TIERS
IN BRIEF

CHILDREN'S SURGICAL SERVICES

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Children's Surgical Services:
Tiers in Brief to Support System Planning

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Children's Surgical Services: Tiers in Brief to Support System Planning

1.0 Tiers of Service

1.1 Tiers of Service Framework and Approach

Planning and coordinating children's 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 health 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.

1.2 BC's Child Health Tiers of Service Modules

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

Clinical Services modules:

- Children's Medicine
- **Children's Surgery**
- Children & Emergency Department Services

Clinical Diagnostic & Therapeutic Service modules:

- Children's Laboratory, Pathology & Transfusion Medicine

- 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)
- Children's Medical Imaging (future)
- Children's Pharmacy Services (future)

Other relevant modules:

- Major Trauma Care (Children & Adults) (Trauma Services BC)
- Maternal/Fetal and Neonatal Services (Perinatal Services BC)

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

2.0 Surgical Tiers of Service

2.1 Module Development

The Children's Surgical Tiers of Service module is made up of three components:

1. Documents that provide context and were developed to inform the Surgical Tiers module
   a. Children's Surgical Services: **Setting the Stage** *for Tiers Development*
   b. Summary of the Evidence Volume-Outcome Relationship in Pediatric Surgery [1]
2. **Tiers in Brief** to Support System Planning: Provides a high-level description of the tiers, including responsibilities and requirements ***(this document)***.
3. **Tiers in Full** to Support Operational Planning: Provides detailed description of the responsibilities and requirements at each tier.

The module was developed by an interdisciplinary working group comprised of a representative(s) from each of BC's HAs (various combinations of surgeons, anesthesiologists, nurses, directors/managers and planners), Child Health BC and a meeting facilitator. In addition to the working group, representatives from all BC HAs and other constituent and topic-specific groups provided feedback on the draft document. The final version was submitted to the Provincial Surgical Executive Committee and Child Health BC Steering Committee for acceptance.

The document was informed by work done in other jurisdictions, mostly notably Queensland,[2,3] New South Wales,[4-7] Australia,[8] the United Kingdom [9-13] and the United States.[14] B.C. data was used where it was available, as were relevant BC and Canadian standards (e.g., Provincial Privileging documents [15-18] and the Royal College of Physicians and Surgeons Competencies [19,20]) and nursing standards.[21,22]

2.2 Module Scope

Surgical services discussed in this document are hospital-based and are provided in surgical day care, operating rooms, and inpatient and outpatient settings. Procedures usually require some form of anesthetic and/or procedural sedation.

Services are accessible follows:[i]

a. New patients: Up to a child's 17th birthday (16 years + 364 days); and
b. Children receiving ongoing care: Up to a child's 19th birthday (18 years + 364 days).

The document does not include surgical services provided in/by:

- Private offices or clinics of dentists, surgeons or other physicians (beyond the influence of the tiers of service initiative).[ii]
- Emergency Departments (EDs) (discussed in the Children's ED Services document).
- Neonatal Intensive Care Units[iii] (refer to Tiers of Perinatal Care at: www.perinatalservicesbc.ca).

2.3 Recognition of the Tiers

The Child Health Tiers of Service Framework includes 6 tiers of service. The Children's Surgical Services module recognizes 5 out of the 6 tiers. T1 (Prevention, Primary & Emergent Health Services) is not applicable to the Surgical Tiers.

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

Refer to Table 1 for an overview of Children's Surgical Tiers (Tiers at a Glance).

[i] BC Children's Hospital. Administration manual: Admission age, BCCH and Sunny Hill Hospital for Children. 2010.
[ii] This document may also be helpful to HAs when establishing standards for contracted services (e.g., HA contract with a private clinic to perform dental surgery on children).
[iii] Responsibilities and requirements for the general care of neonates is discussed in the NICU Levels of Care document. Surgery-specific components of the care are included in this (surgical) document.

