TIERS
IN FULL

CHILDREN'S EMERGENCY DEPARTMENT SERVICES

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Children’s Emergency Department Services: Tiers in Full to Support Operational Planning

Contents

1.0 ED Tiers of Service ... 3
- 1.1 Module Development ... 3
- 1.2 Module Scope ... 4

2.0 Children’s ED Tiers in Full ... 4
- 2.1 Differentiation of the Tiers ... 4
- 2.2 Responsibilities and Requirements at each Tier ... 6
  - 2.2.1 Clinical Service ... 7
    - 2.2.1.1 Responsibilities ... 7
    - 2.2.1.2 Requirements ... 19
      - 1.0 Providers ... 19
      - 2.0 Facilities ... 24
      - 3.0 Clinical Diagnostic & Support Services ... 25
      - 4.0 Volumes per Year ... 25
      - 5.0 Specialist/Subspecialist Physician Interdependencies ... 25
      - 6.0 Other Requirements ... 25
  - 2.2.2 Knowledge Sharing & Transfer/Training ... 29
  - 2.2.3 Quality Improvement/Research ... 33

3.0 References ... 36

Appendix 1: Medications for the Emergency Care of Pediatric Patients ... 38
Appendix 2: Equipment and Supplies for Pediatric Patients in the ED ... 40
Appendix 3: Glossary ... 43

HOW TO CITE THE CHILDREN’S EMERGENCY DEPARTMENT SERVICES:

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 each of the three documents. If referencing the full module, please cite as:

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Children’s Emergency Department Services: Tiers in Full to Support Operational Planning

1.0 ED Tiers of Service

1.1 Module Development

The Children's Emergency Department (ED) Tiers module is made up three components:

- Setting the Stage for Tiers Development: Summarizes the data and literature used to create the module.
- Tiers in Brief to Support System Planning: Provides a high-level overview of key aspects of the module.
- Tiers in Full to Support Operational Planning: Provides significant detail of key aspects of the module: (1) clinical service. (2) knowledge sharing/training. and (3) quality improvement/ research ***(this document)***.

This document, **Children's ED: Tiers in Full to Support Operational Planning,** provides a detailed description of the tiers and the services provided to children that present to an ED with acute and often undifferentiated medical problem(s) and/or injury(ies). It builds on and is intended to be used in conjunction with the *Children's ED: Tiers in Brief to Support System Planning.*

The ED module was developed by an interdisciplinary working group comprised of representatives from each of the Health Authorities (various combinations of ED physicians, nurses and directors/managers), the Ministry of Health, Child Health BC and a meeting facilitator. In addition to the working group, representatives from associated health authorities (HAs) and other constituent groups were invited to provide feedback on the draft document. The final version was submitted to the Child Health BC Steering Committee for acceptance.

The document was informed by work done in other jurisdictions reported in the literature, mostly notably Australia/New Zealand,[1-3] Queensland,[4] New South Wales[5,6] and the United Kingdom.[7-9] B.C. data was used, where it was available, as were relevant standards and guidelines (e.g., Accreditation Canada[10] Canadian Association of Emergency Physicians,[11] Royal College of Physicians and Surgeons,[12] Trauma Association of Canada[13] and the American Academy of Pediatrics[14-16]).

1.2 Module Scope

The ED Tiers module focuses on care provided in EDs[i] to children up to their 17th birthday (16 years + 364 days) in:

- HA-funded health centre.
- Hospital emergency departments (EDs).

While emergency care is provided to children in other settings (e.g., private physician offices, schools) and by other care providers (e.g., primary care physicians, Critical Care Transport and Infant Transfer Teams, ground and air ambulance attendants and first responders), these circumstances/settings are outside the scope of this document.

2.0 Children's ED Tiers in Full

2.1 Differentiation of the Tiers

The Child Health Tiers of Service Framework includes 6 tiers of service. The ED module recognizes each of the 6 tiers.

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

The responsibility for *triage* and *initial stabilization* of ill and injured children is the same across all tiers of ED services. The tiers differ, however, in their capacity to manage varying levels of acuity and medical complexity beyond the initial stabilization period.

Capacity is influenced by several factors including the availability of:

- Pediatricians for consultation.
- Specialty/subspecialty physicians that care for children.
- Interdisciplinary team members (e.g., physiotherapists, occupational therapists, pharmacists, social workers, dietitians).
- Surgical services with pediatric expertise.
- Diagnostic support with pediatric expertise (e.g., radiology).
- Pediatric inpatient resources and expertise.

[i] For the purposes of this document, EDs include HA-funded health centres unless otherwise stated.

For the purposes of this document, "acuity" and "medical complexity" are terms used to help differentiate the tiers from each other. Refer to Tables 1 (acuity) and 2 (medical complexity) for definitions.

Table 1: Levels of Acuity[ii]

	Acuity of Presenting Complaint
Low	• Presenting problem(s) is non-urgent. May be part of a chronic problem. No history suggestive of potential for immediate deterioration. • Investigations and interventions could be delayed or referred to other health care providers. • Typically managed in a non-inpatient setting (emergency department, hospital-based clinic/day care, community-based clinic &/or home setting). e.g., Acute otitis media, vomiting, constipation, hematuria, sore throat, closed head injury in the absence of vomiting.
Medium	• Presenting problem(s) could potentially progress to a serious problem requiring extensive intervention. May be associated with significant discomfort or inability to function. • Typically managed in a non-inpatient setting (emergency department, hospital-based clinic/day care, community-based clinic &/or home setting) but may require an inpatient stay. • The need for intensive care would be an unexpected event. e.g., Persistent vomiting, exacerbation of asthma, mild to moderate dehydration, afebrile or febrile seizures.
High	• Presenting problem(s) is a potential or real threat to life, limb or function and requires immediate and potentially aggressive intervention(s). • Typically requires an inpatient stay. e.g., Meningitis, diabetic ketoacidosis.

[ii] Modified Canadian Triage & Acuity Scale (CTAS) guidelines (2008).

Table 2: Levels of Medical Complexity

	Medical Complexity of Underlying Condition
Low	• If chronic condition present, condition is stable. Systemic impact of disease is mild - minimal or no functional limitations. • Chronic condition can be managed using standard lab and diagnostic investigations and treatment protocols. • Typically managed in non-inpatient settings (emergency department, hospital-based clinic/day care, community-based clinic, home &/or school setting). e.g., Child with well controlled asthma or diabetes.
Medium	• Chronic condition is present (diagnosed or suspected), often with signs of mild exacerbation, progression or side effects from treatment. Systematic impact of disease is severe – definite functional limitations. • Chronic condition can be managed using standard lab and diagnostic investigations and treatment protocols. • Typically managed in non-inpatient settings (emergency department, hospital-based clinic/day care, community-based clinic, home &/or school setting) with periodic inpatient stays. e.g., Child with congenital heart disease or early stage muscular dystrophy.
High	• Chronic condition(s) present (diagnosed or suspected), often with signs of significant exacerbation, progression or side effects from treatment. Systematic impact of disease is severe (multiple organs affected) – a constant threat to life. Significant functional limitations present, often requiring dependence on technology. • Chronic condition requires an extended and innovative range of interventions to manage. • Typically managed in non-inpatient settings (hospital-based clinic/day care, community-based clinic, home &/or school setting) with frequent inpatient stays. e.g., Child with late stage muscular dystrophy, pulmonary hypertension or cardiac myopathy.

2.2 Responsibilities and Requirements at each Tier

This section describes the responsibilities and requirements at each tier to provide a **safe, sustainable** and **appropriate** level of ED service.

Sections are divided as follows:

2.2.1 Clinical Service
2.2.2 Knowledge sharing & transfer/training
2.2.3 Quality improvement & research

2.2.1 Clinical Service

2.2.1.1 Responsibilities

		T1	T2	T3	T4	T5	T6
		Primary & Emergent Health Service	**General ED Service**	**Child-Focused ED Service**	**Children's Comprehensive ED Service**	**Children's Regional Enhanced Subspecialty ED Service**	**Children's Provincial Subspecialty ED Service**
1	Triage	Uses the Canadian Pediatric Triage & Acuity Scale to triage & prioritize children for full assessment.	Same as T1.	Same as T1.	Same as T1.	Same as T1.	Same as T1.
2	Critical care management (ill or injured child)	Assesses & initiates stabilization of acutely ill/injured children according to guidelines found in the following: • Pediatric Basic Life Support (BLS[iii]) • Pediatric Advanced Life Support (PALS[iv]) • Advanced Trauma Life Support (ATLS[v]) • BC's Management of Major Pediatric Trauma[vi] guidelines. See Table 3 (sections 1 & 2).	Same as T1. See Table 3 (sections 1 & 2).	Same as T1. See Table 3 (sections 1 & 2).	Same as T1. See Table 3 (sections 1 & 2).	Same as T1. See Table 3 (sections 1 & 2).	Same as T1. Activates trauma team as required. Provides telephone advice 24/7 about pediatric ED critical care management to health care providers *throughout the province* (MD & RN). See Table 3 (sections 1 & 2).

[iii] http://circ.ahajournals.org/content/122/18_suppl_3/S862.full.pdf.
[iv] http://circ.ahajournals.org/content/122/18_suppl_3/S876.full.pdf+html.
[v] http://www.facs.org/trauma/atls (provides information purchasing a copy of the ATLS course manual).
[vi] http://www.bcchildrens.ca/Child-Safety-Site/Documents/ProvincialPediatricTraumaPosterJuly2008.pdf.

