent situations in an appropriate and timely manner.
- Commences and maintains effective basic pediatric life support, including 1- and 2-rescuer infant and child CPR, AED use and management of airway obstructions.
- Provides referrals to public health nursing, nutrition and utilizes contact with the child and family to promote child health. e.g., immunization, child safety.
- Assesses pain and intervenes as appropriate.*
- Initiates and manages peripheral IV infusions on children;* consults expert clinicians as necessary. Identifies and manages complications of IV therapy.

*Refer to body of document for examples of interventions appropriate at each tier.

References: NSW's Guidelines for Care in Acute Care Settings,¹⁷ BC Children's Pediatric Foundational Competencies on-line course¹⁸ and BC Children's CAPE tools (2008-2010).¹⁴

Appendix 2: Change Log

Document	Date	Description of Change
Initial approval (by CHBC Steering Committee +/- relevant Provincial Steering Committees)	Jan 2019	
Minor revision	July 2019	Table 2, Tier 5: Adjusted to include a pediatric surgeon available on days, M-F and a general surgeon available outside those hours (to align with pediatric surgery module) Section 3.2, subsection 1, Tier 5: Added ED residents to the list of potential residents.