Table 1: Children's Surgical Tiers at a Glance

Document	Prevention, Primary & Emergent Health Service T1	General Surgical Service T2	Child-Focused Surgical Service T3	Children's Comprehensive Surgical Service T4	Children's Regional Enhanced & Subspecialty Health Service T5	Children's Provincial Subspecialty Health Service T6
Service reach	Community health service area(s).	Local health area.	Multiple local health areas/ health service delivery area.	Health service delivery area/health authority.	Health authority.	Province.
Service focus	Supports the health & well-being of infants, children, youth & their families. Local services for urgent/emergent care. Stabilizes & refers/transfers as necessary.	Diagnoses & provides definitive treatment for children with low acuity/complexity conditions & minor, uncomplicated injuries. Stabilizes & refers/transfers as necessary.	Diagnoses & provides definitive treatment for children with relatively common, medium acuity/complexity conditions & minor, uncomplicated injuries. Stabilizes & refers/transfers as necessary.	Diagnoses & provides definitive treatment for children with a broad range of medium acuity/complexity conditions (including complex psychosocial issues), uncomplicated injuries & selected types of major trauma. Stabilizes & refers/transfers as necessary.	Diagnoses & provides definitive treatment for children with high acuity &/or relatively common high complexity conditions (including complex psychosocial issues) & most types of trauma. The range of conditions is dependent upon the types of subspecialists available. Stabilizes & refers/transfers as necessary.	Diagnoses & provides definitive treatment for children with all types of high acuity/complexity conditions (including complex psychosocial issues) & all types of trauma, including those requiring complex subspecialty care. Provincial pediatric trauma centre.
Children's Surgical Services *(Adult & Pediatric Surgical Specialists & relevant teams)*		On-site surgical capacity exists (locally or via outreach) for: • Low complexity procedures on a planned, day care basis on healthy children ages 2 & over (ASA 1-2). • Life & limb procedures.[iv]	On-site surgical capacity exists for: • Low complexity procedures on a planned & unplanned, inpatient & day care basis on healthy children ages 2 & over (ASA 1-2) • Life & limb procedures.	On-site surgical capacity exists for: • Low complexity procedures on a planned & unplanned, inpatient & day care basis on healthy children ages 6 months & over[v] (ASA 1 - 2). • Life & limb procedures.	On-site surgical capacity exists for: • Medium & selected high complexity procedures (when relevant pediatric surgery specialist is available) on a planned & unplanned, inpatient & day care basis on children of any age, including those with modest medical complexities (ASA 3).[vi] • Life & limb procedures.	On-site surgical capacity exists for: • High complexity procedures on a planned & unplanned, inpatient & day care basis on children of any age, including those with high medical complexities (ASA 4-5).

[iv] Risk of transporting the child is greater than the risk of performing the procedure locally. Assumes availability of resources (trained personnel, equipment, etc).

[v] Assumes availability of appropriately credentialled anesthesiologist(s) as per provincial privileging document. This requires an anesthesiologist that has recent experience providing anesthesia to children in the 6 mos - 2-year age group.

[vi] Assumes availability of appropriately credentialled anesthesiologist(s) as per provincial privileging document. This requires an anesthesiologist who has completed a 12-month fellowship in pediatric anesthesia and has recent experience working with children in the 0 - 6 mos age group & at least 20 CPD credits in pediatric anesthesiology. For children ages 6 mos - 2 yrs, see footnote above.