		T1 Primary & Emergent Health Service	T2 General ED Service	T3 Child-Focused ED Service	T4 Children's Comprehensive ED Service	T5 Children's Regional Enhanced Subspecialty ED Service	T6 Children's Provincial Subspecialty ED Service
				Capacity in ED for: • Continuous cardiac monitoring. • Time-limited constant visual observation (i.e., 1:1 RN/child ratio).	Capacity for: • Continuous cardiac monitoring. • Extended period of constant visual observation ((i.e., 1:1 RN/child ratio).	Same as T4.	Same as T4.
		Arranges immediate transfer of acutely ill/injured children to T4/T5/T6 service.	Same as T1.	Same as T1.	Receives acutely ill/injured children by ground or air ambulance &/or via autolaunch/Early Fixed Wing Activation Program.[vii] Stabilizes &, if necessary, prepares for transfer to T5/T6.	Same as T4.	Receives acutely ill/injured children by ground or air ambulance &/or via autolaunch.
3	Acute medical / surgical management (see critical care management section for initial management of critically ill children)	Formulates differential diagnoses & provides definitive treatment for children with low acuity/low complexity presentations.	Same as T1 plus: If on-site OR capacity, provides preoperative care for children undergoing surgical procedures.	Formulates differential diagnoses and provides definitive treatment for children with relatively frequent, medium acuity/complexity presentations. Provides preoperative care for children undergoing surgical procedures which are relatively common.	In collaboration with relevant adult specialists, formulates differential diagnoses & provides definitive treatment for children with a broad range of medium acuity/complexity presentations. Pediatric subspecialty &/or ICU services are not required.	In collaboration with relevant adult specialists &/or pediatric sub-specialists, formulates differential diagnoses & provides definitive treatment for children with high acuity (but not life threatening)/medium complexity presentations. Consultation with selected subspecialists may be required. Multiple pediatric subspecialty &/or ICU services are not required.	In collaboration with pediatric sub-specialists, provides definitive treatment for children with the most acute &/or complex presentations. Multiple pediatric subspecialties &/or ICU services may be required.

[vii] "Autolaunch" is a BC Ambulance Service term referring to the simultaneous dispatching of ground and helicopter ambulances when patients experience life or limb-threatening injuries. This program is available in all HAs except the Northern HA where the Early Fixed Wing Activation Program is utilized to manage life & limb-threatening events.

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		T1	T2	T3	T4	T5	T6
		Primary & Emergent Health Service	**General ED Service**	**Child-Focused ED Service**	**Children's Comprehensive ED Service**	**Children's Regional Enhanced Subspecialty ED Service**	**Children's Provincial Subspecialty ED Service**
3	Acute medical / surgical management cont'd	Stabilizes & refers/transfers children with medium & high acuity presentations & children with complex underlying medical conditions to appropriate tier of service. See Table 3 (section 3).		Receives referrals/transfers of children from T1 centres. Stabilizes & refers/transfers children with high acuity presentations & children with complex underlying medical conditions to T5/T6 service. See Table 3 (section 3).	Provides preoperative care for children undergoing a broad range of surgical procedures. Receives referrals/transfers from T1 & T3 centres. Stabilizes & refers/transfers children requiring high acuity/close observation or PICU care or those with complex underlying medical conditions to T5/T6 service. See Table 3 (section 3).	Receives referrals/transfers from T1, T3 & T4 centres. Stabilizes & refers/transfers children requiring T6 PICU care or those with complex underlying medical conditions to T6 service. See Table 3 (section 3).	Receives referrals/transfers of children from T1, T3 & T3 centres. Provides telephone advice 24/7 on pediatric ED-related topics to health care providers *throughout the province* (ED MD & RN). See Table 3 (section 3).
4	Trauma management (see critical care management section for initial management of critically injured children)	Assesses, stabilizes and refers most children with traumatic injuries to a T4, T5 or T6 service. Provides definitive treatment for children with minor injuries such as:	Assesses, stabilizes and provides definitive treatment for children with minor, uncomplicated single system injuries such as: • Minor cuts, abrasions, contusions,	T2 plus: Provides definitive treatment for children with more complex but still uncomplicated single system injuries such as: • Uncomplicated extremity	T3 plus: In collaboration with relevant adult specialists, assesses, stabilizes & provides definitive treatment for children with complex but non-life-threatening single & two-system injuries.	Same as T4 except collaboration may also involve relevant pediatric subspecialists, if available on-site.	T5 plus: In collaboration with pediatric sub-specialists, provides definitive treatment for children with multiple, complex &/or life-threatening injuries (including major trauma[x]) such as: • Pediatric Trauma Score <u><</u>8. • Pediatric Glasgow Coma

[x] Major trauma as defined on the algorithm: http://childhealthbc.ca/pediatric trauma algorithm.

		T1	T2	T3	T4	T5	T6
		Primary & Emergent Health Service	General ED Service	Child-Focused ED Service	Children's Comprehensive ED Service	Children's Regional Enhanced Subspecialty ED Service	Children's Provincial Subspecialty ED Service
		• Minor cuts, abrasions, contusions, sprains/strains & burns (1° & 2°). • Extremity fractures that require pain control +/- simple splints[viii].	sprains/strains & burns (1° & 2°). • Extremity fractures that require pain control +/- simple splints[14]. • Minor spinal fractures (e.g.,. spinous process avulsion and fracture) & rib fractures. • Uncomplicated abdominal injuries. • Mild traumatic brain injuries/concussions Stabilizes & arranges transfer of children with complex, complicated &/or more than single system injuries to a T4, T5 or T6 service.	fractures that require definitive casting (includes minimally displaced fractures). • Pneumothorax not requiring surgical intervention, with the exception of flail chest.	If capacity for definitive treatment is not available regionally,[ix] transfers to T6 service. If appropriate on-site medical & surgical capacity exists, receives transfers direct from trauma scene &/or from T1-T3 services. See Table 3 (section 3).		Scale<12 or focal neurologic deficit. • Respiratory distress/CV compromise. • Multiple organ system injury. • Uncontrolled hemorrhage. • Open chest wound. • Any penetrating torso, head, neck or proximal extremity injury. • Complete/partial major amputation (excluding digits). • 2 or more long bone fractures. • Combination trauma & burn. • Vascular injuries requiring OR repair for children of all ages. • Hostile environment (heat/fire, cold water, etc) with trauma. • Injuries that require management by pediatric sub-specialists (e.g., unstable spinal column fracture, severe traumatic brain injury, complex vascular injuries,

[viii] Consults with local orthopedic surgeon if fracture requires reducing, definitive casting &/or surgery.

[ix] Large variations in geography, trauma volume and resources do not permit distinct descriptions for the level of pediatric trauma care that can be expected regionally. Case definitions of appropriate levels of care that can be provided regionally need to be worked out between HAs and the provincial pediatric trauma centre (BCCH).

		T1	T2	T3	T4	T5	T6
		Primary & Emergent Health Service	General ED Service	Child-Focused ED Service	Children's Comprehensive ED Service	Children's Regional Enhanced Subspecialty ED Service	Children's Provincial Subspecialty ED Service
							major facial soft tissue injuries). Receives transfers direct from trauma scene & from T1-T5 services (no refusal policy for major trauma).
5	Pain management	Conducts pain assessment using age & developmentally appropriate pain assessment tool(s) (non-verbal & verbal) & intervenes as necessary. Administers weight-based doses of analgesics via topical, oral, intranasal, rectal & direct & intermittent IV routes. Manages complications of analgesia & sedation (e.g., manage airway, administer antidotes).	Same as T1.	Same as T1.	Same as T1 plus: Administers weight-based doses of analgesics via continuous IV.	Same as T4.	Same as T3 plus: Administers regional analgesia/anesthesia.

		T1	T2	T3	T4	T5	T6
		Primary & Emergent Health Service	**General ED Service**	**Child-Focused ED Service**	**Children's Comprehensive ED Service**	**Children's Regional Enhanced Subspecialty ED Service**	**Children's Provincial Subspecialty ED Service**
6	Procedural sedation			Maintains appropriate staffing[xi] to administer oral, intranasal, IM & IV sedation/anesthesia 2 4/7 for children ages 6 months & over.	Same as T3.	Same as T4.	Maintains appropriate staffing to administer oral, intranasal, IM or IV sedation/anesthesia 24/7 for children of any age.
7	Mental health &/or substance use crisis management	Assesses, stabilizes & takes action to meet immediate safety needs, including risk of harm to self (suicide) & others. Referral pathways in place to access mental health professionals (including consultation with a general psychiatrist within the HA by telephone) for mental health crises. In collaboration with child/family, develops post-ED discharge safety plan. May include transfer to T2-T6 ED or inpatient bed. If meets criteria for involuntary admission under the Mental Health	Same as T1 plus: If secure room exists, utilizes according to the *Secure Rooms & Seclusion Standards & Guidelines* (in development) & with consideration to developmental age. If secure room not available, stabilizes & transfers to T3-T6 ED or inpatient bed. If designated as a provincial mental health facility, psychiatric unit or observation unit,	Same as T2 plus: Referral pathways include access to on-site consultation from a general psychiatrist to assist in determining plan for definitive care.	Same as T3 plus: Secure room exists & is utilized according to the *Secure Rooms & Seclusion Standards & Guidelines* (in development) & with consideration to developmental age.	Same as T4. Referral pathways include access to on-site consultation from a child & youth psychiatrist (days, M-F) & general psychiatrist (outside these hours).	Same as T3 plus: Referral pathways include access to on-site consultation from a child & youth psychiatrist 24/7. Often requires consultation with medical & surgical subspecialists (e.g., neurologists, complex pain service, infectious diseases). Receives transfers from T1, T3 & T3 services.

[xi] MD with PALS certification 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.

		T1	T2	T3	T4	T5	T6
		Primary & Emergent Health Service	General ED Service	Child-Focused ED Service	Children's Comprehensive ED Service	Children's Regional Enhanced Subspecialty ED Service	Children's Provincial Subspecialty ED Service
		Act, completes documentation & arranges transfer to designated provincial mental health facility, psychiatric unit or observation unit (http://www2.gov.bc.ca). Provides safe environment until transfer is made.	receives transfers of involuntary admissions from within the HA. Arranges transfer to inpatient bed. Utilizes evidence-based protocols to manage symptoms of acute intoxication & substance withdrawal.				
8	Psychosocial crisis management[xii]	Assesses, stabilizes & takes action to meet immediate safety needs. In collaboration with child/ family, develops post-ED discharge safety plan. This may include transfer/admission to inpatient bed &/or contacting MCFD for an assessment & follow-up (e.g., temporary fostering).	Same as T1.	Same as T1.	Same as T1.	Same as T1.	Same as T1.

[xii] e.g., Breakdown of foster home because child is aggressive.

		T1	T2	T3	T4	T5	T6
		Primary & Emergent Health Service	General ED Service	Child-Focused ED Service	Children's Comprehensive ED Service	Children's Regional Enhanced Subspecialty ED Service	Children's Provincial Subspecialty ED Service
9	Child maltreatment (neglect & physical, sexual & emotional abuse)	Recognizes suspected cases of child maltreatment. Takes action to ensure immediate medical & safety needs are met, findings are documented & appropriate cases reported to MCFD as per the Child, Family & Community Service Act. Refers to pediatrician or local/regional child protection team, if needed (may require transfer to T3 service).	Same as T1.	Same as T2 plus: Provides consultation for children referred for suspected maltreatment (pediatrician). Refers complex cases to local/regional child protection team.	Same as T3.	Same as T3.	Recognizes suspected cases of child maltreatment. Provides advanced diagnostic & treatment services & coordinates follow-up of complex cases referred from throughout the province for child maltreatment. Services often provided in consultation with multiple medical, surgical & mental health subspecialists.
		Suspected cases of adolescent sexual assault: If trained sexual assault examiner is available, performs examination & arranges follow-up. If no trained examiner available, refers/ transfers to T3-T6.	Same as T1.	Same as T1.	Suspected cases of adolescent sexual assault: Trained sexual assault examiner performs examinations & arranges follow-up.	Same as T3.	Suspected cases of adolescent sexual assault: Refers/transfers adolescents to appropriate adult service for examination by trained examiner & to arrange follow-up.

Table 3: Procedure List, by Tier

X= required. R=recommended (but not required). Chart applies to children of all ages (0 – 16.99 years) unless noted.

		Primary & Emergent Health Service	General ED Service	Child-Focused ED Service	Children's Comprehensive ED Service	Children's Regional Enhanced Subspecialty ED Service	Children's Provincial Subspecialty ED Service
		T1	T2	T3	T4	T5	T6
1.0	**Critical Care Management in ED**						
1.1	Basic life support procedures	x	x	x	x	x	x
1.2	Airway adjuncts, oxygen delivery & suctioning	x	x	x	x	x	x
1.3	Bag/mask ventilation	x	x	x	x	x	x
1.4	Cardioversion & defibrillation	x	x	x	x	x	x
1.5	McGill forceps removal of supraglottic foreign body	R	x	x	x	x	x
1.6	Placement of supraglottic airway device	R	x	x	x	x	x
1.7	Access indwelling central catheters (e.g., VADs)	R	x	x	x	x	x
1.8	Rapid sequence induction for endotracheal intubation	R	x	x	x	x	x
1.9	Manage difficult airway (e.g., difficult anatomy, airway difficult to get)			x	x	x	x
1.10	Mechanical ventilation (respirator/ventilator)				x	x	x
1.11	Emergency cricothyrotomy & transtracheal ventilation		x	x	x	x	x
2.0	**Trauma Management in ED**						
2.1	Cervical spine immobilization	x	x	x	x	x	x
2.2	Control exsanguinating external hemorrhage	x	x	x	x	x	x
2.3	Needle decompression of chest	x	x	x	x	x	x
2.5	Emergency chest tube thoracostomy	R	x	x	x	x	x
2.6	Focused assessment with sonography for trauma (FAST)				x	x	x
3.0	**Acute Medical/Surgical Management in ED**						
3.1	Pediatric vascular access techniques						
	a. Phlebotomy	x	x	x	x	x	x
	b. Intraosseous access	x	x	x	x	x	x
	c. Peripheral venous access	R	x	x	x	x	x
	d. Umbilical vessel catheterization			x	x	x	x
3.2	Cardiac procedures						
	a. Converting stable SVT using vagal maneuvers	x	x	x	x	x	x
	b. Pericardiocentesis			x	x	x	x

		Primary & Emergent Health Service	General ED Service	Child-Focused ED Service	Children's Comprehensive ED Service	Children's Regional Enhanced Subspecialty ED Service	Children's Provincial Subspecialty ED Service
		T1	T2	T3	T4	T5	T6
3.3	Dental procedures						
	a. Reimplanting an avulsed permanent tooth (>6 yrs)	x	x	x	x	x	x
	b. Orofacial anesthesia techniques (local anesthetics & blocks)	x	x	x	x	x	x
	c. Reduction of temporomandibular joint dislocation		x	x	x	x	x
	d. Incision & drainage of a dental abscess		x	x	x	x	x
3.4	Gastrointestinal procedures						
	a. Insertion of NG tube	x	x	x	x	x	x
	b. Replacement of gastrostomy tube with foley (if fallen out)	x	x	x	x	x	x
	c. Rectal prolapse reduction	x	x	x	x	x	x
	d. Hernia reduction		x	x	x	x	x
	e. Rectal foreign body removal			x	x	x	x
3.5	Genitourinary skills						
	a. Management of unplanned labour/deliveries	x	x	x	x	x	x
	b. Manual detorsion of torted testicle	x	x	x	x	x	x
	c. Management of zipper injuries	x	x	x	x	x	x
	d. Adolescent pelvic exam	x	x	x	x	x	x
	e. Forensic examination of a sexual assault victim	X[xiii]	X[20]	X[20]	x	x	x (<13.99 yrs girls; <18.99 boys)
	f. Bladder catheterization	R	x	x	x	x	x
	g. Reduction of paraphimosis		x	x	x	x	x
	h. Vaginal foreign body removal		x	x	x	x	x
3.6	Head & neck procedures						
	a. Acute upper airway foreign body removal	x	x	x	x	x	x
	b. Foreign body removal from the external auditory canal	x	x	x	x	x	x
	c. Nasal foreign body removal	x	x	x	x	x	x
	d. Management of epistaxis: suspected source anterior nasal cavity	x	x	x	x	x	x
	e. Management of epistaxis: suspected source posterior nasal cavity		X[20]	x	x	x	x
	f. Drainage & packing of nasal septal & pinna hematomas			x	x	x	x
3.7	Neurological procedures						
	Lumbar puncture		x	x	x	x	x

[xiii] Consult T5/T6 service.

		Primary & Emergent Health Service	General ED Service	Child-Focused ED Service	Children's Comprehensive ED Service	Children's Regional Enhanced Subspecialty ED Service	Children's Provincial Subspecialty ED Service
		T1	T2	T3	T4	T5	T6
3.8	Ophthalmologic procedures						
	a. Ocular irrigation & decontamination	x	x	x	x	x	x
	b. Slit lamp exam		x	x	x	x	x
	c. Ocular foreign body removal		x	x	x	x	x
3.9	Orthopedic procedures						
	a. Splinting procedures	x	x	x	x	x	x
	b. Casting procedures.	x	x	x	x	x	x
	c. Performing a joint aspiration on the elbow or knee		x	x	x	x	x
	d. Performing closed reductions under sedation in ED.		X[21]	X[21]	x	x	x
3.10	Toxicological/environmental procedures						
	a. Activated charcoal administration	x	x	x	x	x	x
	b. Skin decontamination (e.g., chemical on skin)	x	x	x	x	x	x
	c. Tick removal	x	x	x	x	x	x
	d. External cooling procedures (e.g., heat stroke)	x	x	x	x	x	x
	e. External warming procedures	x	x	x	x	x	x
	f. Gastric emptying			x	x	x	x
3.11	Respirology procedures:						
	a. Continuous end tidal CO2 monitoring		x[xiv]	X[22]	x	x	x
	b. Use of MDIs with spacing devices & other systems for delivering inhaled medications	x	x	x	x	x	x
	c. Suctioning the trachea	x	x	x	x	x	x
	d. Replacement of a tracheostomy cannula in emergency situation	x	x	x	x	x	x
	e. Thoracentesis			x	x	x	x

[xiv] Required if performing procedural sedation.