Document	Prevention, Primary & Emergent Health Service T1	General Surgical Service T2	Child-Focused Surgical Service T3	Children's Comprehensive Surgical Service T4	Children's Regional Enhanced & Subspecialty Health Service T5	Children's Provincial Subspecialty Health Service T6
Children's Surgical Services cont'd *(Adult & Pediatric Surgical Specialists & relevant teams)*		*Surgical specialties:* Variable, depending on local surgeon availability. General surgeon or family practice physician with enhanced surgical skills available in rural & remote sites (not 24/7). *Anesthesia:* Anesthesia provider (specialist or family practice physician) available during times surgical procedures are performed. Transfer algorithm in place when surgical or anesthesia provider is not available.	*Surgical specialties:* General surgeon on-call 24/7. Strive to have dental surgery, ophthalmology, orthopedics, ENT, plastics, and urology on-call 24/7. Transfer algorithm in place at times appropriate surgical specialty is not available (e.g., vacations). *Anesthesia:* Anesthesia provider (specialist or family practice physician) on-call 24/7.	*Surgical specialties:* Specialists on-call 24/7 & available 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. *Anesthesia:* Anesthesiologist who meets the age-specific credentialling requirements available on-call 24/7 to provide anesthesia to children ages 6 mos - 2 yrs.	*Surgical specialties:* Specialists available on-call 24/7 & available 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 T6 service. Pediatric surgical specialists available for some specialties (not 24/7). At a minimum, this includes a pediatric (general) surgeon and one other pediatric surgical subspecialist. *Anesthesia:* Pediatric anesthesiologist on-call 24/7. *Outpatients:* Some specialty-specific outpatient clinics available for children with complex needs.	Surgical specialties: Pediatric surgical specialists on-call 24/7 & available to assess & definitively manage children with all types of surgical conditions, including multi-system trauma. *Anesthesia:* Pediatric anesthesiologist(s) available 24/7. *Outpatients:* Broad range of specialty-specific outpatient clinics available for children with complex needs.

3.0 Children's Surgical Tiers In Brief

3.1 Differentiation of the Tiers

3.1.1 Definitions

"Medical complexity," "procedural complexity" and "age" are used to differentiate the tiers from each other. Refer to tables 2, 3 and 4 for definitions.

Table 2: Medical Complexity (ASA Score)

The American Society of Anesthesiologists (ASA)[23] score is used as a proxy for "medical complexity."

Medical Complexity	ASA Score	Description
Low	ASA 1	• Healthy child (no acute or chronic disease), normal BMI percentile for age.
	ASA 2	• Child with mild systemic disease – no functional limitation (e.g., asymptomatic congenital cardiac disease, well controlled dysrhythmias, asthma without exacerbation, well controlled epilepsy, noninsulin dependent diabetes mellitus, abnormal BMI percentile for age, mild/moderate OSA, oncologic state in remission, autism with mild limitations).
Modest	ASA 3	• Child with severe systemic disease – definite functional limitation (e.g., uncorrected stable congenital cardiac abnormality, asthma with exacerbation, poorly controlled epilepsy, insulin dependent diabetes mellitus, morbid obesity, malnutrition, severe OSA, oncologic state, renal failure, muscular dystrophy, cystic fibrosis, history of organ transplantation, brain/spinal cord malformation, symptomatic hydrocephalus, premature infant PCA, full term infants <6 weeks of age).
Severe	ASA 4	• Child with severe systemic disease – a constant threat to life (e.g., symptomatic congenital cardiac abnormality, congestive heart failure, active sequelae of prematurity, acute hypoxicischemic encephalopathy, shock, sepsis, disseminated intravascular coagulation, automatic implantable cardioverterdefibrillator, ventilator dependence, endocrinopathy, severe trauma, severe respiratory distress, advanced oncologic state).
	ASA 5	• Moribund child not expected to survive 24 hrs with or without surgery (e.g., massive trauma, intracranial hemorrhage with mass effect, patient requiring ECMO, respiratory failure or arrest, malignant hypertension, decompensated congestive heart failure, hepatic encephalopathy, ischemic bowel, or multiple organ/system dysfunction).

Note re use of ASA score as a proxy for medical complexity:
ASA is a simple classification system used to identify a child's health status before surgery. The intent of using the ASA classification as a proxy for medical complexity is to convey the concept that a child without a significant concurrent medical condition(s) or with a condition which is medically controlled and not expected to significantly impact the complexity or risk of periop/post-operative care can be safely cared for in a T2, T3 or T4 centre. Conversely, a child with a significant concurrent medical condition(s) which is not medically controlled and/or is evolving and/or is expected to significantly impact the complexity or risk of providing periop/post-operative care is most safely cared for in a T6 or, depending upon the type and severity of the condition(s), a T5 centre. Final determination of the appropriate tier needs to be decided on a case-by-case basis.