		Primary & Emergent Health Service	General ED Service	Child-Focused ED Service	Children's Comprehensive ED Service	Children's Regional Enhanced Subspecialty ED Service	Children's Provincial Subspecialty ED Service
		T1	T2	T3	T4	T5	T6
3.12	Wound management:						
	a. General wound management	x	x	x	x	x	x
	b. Management of plantar puncture wounds	x	x	x	x	x	x
	c. Management of subcutaneous foreign bodies	x	x	x	x	x	x
	d. Hair tourniquet removal	x	x	x	x	x	x
	e. Incision & drainage of a cutaneous abscess, paronychia & felon	x	x	x	x	x	x
	f. Fishhook removal	x	x	x	x	x	x
	g. Ring removal	x	x	x	x	x	x
	h. Single layer closure of lacerations	x	x	x	x	x	x
	i. Multilayer closure of lacerations		x	x	x	x	X
3.13	Standardized protocols consider the needs of children:						
	a. Consent, including situations where a parent is not immediately available.	x	x	x	x	x	x
	b. Use of physical or chemical restraints.	x	x	x	x	x	x
	c. Do not resuscitate (DNR) orders.	x	x	x	x	x	x
	d. Disaster-preparedness plan.	x	x	x	x	x	x

2.2.1.2 Requirements

(1) Providers; (2) Facilities; (3) Clinical support services; (4) Minimum service volumes; (5) Interdependencies with other clinical services; & (6) Other requirements.

		Primary & Emergent Health Service	General ED Service	Child-Focused ED Service	Children's Comprehensive ED Service	Children's Regional Enhanced Subspecialty ED Service	Children's Provincial Subspecialty ED Service
		T1	T2	T3	T4	T5	T6
1.0	**Providers**						
1.1	Physicians / NPs in ED	MD/NP available (1) on-site; or (b) on-call when centre open. If on-call, available by phone within 10 min & on-site within 45 min.[xv] Current Pediatric Advanced Life Support (PALS) or equivalent certification recommended.	MD/NP available 24/7 (on-site or on-call). If on-call, same expectations as T1. Current PALS or equivalent certification recommended.	MD on-site in ED 24/7. Current PALS or equivalent certification recommended.	MD(s) with ED specialty training (CCFP (EM) or RCPSC) in ED 24/7. Current PALS or equivalent certification recommended.	Pediatric emergency medicine physician leadership provided by: • Pediatric emergency medicine sub-specialist with RCPSC subspecialty or equivalent training, & formal membership in the UBC academic division of pediatric emergency; OR • ED specialist with RCPSC or CCFP (EM) designation & demonstrated special interest, knowledge & skills in the emergency care of children acquired & maintained through clinical experience & specific pediatric focused continuing medical education, & formal membership in UBC academic pediatric	Pediatric emergency medicine physician leadership provided by pediatric emergency medicine subspecialist with RCPSC or equivalent training & formal membership in the UBC academic division of pediatric emergency. Physician staffing: At least one MD with pediatric emergency medicine subspecialty training in ED 24/7. Current PALS or equivalent certification recommended. Pediatric ED MDs available 24/7 to provide telephone advice to health care providers throughout the province on pediatric ED-related topics.

[xv] For details, refer to the Medical On-Call Availability Program (MOCAP) at www.health.gov.bc.ca/pcb/mocap.html. Actual response times are based on individual patient need on a case by case basis.

		Primary & Emergent Health Service	General ED Service	Child-Focused ED Service	Children's Comprehensive ED Service	Children's Regional Enhanced Subspecialty ED Service	Children's Provincial Subspecialty ED Service
		T1	T2	T3	T4	T5	T6
						emergency division. Physician staffing: 24/7 MD staffing using a combination of MDs with: • Pediatric emergency medicine sub-specialty training (RCPSC); & • ED specialty education (CCFP (EM) or RCPSC) with enhanced education/experience in pediatric emergency medicine. Current PALS or equivalent certification recommended.	
1.2	Medical / surgical specialist physicians available for consultation		If on-site OR capacity: Variable, depending on surgeon availability. Rural remote sites: General surgeon or family practice MD with enhanced surgical skills & anesthesia provider available (not 24/7).	Pediatrician on-call 24/7 & available on-site as needed. General surgeon available on-call 24/7 & available on-site as needed. Strive to have dental surgery, ophthalmology, orthopedics, ENT, plastics & urology on-call 24/7 & available on-site as needed. Transfer algorithm in place at times an appropriate surgical specialty is not available (e.g., vacations). Anesthesia provider on-call 24/7.	Pediatrician on-call 24/7 & available on-site as needed. Surgical specialists available on-call 24/7 & available on-site as needed to assess & manage children with all types of surgical conditions except cardiac or neurosurgery related. Managing a surgical condition may include performing a surgical procedure, developing an alternative management plan or transferring the child to a T5/T6 service.	Pediatrician or designate <u>on-site</u> 24/7. Pediatric surgical specialists available for some specialties (not 24/7). Pediatric anesthesiologist(s) on-call 24/7 & available on-site as needed. See Table 4 for specialist/subspecialist physician interdependencies.	Pediatrician or designate <u>on-site</u> 24/7. Pediatric surgical specialists on-call 24/7 & available on-site as needed to assess & definitively manage children with all types of surgical conditions, including multisystem trauma. Pediatric anesthesiologist(s) on-call 24/7 & available on-site as needed. See Table 4 for specialist/subspecialist physician interdependencies.

		Primary & Emergent Health Service	General ED Service	Child-Focused ED Service	Children's Comprehensive ED Service	Children's Regional Enhanced Subspecialty ED Service	Children's Provincial Subspecialty ED Service
		T1	T2	T3	T4	T5	T6
					Anesthesiologist who meets the credentialling requirements available to provide anesthesia to children ages 6 mos - 2 yrs on-call 24/7 & available on-site as needed. See Table 4 for specialist/ subspecialist physician interdependencies.		
1.3	Nurses	RNs with Basic Life Support (Level C) available when centre open. Current PALS & Emergency Nursing Pediatric Course (ENPC) certification strongly recommended.	RNs with Basic Life Support (Level C) available on-site 24/7. Current PALS & ENPC certification strongly recommended.	RNs with ED education/ experience on-site 24/7. Current PALS & ENPC certification strongly recommended.	Same as T3 except higher volumes will provide greater pediatric exposure & opportunities to enhance pediatric ED expertise.	RNs with *pediatric-specific* ED education/experience on-site 24/7. Current PALS & ENPC certification strongly recommended.	Same as T5 plus: Pediatric ED RNs available 24/7 to provide telephone advice to health care providers throughout the province on pediatric ED-related topics.
		Access to nurse educator within the HA to support ED RNs.	Same as T1.	Same as T1.	ED nurse educator available days, M-F.	Pediatric ED nurse educator available days, M-F.	Same as T5.

		Primary & Emergent Health Service	General ED Service	Child-Focused ED Service	Children's Comprehensive ED Service	Children's Regional Enhanced Subspecialty ED Service	Children's Provincial Subspecialty ED Service
		T1	**T2**	**T3**	**T4**	**T5**	**T6**
1.4	Psychosocial professionals		In-hospital social worker available on request for individual cases on days, M-F.	Same as T2 plus: Spiritual care practitioner available on request.	Same as T3 except social worker available 12 hr/d, 7d/wk.	Same as T4 except social worker practices exclusively with children.	Same as T5.
1.5	Allied health	Pharmacist available by phone to provide medication information to health care professionals. Consults with other tiers, as required.	Same as T1 plus: Pharmacist available as per Accreditation Canada standards, including on-call service (standards not specific to pediatrics).	Access to: • Generalist respiratory therapist (RT) on-call 24/7 & available on-site as needed. • Generalist PT & OT days, M-F. • Pharmacist as per T2.	Access to: • RT available on-site 24/7. Significant component of RT's practice is pediatrics (i.e., daily exposure). • PT & OT days, M-F. • Child life specialist in ED for portion of each day, M-F. • Pharmacist with pediatric expertise[xvi] available on-site days, M-F. Outside these hours, general pharmacist is on-call for telephone consultation.	Same as T4 plus: Pharmacist with pediatric expertise available in ED at least a portion of the day, M-F.	Availability of: • Pediatric RT available on-site 24/7. • Pediatric OT & PT 7d/wk, 12 hr/day. • Child life specialist in ED for portion of each day, M-F. • Pharmacist with pediatric ED expertise available in ED days, M-F. Pharmacist with pediatric expertise on-call outside these hours. Work exclusively or almost exclusively with children.

[xvi] Pharmacist that has completed a Pharmacy Practice Residency Program and has a demonstrated special interest, knowledge and skills in pediatric pharmacy. Pediatric knowledge and skills are acquired & maintained through clinical experience and special pediatric-focused continuing pharmacy education.