Table 3: Procedural Complexity

Procedural Complexity	Description
Low	• Procedure is commonly performed on children (most low complexity procedures are also commonly performed on adults); AND • Typical time in the operating room is less than 2 hours; AND • Routine OR equipment requirements; AND • Post-operative care requires RNs with general pediatric knowledge and skills, with access to an interdisciplinary team on a case-by-case basis; AND • Post-operative admission to an NICU or PICU is not expected; AND • Transfusion of blood products intraoperatively is unlikely; AND • Risk of a significant intra or post-operative complication is low.
Medium	• Procedure or technique is unique to children but is performed relatively frequently; OR • Requires equipment or devices not routinely stocked by operating rooms; OR • Risk of intraoperative blood product transfusion(s) is not negligible; OR • Risk of intra or post-operative complication(s) is not negligible; OR • Post-operative care requires RNs and an interdisciplinary team with med/surg knowledge and skills that works exclusively or primarily with children; AND • Post-operative admission to PICU is not expected (post-operative admission to an NICU may be expected); AND • Involves a single perioperative surgical specialty; AND • Does not require pre- and post-operative multi-specialty coordination (e.g., oncology, GI medicine and interventional radiology).
High	• Procedure or technique is unique to children and is performed infrequently; OR • Post-operative care requires RNs and an interdisciplinary team with subspecialty surgical knowledge and skills that works exclusively or primarily with children; OR • Post-operative admission to a PICU is expected; OR • Involves multi-specialty perioperative participation (e.g., general and ENT surgeon); OR • Requires pre- and post-operative multi-specialty coordination (e.g., oncology, GI medicine and interventional radiology).
Life & limb *Applicable to T2-T6*	• Procedure done on an unplanned/emergency basis that would not normally be within the capacity of a given site but which, if resources are available (trained personnel, equipment, etc), is performed because the risk of transport is > risk of performing the procedure locally. • Most likely to occur in rural & remote settings.

Table 4: Age

Description	Pediatric Expertise & Requirements	Anesthesia Provider
14 – 16.9 years	Limited pediatric expertise and equipment required	Adult anesthesia specialist
2 – 13.9 years	Pediatric expertise and equipment required	Adult anesthesia specialist with some pediatric practice
6 mos – 1.9 years	Pediatric expertise and equipment for very young children required	Adult anesthesiologist with high volume pediatric practice or pediatric anesthesiologist
0 – 6 months	Pediatric expertise & equipment for neonates & very young children required	Pediatric anesthesiologist

3.1.2 Relationships: Medical & Procedural Complexity, Age & Tiers

Table 5 provides an overview of the relationship between medical complexity, procedural complexity, age, and the appropriate types of children served at each tier.

Table 5: Children Appropriate to Receive Services at Each Tier (based on Medical Complexity, Age & Procedural Complexity)

		T2			T3			T4			T5			T6		
		Procedural Complexity														
Medical Complexity	**Age**	Low	Med	High	Low	Med	High	Low	Med	High	Low	Med	High	Low	Med	High
Low (ASA 1-2)	0 - 6 mos										*	*	*			
	6 mos - 2 yrs												*			
	2 yrs & up												*			
Med (ASA 3)	0 - 6 mos										*	*	*			
	6 mos - 2 yrs												*			
	2 yrs & up												*			
High (ASA 4&5)	0 - 6 mos															
	6 mos - 2 yrs															
	2 yrs & up															
Life & Limb																

*= Applicable only if relevant pediatric surgical specialty team and pediatric anesthesiologist is available.

3.2 Responsibilities and Requirements at each Tier

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

Notes about the TOS for Children's Surgical Services:

1. The Tiers of Service (TOS) framework describes a <u>future</u> **(not current)** state model and is intended to support future planning of children's surgical services in BC. The module describes **minimum** expectations to provide a **safe, sustainable,** and **appropriate** level of children's surgical services.

2. 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 patients may be managed and/or procedures/interventions performed on an unplanned/emergency basis that would not normally be within the capacity of a given site, but which are performed if the resources are available (trained personnel, equipment, etc.) because the risk of transport is greater than the risk of performing the intervention/procedure locally. These special situations are **not** specified in this module.