		Primary & Emergent Health Service	General ED Service	Child-Focused ED Service	Children's Comprehensive ED Service	Children's Regional Enhanced Subspecialty ED Service	Children's Provincial Subspecialty ED Service
		T1	T2	T3	T4	T5	T6
1.6	Mental health providers		General psychiatrist from within HA available for telephone consultation for urgent cases 24/7.	General psychiatrist available for on-site consultation 24/7. In-hospital mental health crisis response team available 24/7 (responds to crisis calls for adults & children).	In-hospital mental health crisis response team available 24/7 (responds to crisis calls for adults & children). Child & youth MH worker/psychiatry liaison nurse available to assess, treat & connect children in ED with community MH resources 8 hrs/day, 5d/wk. See Table 4 for specialist/ subspecialist physician interdependencies.	Same as T4 plus: See Table 4 for specialist/ subspecialist physician interdependencies.	In-hospital child & youth - specific mental health crisis response team available 24/7. Child & youth MH worker/psychiatry liaison nurse available to assess, treat & connect children in ED with community MH resources 8 hrs/day, 7d/wk. See Table 4 for specialist/ subspecialist physician interdependencies.
1.7	Child maltreatment (neglect & physical, sexual & emotional abuse)	Phone access to MCFD social worker 24/7 for child protection issues.	Same as T1 plus: In-hospital social worker available days, M-F.	Same as T3 plus: Pediatrician competent in providing consultation & follow-up for children referred for suspected child maltreatment on-call 24/7 & available on-site as needed.	Same as T3.	Same as T3.	Same as T3 plus: Child protection team on-call 24/7 & available on-site as needed (pediatrician, psychiatrist, psychologist, social worker & RN). Child protection team available to health care providers *throughout the province* 24/7 for advice on child maltreatment-related situations.

		Primary & Emergent Health Service	General ED Service	Child-Focused ED Service	Children's Comprehensive ED Service	Children's Regional Enhanced Subspecialty ED Service	Children's Provincial Subspecialty ED Service
		T1	T2	T3	T4	T5	T6
		May have access to trained sexual assault examiner; if not, arrangements are in place to refer/ transfer to adult service with trained examiner.	Same as T1.	Same as T2.	Trained sexual assault examiner on-call 24/7 & available on-site as needed.	Same as T4.	Arrangements are in place for referral/transfer of adolescents to adult service with trained sexual assault examiner.
2.0	**Facilities**						
2.1	Emergency Department	Triage, assessment, treatment & resuscitation areas are safe, appropriate & equipped for children.	Same as T1 plus: Capacity for isolation within ED (area used by children & adults). If secure room exists, meets standards outlined in the *Secure Rooms & Seclusion Standards & Guidelines* (in development).	Same as T2 plus: There is a waiting space designated for children (space may be within the larger ED waiting room). Space includes age-appropriate entertainment for children of all ages. Baby-changing area available in ED.	Same as T3 plus: Where possible, there are physical sight & sound barriers in the waiting & treatment areas that separate children from adult patients. There is an appropriate private space for children with mental health issues to sit & for interviews to be conducted. Secure room exists & meets standards outlined in the *Secure Rooms & Seclusion Standards & Guidelines* (in development).	ED designed for children & appropriately decorated, furnished & equipped. There is an appropriate private space for children with mental health issues to sit & for interviews to be conducted. Secure room exists, is dedicated for children & meets standards outlined in the *Secure Rooms & Seclusion Standards & Guidelines* (in development). Negative-pressure room available within ED.	Same as T5.

		Primary & Emergent Health Service	General ED Service	Child-Focused ED Service	Children's Comprehensive ED Service	Children's Regional Enhanced Subspecialty ED Service	Children's Provincial Subspecialty ED Service
		T1	T2	T3	T4	T5	T6
					Negative-pressure room available within ED (used by children & adults).		
2.2	Inpatient resources		"Safe pediatric bed(s)" (see glossary) available to admit children with low-acuity conditions (may be in ED or inpatient area).	On-site designated "safe pediatric bed(s)" (see glossary).	On-site "safe pediatric unit" (see glossary). Youth Mental Health inpatient beds within the HA.	Same as T4.	On-site safe "safe pediatric units" (see glossary). Child & youth mental health beds available on-site.
3.0	**Clinical Diagnostic & Support Services**	Refer to relevant modules (under development)					
4.0	**Volumes per Year**[xvii]						
4.1	Pediatric ED visits per year	Less than 1,500 pediatric ED visits/yr.	Less than 3,000 pediatric ED visits/yr.	Minimum 3,000 pediatric ED visits/yr.	Minimum 10,000 pediatric ED visits/yr.	Minimum 20,000 pediatric visits/yr.	Minimum 40,000 child visits/yr.
5.0	**Specialist/Subspecialist Physician Interdependencies**						
5.1	Interdep's	None.	None.	None.	See Table 4.	See Table 4.	See Table 4.
6.0	**Other Requirements**						
6.1	Medications	Pediatric medications available. See Appendix 1. Processes in place for safe medication storage, prescription, dosage calculations & delivery & include pre-	Same as T1.	Same as T1.	Same as T1.	Same as T1.	Same as T1.

[xvii] If a facility meets the responsibilities and requirements for a given tier EXCEPT the minimum volumes, suggestions to mitigate the insufficient volume include: (1) creating opportunities for the ED team to gain pediatric experience through "in reach" and "outreach;" (2) creating simulation experiences; and (3) reviewing the visits of local children to BCCH to determine whether there is capacity to see these children locally and, if so, to develop a plan which promotes the use of local EDs (applicable to the lower mainland only). Systems are in place to review regularly review pediatric ED outcomes (refer to section 2.2.3).

		Primary & Emergent Health Service	General ED Service	Child-Focused ED Service	Children's Comprehensive ED Service	Children's Regional Enhanced Subspecialty ED Service	Children's Provincial Subspecialty ED Service
		T1	T2	T3	T4	T5	T6
		calculated weight-based dosing guidelines for children of all ages. Dosages are calculated manually first & double-checked against references. System measures allow for easy differentiation between pediatric & adult medications & dosages, especially in emergency situations.					
6.2	Equipment & supplies	See Appendix 2 for reference list.	See Appendix 2 for reference list.	See Appendix 2 for reference list.	See Appendix 2 for reference list.	See Appendix 2 for reference list.	See Appendix 2 for reference list.
6.3	Phlebotomy & IV starts	Algorithm in place to manage difficult pediatric blood draws & IV starts.	Same as T1.	Same as T1.	Same as T1 plus: Capacity to collect blood samples at time of IV initiation.	Same as T4.	Same as T1 plus: IV/phlebotomy specialist available 24/7.
6.4	Forensic evidence (sexual assault)				Capacity to collect & store forensic evidence following sexual assault exam (dedicated, locked freezer)		Same as T3.

Table 4: Specialist/Subspecialist Physician Interdependencies

The table below refers to subspecialty physician service interdependencies within T3 & T6 centres. Interdependencies in T1 & T3 centres are identified under "responsibilities" in the main table. Unless otherwise noted, ✓ = available on-call 24/7 & available for on-site consultation as needed.

Service	Availability		
	T4	T5	T6
Pediatrician	✓	✓ (ped'n or designate on-site 24/7; excludes ED MD)	✓ (ped'n or designate on-site 24/7; excludes ED MD)
Pediatric allergy			
Anesthesiologist that provides care to children & adults	✓		
Pediatric anesthesiologist		✓	✓
Pediatric biochemical/metabolic diseases			✓
Pediatric bone marrow transplant			
Pediatric cardiology			✓
Pediatric cardiovascular surgery			✓
Pediatric child protection medical specialist	✓ (e.g., ped'n with enhanced training/ experience)	✓ (e.g., ped'n with enhanced training/ experience)	✓
Pediatric critical care			✓
Dentist that will treat children & adults in ED	✓	✓	
Pediatric dentist			✓
Pediatric dermatology			
Developmental pediatrician/child development & rehab			
Ear, nose & throat surgeon that provides care to children & adults	✓	✓	
Pediatric ear, nose & throat surgery			✓
Endocrinologist that provides care to children & adults			
Pediatric endocrinology			✓
Gastroenterologist that provides care to children & adults			
Pediatric gastroenterology			✓
General surgeon that provides care to children & adults	✓	✓	
Pediatric general surgery			✓
Pediatric hematology/oncology			✓
Pediatric immunology			
Infectious diseases physician that provides care to children & adults	✓ (on-call M-F days & available for on-site consultation as needed)	✓ (on-call M-F days & available for on-site consultation as needed)	
Pediatric infectious diseases			✓
Medical genetics			
Neonatology		L3 NICU	L3 NICU
Nephrologist that provides care to children & adults			
Pediatric nephrology			✓
Neurologist that provides care to children & adults	✓ (on-call M-F days & available for on-site consultation as needed)	✓ (on-call M-F days & available for on-site consultation as needed)	
Pediatric neurology			✓
Pediatric neurosurgery			✓

Service	Availability		
	T4	T5	T6
Pediatric ophthalmology			✓
Orthopedic surgeon that provides care to children & adults	✓	✓	
Pediatric orthopedic surgeon			✓
General psychiatrist	✓	✓ (on-call after-hours & available for on-site consultation as needed)	
Children & youth psychiatrist		✓ (on-call M-F days & available for on-site consultation as needed)	✓
Pediatric plastic surgery			✓
Pediatric radiation therapy			
Radiologist that provides care to children & adults	✓ Diagnostics 24/7; Interventional radiology (older children) M-F days	✓ Diagnostics 24/7; Interventional radiology (older children) M-F days	
Pediatric radiology + pediatric interventional radiology			✓
Pediatric respiratory medicine			✓
Pediatric rheumatology			✓
Pediatric urology			✓

Pediatric subspecialty trained physicians are:

- Specialists that complete a pediatric subspecialty residency program and the relevant RCPSC examination (RCPSC-recognized subspecialists). Includes pediatric surgeons, adolescent medicine physicians, child & youth psychiatrists, developmental pediatricians, pediatric emergency medicine physicians, pediatric hematologists/oncologists and pediatric radiologists.
- Specialists that complete a pediatric fellowship which may range from one to four years in length. No subspecialty RCPSC examination is required.

2.2.2 Knowledge Sharing & Transfer/Training

		T1	T2	T3	T4	T5	T6
		Primary & Emergent Health Service	**General ED Service**	**Child-Focused ED Service**	**Children's Comprehensive ED Service**	**Children's Regional Enhanced & Subspecialty ED Service**	**Children's Provincial Subspecialty ED Service**
1.0	**Student learning**						
1.1	Undergraduate medical students (multiple sites across BC)			If designated by UBC as a teaching site, provides ED placements for 3rd year (part of core rotation) & 4th year (elective rotation) students (not pediatric specific).	Same as T3.	Same as T3.	Provides ED placements for 3rd year & 4th year medical students (elective rotation, pediatric specific).
1.2	Family medicine residents – CCFP[xviii] (18 sites across BC)			If designated by UBC as a teaching site, provides ED placements for family medicine residents (core rotation, not pediatric specific).	Same as T3.	Same as T3.	Provides ED placements for family medicine residents (elective rotation, pediatric specific).
1.3	CCFP – EM residents (SPH, LGH, RCH, Kamloops, Nanaimo & PG)			If designated by UBC as a teaching site, provides clinical placements for CCFP – EM residents (not pediatric specific, core rotation).	Same as T3.	If designated by UBC as a teaching site, provides clinical placements for CCFP – EM residents (pediatric specific, core rotation).	As designated by UBC, provides clinical placements for CCFP – EM residents (pediatric specific, core rotation).
1.4	Pediatric residents – RCPSC[xix] (BCCH)						Designated by UBC as a teaching site. Provides ED placements for pediatric residents (core rotation, pediatric specific).

[xviii] CCFP = College of Family Physicians of Canada.
[xix] RCPSC = Royal College of Physicians & Surgeons of Canada.

		T1	T2	T3	T4	T5	T6
		Primary & Emergent Health Service	General ED Service	Child-Focused ED Service	Children's Comprehensive ED Service	Children's Regional Enhanced & Subspecialty ED Service	Children's Provincial Subspecialty ED Service
1.5	RCPS – EM residents (VGH, SPH, RCH, Vic Gen, RJH, BCCH)			If designated by UBC as a teaching site, provides ED placements for RCPS – EM residents (core rotation, not pediatric specific).	Same as T3.	Same as T3.	Designated by UBC as a teaching site. Provides ED placements for RCPS – EM residents (core rotation, pediatric specific).
1.6	RCPSC – Pediatric EM fellowship (BCCH)						Designated by UBC as a teaching site. Offers 2-year pediatric emergency medicine fellowship training program (core rotation, pediatric specific).
1.7	RCPSC – Other subspecialty residents & fellows						As designated by UBC, provides ED placements for residents in anaesthesia, radiology, orthopedic & otolaryngology programs (core rotation, pediatric specific).
1.8	Undergraduate nursing & allied heath education students			Specific ED placements/experiences are negotiated between the site & applicable learning institution (not pediatric specific).	Same as T3.	Same as T3.	Pediatric-specific placements/experiences are negotiated between the site & applicable learning institution.
1.9	Post-graduate nursing & allied health education students			Specific ED placements/experiences are negotiated between the site & applicable learning institution (not pediatric specific).	Same as T3.	Same as T3.	Pediatric-specific placements/experiences are negotiated between the site & applicable learning institution.

		T1	T2	T3	T4	T5	T6
		Primary & Emergent Health Service	**General ED Service**	**Child-Focused ED Service**	**Children's Comprehensive ED Service**	**Children's Regional Enhanced & Subspecialty ED Service**	**Children's Provincial Subspecialty ED Service**
2.0	**Continuing education**						
2.1	Physicians	Facilitates access to learning activities that support the maintenance of ED physician competencies, including pediatric ED competencies.	Same as T1.	Mechanism is in place to regularly review physician education needs related to pediatric ED care & maintenance of pediatric ED competencies. Creates or facilitates ED physician access to appropriate learning activities based on identified practice gaps. Creates or facilitates opportunities for ED physicians to practice critical skills where limited opportunity exists in "real life" (e.g., simulation, clinical experience with T4-T6 service).	Same as T3 plus: In collaboration with T5, organizes regional learning activities for T1, T3 & T3 ED physicians that support the provision of pediatric ED care & maintenance of pediatric ED competencies. Provides on-site pediatric ED experiences for T1 & T3 ED physicians.	Same as T4.	Same as T3 plus: In collaboration with T1, T3 & T3 physicians, identifies core pediatric ED physician competencies required at each tier. Develops & shares educational resources that support the maintenance of pediatric ED physician competencies. • Partners with HAs, provincial & national organizations to offer province-wide learning activities which support the maintenance of pediatric ED physician competencies. • Provides pediatric ED experiences on-site & via simulation for T1, T3 & T3 physicians.

		T1	T2	T3	T4	T5	T6
		Primary & Emergent Health Service	**General ED Service**	**Child-Focused ED Service**	**Children's Comprehensive ED Service**	**Children's Regional Enhanced & Subspecialty ED Service**	**Children's Provincial Subspecialty ED Service**
2.2	Nurses & allied health care providers	Facilitates access to learning activities that support the maintenance of ED staff competencies, including pediatric ED competencies (e.g., developmental stages, pediatric reference values, informed consent, Pediatric Canadian Triage and Acuity Scale, pediatric resuscitation & life support, weight-based dose adjustment of medications, safe use of pediatric equipment, pain management, care of common pediatric conditions & child maltreatment).	Same as T1.	Mechanism is in place to regularly review staff education needs related to pediatric ED care & maintenance of pediatric ED competencies. Creates or facilitates staff access to appropriate learning activities based on identified practice gaps. Creates or facilitates opportunities for staff to practice critical skills where limited opportunity exists in "real life" (e.g., simulation, clinical experience with T3 or T6 service).	Same as T3 plus: In collaboration with T5, organizes learning activities for T1, T3 & T3 staff that support the provision of pediatric ED care & maintenance of pediatric ED competencies. Provides on-site pediatric ED experiences for T1 & T3 staff.	Same as T4.	Same as T3 plus: In collaboration with T1, T3 & T3 staff, identifies core pediatric ED staff competencies required at each tier. Develops & shares educational resources that support the maintenance of pediatric ED staff competencies: • Partners with HAs, provincial & national organizations to offer province-wide learning activities which support the maintenance of pediatric ED staff competencies. • Provides pediatric ED experiences on-site & via simulation for T1, T3 & T3 staff.

2.2.3 Quality Improvement/Research

		T1	T2	T3	T4	T5	T6
		Primary & Emergent Health Service	General ED Service	Child-Focused ED Service	Children's Comprehensive ED Service	Children's Regional Enhanced & Subspecialty ED Service	Children's Provincial Subspecialty ED Service
1.0	Quality improvement (QI)	HAs have established HA QI structures & processes in place, including review of pediatric ED cases as required, based on specified criteria.	Same as T1.	Same as T1.	Same as T1.	Same as T1.	Same as T1.
		Reviews & makes & implements recommendations from at-risk ED case reviews. If the case involves a child, physicians & staff with pediatric expertise participate in the review, as appropriate.	Same as T1.	Same as T1 plus: Provides pediatric expertise for T1 case reviews, if requested.	Same as T1 plus: Provides pediatric expertise for T1 & T3 case reviews, if requested.	Same as T4.	Same as T1 plus: Provides pediatric expertise for T1, T3 & T3 case reviews, if requested. Consults with pediatric experts within or outside BC for T6 case reviews, as appropriate.
		Reviews trends at a local level of ED hazards, adverse events & near misses as per reports generated from the BC Patient Safety Learning System. Takes local action to reduce future occurrences within the ED.	Same as T1.	Same as T1.	In collaboration with T5, reviews trends at a local level of ED hazards, adverse events & near misses that involve pediatric patients as per reports generated from the BC Patient Safety Learning System. Takes local action to reduce future occurrences within the ED.	Same as T4.	Same as T3.
		Concepts of child & family-centered care (see glossary) are incorporated into child health programming.	Same as T1.	Same as T1.	Same as T1.	Same as T1.	Same as T1.

		T1	T2	T3	T4	T5	T6
		Primary & Emergent Health Service	**General ED Service**	**Child-Focused ED Service**	**Children's Comprehensive ED Service**	**Children's Regional Enhanced & Subspecialty ED Service**	**Children's Provincial Subspecialty ED Service**
	Quality improvement (QI) cont'd	Organizational mechanisms in place to obtain child/family feedback on the services provided. Incorporates feedback, as appropriate.	Same as T1.	Same as T1.	Same as T1.	Same as T1.	Same as T1.
					In collaboration with T5, collects & tracks pediatric –specific emergency care quality indicators at a regional level. In collaboration with T5, utilizes available data (e.g., reports generated from the BC Patient Safety Learning System, pediatric emergency care quality indicators) to review regional quality/risk related trends.	Same as T4.	In collaboration with CHBC & HAs, establishes, collects & tracks provincial pediatric ED care quality indicators. Utilizing available data (e.g., reports generated from the BC Patient Safety Learning System, pediatric emergency care quality indicators), reviews provincial quality/risk related trends.
		Participates in regional & provincial pediatric emergency care improvement initiatives.	Same as T1.	Same as T1.	In collaboration with T5, leads pediatric emergency care improvement initiatives at a regional level to address quality/risk issues within HA EDs. Participates in provincial pediatric emergency care improvement initiatives.	Same as T4.	In collaboration with CHBC & HAs, leads pediatric emergency care improvement initiatives at a provincial level to address quality/risk issues within BC EDs.

		T1	T2	T3	T4	T5	T6
		Primary & Emergent Health Service	**General ED Service**	**Child-Focused ED Service**	**Children's Comprehensive ED Service**	**Children's Regional Enhanced & Subspecialty ED Service**	**Children's Provincial Subspecialty ED Service**
	Quality improvement (QI) cont'd	System supports are in place to enable health care providers to provide care that is consistent with current pediatric ED guidelines.	Same as T1.	Same as T1.	Same as T1.	Same as T1.	In collaboration with CHBC & HAs, develops & disseminates guidelines on relevant pediatric ED topics. System supports are in place to enable health care providers to provide care consistent with current ED guidelines.
							Contributing member of the Canadian Association of Paediatric Health Centres (CAPHC).
2.0	Research					Participates in research related to pediatric emergency care.	Conducts & supports others to conduct research related to pediatric emergency care. Participates in Pediatric Emergency Research Canada.

3.0 References

1. Royal Australasian College of Physicians (PACP) Paediatric and Child Health Division, the Association for the Wellbeing of Children in Health Care and Children's Hospitals Australasia. Standards for the care of children and adolescents in health services; http://www.awch.org.au/pdfs/Standards_Care_Of_Children_And_Adolescents.pdf. 2008. Accessed 12/10, 2016.

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Appendix 1: Medications for the Emergency Care of Pediatric Patients

The Pediatric Advanced Life Support (PALS) course has been identified as the standard guideline and educational requirement for healthcare providers who respond to emergencies involving infants and children. The goal of PALS is to provide a systematic approach to pediatric assessment, basic life support, treatment algorithms, effective resuscitation and team dynamics. The following lists of medications are derived from the PALS course, as well as other medication categories required for pediatric emergency care. The lists of medications are recommended for all Tiers of Service that provide emergency care to pediatric patients.

Processes need to be in place for safe medication storage, prescription, dosage calculations & delivery & include pre-calculated weight-based dosing guidelines for children of all ages. It is recommended that dosages are calculated manually first and double-checked against references.

Pediatric medication dosages MUST be weight-based calculations. Whenever possible, weigh every child prior to medication calculations and administration.

If it is absolutely impossible to weigh a child, utilize a reference tool to estimate a child's weight as accurately as possible (i.e. age/weight reference charts, Broselow Pediatric Emergency Tape).

The list provided in this Appendix is a reference. Local variation may be appropriate.

Drugs Used in PALS (required at all sites)

Note: This list was current at the time this document was developed. Please refer to the PALS[20] resource manual for an up-to-date list.

Drug	Indications	
Adenosine	SVT	
Albumin	Shock, Trauma, Burns	
Alprostadil (PGE_1)	Ductal-dependent Congenital Heart Disease (all forms)	
Amiodarone	SVT, VT (with pulses)	
Atropine Sulfate	Bradycardia (symptomatic) Toxins/Overdose (e.g. organophosphate, carbamate)	
Calcium Chloride 10%	Hypocalcemia, Hyperkalemia, Hypermagnesemia, Calcium Channel Blocker Overdose	
Calcium gluconate	Hypocalcemia, Hyperkalemia, Hypermagnesemia, Calcium Channel Blocker Overdose – preferred agent if no central line access if available	
Dexamethasone	Croup, acute asthma exacerbation	
Dextrose (Glucose)	Hypoglycemia	
Diphenhydramine	Allergic reaction - adjunct to epinephrine & other medications for anaphylactic shock. Refer to www.childhealthbc.ca (anaphylaxis guideline) for treatment of anaphylactic shock.	
Dobutamine	Congestive Heart Failure, Cardiogenic Shock	
Dopamine	Cardiogenic Shock, Distributive Shock	
Epinephrine	Pulseless Arrest, Bradycardia (symptomatic)	Asthma Croup

[20] http://circ.ahajournals.org/content/122/18_suppl_3/S876.full.pdf+html.

Drug	Indications	
	Hypotensive Shock Anaphylaxis	Toxins/Overdose (e.g. β-adrenergic blocker, calcium channel blocker)
Hydrocortisone	Adrenal Insufficiency	
Ipratropium Bromide	Asthma	
Lidocaine	VF/Pulseless VT, Wide-Complex Tachycardia (with pulses)	
Magnesium Sulfate	Asthma (refractory status asthmaticus), Torsades de Pointes, Hypomagnesemia	
Methylprednisolone	Asthma (status asthmaticus), Anaphylactic Shock	
Milrinone	Myocardial Dysfunction and Increased SVR/PVR	
Naloxone	Narcotic (opiate) Reversal	
Nitroglycerin	Congestive Heart Failure, Cardiogenic Shock	
Norepinephrine	Hypotensive (usually distributive) Shock	
Oxygen	Hypoxia, Hypoxemia, Shock, Trauma, Cardiopulmonary Failure, Cardiac Arrest	
Procainamide	SVT, Atrial Flutter, VT (with pulses)	
Salbutamol	Asthma, Anaphylaxis (bronchospasm), Hyperkalemia	
Sodium Bicarbonate	Metabolic Acidosis (severe), Hyperkalemia Sodium Channel Blocker Overdose (e.g. tricyclic antidepressant)	
Sodium Nitroprusside	Cardiogenic Shock, Severe Hypertension	
Adenosine	SVT	
Albumin	Shock, Trauma, Burns	

Other Required Drugs/Categories (required at all sites)

Drug	Indication
Activated Charcoal	Toxic Ingestion
Analgesics: oral, injectable, intranasal (Acetaminophen, Ibuprofen, Morphine, Fentanyl)	Pain Control
Antibiotics (parenteral)	Anti-infective
Antiviral (Acyclovir)	Anti-infective
Anticonvulsants/Sedatives (Diazepam, Lorazepam, Phenytoin, Midazolam)	Anti-seizure Anxiolytics
Antidotes (Acetylcystine, Flumazenil)	Ingestions
Antipyretics	Fever Reduction
Insulin	DKA
Mannitol 20%	Reduce ICP
Topical Anesthetics	Wound closure Venipuncture

Rapid Sequence Intubation/Sedation (required at T2, T3, T3 & T6 sites)

Drug	Indication
Rocuronium &/or Succinylcholine	Neuromuscular Blocking Agents
Ketamine	Sedation
Propofol	Sedation

Appendix 2: Equipment and Supplies for Pediatric Patients in the ED

List includes equipment and supplies for neonates that were recommended by the working group. It is provided as a reference. Local variation may be appropriate.

Equipment	Details	ED Tiers
Oxygen/ Airway	Simple oxygen masks (standard & non- rebreathing) sizes: infant, child, adult	All
	Nasal cannulas: sizes: infant, child, adult	All
	Nebulizer mask/tubing: sizes: child, adult	All
	MDI spacer (aerochamber) (infant, child, adult)	All
	Oropharyngeal airways: sizes 0-5 (50mm-100mm)	All
	Nasopharyngeal airways (infant, child & adult)	All
	Supraglottic airway device: all sizes	All
	Self-inflating bag-mask device with reservoir, PEEP valve, pressure gauge & maximum pressure valve (infant, pediatric & adult sizes).	All
	Masks to fit bag-mask device adaptor (infant, child & adult sizes)	All
Airway/respiratory	Laryngoscope: 1x small handle 1x large handle	T2 & up
	Blades: 1 each x Miller blades (straight): sizes 0, 1 1 each x Mac (curved) blades: sizes 1,2,3,4	T2 & up
	1 each x Magill forceps (large & small)	T2 & up
	1 x Lidocaine spray & nozzle	T2 & up
	Extra bulbs & batteries for laryngoscope	T2 & up
	Endotracheal tubes • 1 x uncuffed: sizes 2.5 -3.0 • 2 x microcuffed: sizes 3.0-4.5 • 2 x cuffed: sizes 5-8.5	T2 & up
	Stylets for endotracheal tubes (6f, 10f & 14f)	T2 & up
	2 x ET CO2 (adult & pediatric in-line) 1 x ET CO2 detector (pediatric & adult –quick cap)	T2 & up
	1 x bottle Med Adhesive Glue / Mastisol / Detachol	T2 & up
	Scissors	T2 & up
	Tape or securing device for endotracheal tube 2 x twill ties (wide & narrow)	T2 & up
	2 x 15mm connectors 2 x 22mm connectors	T2 & up
	Needle decompression of chest: 21g , 23g butterfly needle or 18g, 20g or 22 g cannula over needle	T2 & up
	Chest Tubes: (Trocar) Sizes: 8fr-40fr, 1% Lidocaine Without Epinephrine, Heimlich valve, 3-way stopcock, chest tube clamps, dry suction water seal chest drainage system	T2 & up
	Tube thoracostomy tray (scalpel, sutures, clamps, sterile towels, etc)	T2 & up
	Cricothyrotomy tray (dilator & scalpel)	T2 & up
Suction	Mechanical suction & tubing	All
	Suction catheters: sizes 5/6.5F-12F	All
	Yankauer suction: small, large	All
GI Equipment	NG tubes (sump tubes): sizes 10,12,14,16 Infant feeding tubes: sizes 5fr,8fr,10fr	All

Equipment	Details	ED Tiers
	PH strips for checking NG placement	All
	Enteral collection receptacles	T2 & up
	Duoderm, tegaderm, scissors, waterproof tape	T2 & up
Monitoring	Cardiac monitor/defibrillator with pediatric & adult capabilities including pediatrics-sized pads/paddles	T2 & up
	ECG leads (infant & adult)	All
	Automated External Defibrillator (AED) (preferably, that can detect pediatric rhythms): • For children ages 1 to 8 years of age, use an AED with pediatric pads and a pediatric dose-attenuator system, if available. If not available, a standard AED without a dose attenuator may be used. • For infants (<1 year of age), a manual defibrillator is preferred. If not available, an AED with pediatric dose attenuation is desirable. If neither a manual defibrillator nor an AED with pediatric dose attenuation are available, a standard AED without a dose attenuator may be used.	T1
	Pulse oximeter with neonate, pediatric & adult-sized probes	All
	Stethoscopes: sizes: pediatric, adult	All
	Thermometer with separate oral & rectal probes	All
	Blood pressure cuffs: sizes: neonatal, infant, child, small adult, adult – arm & thigh	All
	Doppler ultrasonography devices	All
Vascular Access	Intravenous safety catheters: sizes 14g – 24 g	All
	Infusion control device (i.e., infusion pump)	All
	Rapid infuser/tubing	T2 & up
	IV fluid administration sets (including blood administration sets & secondary lines)	All
	IV caps, Y-connectors, stop cocks, tourniquets, alcohol swabs, Tegaderm, tape, t-pieces, armboards	All
	IV solutions: Normal Saline (NS), Dextrose 5% in NS, Dextrose 5% in NS with 20 mmol KCL/L & Dextrose 10% in NS	All
	Intraosseous needles & insertion device (pediatrics & adult sizes)	All
	Arm boards (infant, child & adult sizes)	All
	1% lidocaine without epinephrine	All
Thermoregulation	Patient warming device (e.g., overbed warmer, Bair Hugger)	All
	Intravenous blood/fluid warmer/tubing	T2 & up
Fracture management	Extremity splints, including femur splints (pediatrics & adult sizes)	All
	Spinal stabilization: backboard & hard collars: sizes infant – adult X-Tall (9 sizes)	All
Specialized trays	LP tray including infant (22 g), pediatrics (22 g) & adult (18 – 21 g) LP needles	T2 & up
Urinary Equipment	Urinary catheterization kit	T2 & up
	Urinary (indwelling) catheters: sizes (5,8,10,12,14)	T2 & up
	Urinary drainage set	T2 & up
	Sterile specimen containers	All
	Multi-stix dipsticks to test for wbc/nitrates, etc.	All
Integumentary	Dressing supplies	All
	Burn care dressings (as per provincial burn care guideline)	All
Ophthalmology	Eye irrigation equipment	All

Equipment	Details	ED Tiers
Miscellaneous	Syringes, gloves, blood collection tubes	All
	Age-appropriate non-medication pain management/distraction supplies (e.g., pacifiers dipped in sweet liquid, toys, rewards, etc.)	All
	Tool or chart that incorporates both weight (in kg) & length to assist in determining equipment size & correct drug dosing (by weight & total volume). (An example of a tool is the length-based resuscitation tape (e.g. Broslow tape)	All
	Weigh scale**: kg only** (not pounds) for infants & children Height measuring device	All
	Pain scale assessment tools appropriate for age	All
	Calculator	All

This list is specific to pediatric ED requirements. It assumes that "standard ED equipment" required for the care of patients of all ages is available.

Sources used in developing this equipment list:

1. Review of Pediatric Advanced Life Support (PALS) training & associated equipment.
2. Equipment list for BCCH resuscitation rooms.
3. Equipment list on respiratory therapy carts at BCCH.
4. American Academy of Pediatrics, 2009.
5. Input from the ED Tiers of Service Working Group.

Appendix 3: Glossary

Registered Nurse with "pediatric skills"

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

References:

- NSW's Guidelines for Care in Acute Care Settings[6]
- BC Children's Pediatric Foundational Competencies on-line course[17]
- BC Children's CAPE tools (2008-2010).[18]

"Enhanced pediatric skills" (refers to RNs and others on the interdisciplinary team)

- Demonstrates in-depth knowledge in a specific area of clinical care (e.g., respiratory diseases, sexual assault, diabetes, wound management, etc).
- Performs comprehensive assessments and plans, provides and evaluates care in children with suspected or known issues in specific areas of clinical care.

Reference: BC Children's CAPE tools.[18]

Safe pediatric bed (extracted from CHBC Children's Medicine module)
All hospitals that admit children must take steps to ensure the environment is as safe as possible for children & youth (<16.9yrs). For a T2 service, this includes:

- Physical safety:
  - Area is physically safe for children & youth with any potentially dangerous equipment or sharps, ligature risks, medications, chemicals or fluids out of reach or in locked cupboards. Windows if present must have safe guards to allow for minimal opening.
  - Ability to position bed near the nursing station for appropriate level of observation, as required (e.g., children/youth with mental health conditions).
  - Physical separation of children & youth from adult patients is recommended. If physical separation is not possible, children & youth are not in the same area/unit as adults who are under the influence of, or withdrawing from alcohol or chemical substances, known sex offenders, a danger to themselves or others and/or are confused and/or wandering.
  - Furniture meets appropriate safety standards for children & youth, with appropriate size of beds for smaller children.
- Psychological comfort:
  - Parents/primary caregivers are able to stay with their children & youth 24/7 during hospitalization.
  - Self-served food and drink is in close proximity.
- Knowledgeable staff:
  - Sufficient “RNs with pediatric skills” are allocated each shift to ensure adequate supervision and care (includes adhering to a daily routine) relevant to the age and nursing needs of child.
  - Criminal record checks are required as part of the credentialing and/or hiring process for all staff and physicians (as per legislation).
- Equipment and supplies:
  - Pediatric emergency equipment and supplies are in close proximity (refer to Appendix 1 in the Medical Tiers in Full document for a non-exhaustive list of equipment and supplies).

Additional requirements for a T3/T4 service:

- Psychological comfort:
  - Access to child-friendly bathrooms.
  - Space for changing diapers (if appropriate to the clinical specialty).
  - Facilities for breastfeeding and breast milk storage (if appropriate to the clinical specialty).
  - Safe space(s) and age-appropriate facilities/equipment for children and youth to play/be entertained/have exercise. e.g., age appropriate media, arts/crafts books and board games, supervised use of courtyard, if available.

Safe pediatric unit (extracted from CHBC Children's Medicine module)
In addition to the requirements for a safe bed, a "safe pediatric unit" includes:

- Physical safety:
  - Children & youth are cared for on a dedicated pediatric inpatient unit(s).
  - Pediatric unit is functionally separate from adult patients, preferably with a door that can be closed (but not locked) and not opened by young children.
  - Regulated hot water temperature and secure electrical outlets are present on the unit.

- Psychological comfort:
  - Bedside sleeping facilities and ideally a kitchenette with fridge and microwave are available for parents/primary care givers.
  - Youth-friendly facilities/activities are available.

Child and family-centred care

Child & family-centred is one of the tenets of pediatric care. For all tiers, this means:

- Services are delivered in line with the principles of the UN Convention on the Rights of the Child (version in child friendly language is at: http://www.unicef.org/rightsite/files/uncrcchilldfriendlylanguage.pdf).
- Children and their families are actively involved in health care planning and transitions.
- Children and their families are provided information about care options available to them in a way they can understand. This allows them to make informed choices.
- The chronological and developmental age of the child is considered in the provision of information and care.
- Families are actively encouraged to participate in the care of their child.
- Education is provided to children and their families who wish to be involved in providing elements of their own/their child's care.
- When families stay in hospital to help care for a child:
  - The environment supports family presence and participation (e.g., overnight accommodation, sitting room, quiet room/area for private conversation and facilities for making refreshments).
  - Consideration is given to their practical needs, including regular breaks for personal needs, to obtain food/drink, make telephone calls, etc.
- Information and support is given to families on how to access funds for travel to and from specialist centres.
- Information is available for children and their families in several formats including leaflets and videos. Information is culturally and age-appropriate and is provided in a variety of commonly used languages.
- Child and their families have access to professional interpreter services.
- Children and their families are provided with contact details for available support groups, as appropriate.
- Transition pathways are in place to allow for seamless transition to adult services.
- Children and families are actively encouraged to assist in identifying safety risks (e.g., ask questions about medications, question providers re hand washing etc).
- Opportunities are available for children and their families to provide input on the quality and safety of care provided (e.g., surveys, committees, rounds, parent advisory council, etc).

  Adapted from:
  - Institute for Healthcare Improvement, the National Initiative of Children's Healthcare Quality and the Institute for Patient- and Family-Centered Care, Patient- and Family-Centered Organizational Self-Assessment Tool, 2013.[19]
  - Welsh Assembly Government, All Wales Universal Standards for Children and Young People's Specialised Healthcare Services, 2008.[20]
  - Maurer, M et al, Guide to Patient and Family Engagement: Environmental Scan Report (Agency for Healthcare Research and Quality), 2012.[21]