3. This document is intended to guide discussions within HAs and provincially about the appropriate provision of surgical services for children. These discussions are guided not only by the responsibilities and requirements outlined in this document but also by the risks inherent in the service being discussed and by similar activities that contribute to the maintenance of the required service and skills. This module creates an opportunity for HAs to reflect on the appropriate types of surgical services provided to children and to deliberately plan an approach to service and skill maintenance, especially in situations where limited practical experience is available.

For the types of surgical procedures appropriate to be performed at each tier, on whom and by whom, refer to Table 6 (Table 6 is like Table 5 but provides additional detail about the types of providers appropriate to involve, by tier).

Table 6: Types of Surgical Procedures Performed at Each Tier, on Whom & by Whom

			T2			T3			T4			T5			T6		
			General Surgical Services			Child-Focused Surgical Services			Children's Comprehensive Surgical Services			Children's Regional Enhanced & Subspecialty Surgical Services			Children's Provincial Surgical Subspecialty Services		
			Procedural Complexity			Procedural Complexity			Procedural Complexity			Procedural Complexity			Procedural Complexity		
ASA		Age	Low	Med	High	Low	Med	High	Low	Med	High	Low	Med	High	Low	Med	High
Medical Complexity	1 & 2	0 - 6 mos										PA & S	PA & PS	PA & PS[2]		PA & PS	PA & PS[3]
		6 mos - 2 yrs							A2 & S				A2 & S	PA & PS[2]			PA & PS[3]
		2 yrs & up	A1 & S			A1 & S							A1 & S	PA & PS[2]			PA & PS[2]
	3	0 - 6 mos										PA & PS	PA & PS	PA & PS[2]	PA & PS	PA & PS	PA & PS[3]
		6 mos - 2 yrs										A2 & S	A2 & S	PA & PS[2]			PA & PS[3]
		2 yrs & up										A1 & S	A1 & S	PA & PS[2]			PA & PS[3]
	4 & 5	0 - 6 mos													PA & PS	PA & PS	PA & PS
		6 mos - 2 yrs													PA & PS	PA & PS	PA & PS
		2 yrs & up													PA & PS	PA & PS	PA & PS
Life & limb procedures[1]			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Abbreviations

A1	Anaesthesiologist who meets the currency requirements in the Provincial Privileging document (400 hrs/yr, adults & children). At T2 & T3, may be a family practice anesthesia provider who meets the currency requirements in the Provincial Privileging document (recommended current clinical activity to meet licensure requirements of the College of Physicians and Surgeons of BC, of which 150 hrs are self-reported anesthesia related activity plus 30 hours of anesthesia-related CME over a 3-year cycle).
A2	Anaesthesiologist who meets the currency requirements in the Provincial Privileging document for providing anesthesia to children ages 6 mos - 2yrs. This includes recent experience providing anesthesia to children in this age group.
PA	Anaesthesiologist who has completed a 12-month fellowship in pediatric anesthesia & meets the currency requirements in the Provincial Privileging document. This includes recent experience providing anesthesia to children in the 0 - 6 mos age group + at least 20 CPD credits in pediatric anesthesiology. For cardiac anesthesia an additional 6-month fellowship in pediatric cardiac anesthesiology is required + 50 pediatric cardiac cases/yr + at least 20 CPD credits/yr in pediatric cardiac anesthesiology.
S	Surgeon who meets the currency requirements in the Provincial Privileging document for the relevant specialty (most specialties specify a minimum # procedures &/or # operative hrs required as the primary surgeon. Some also specify CME credit hrs/yr). At T2, may be a family physician with enhanced surgical skills who meets the currency requirements in the Provincial Privileging document (current demonstrated skill & an adequate volume of experience based on results of ongoing professional practice valuation & outcomes within an effective CQI program).
PS	Surgeon who has completed a pediatric fellowship & meets the currency requirements in the Provincial Privileging document for the relevant surgical specialty (including pediatric-specific requirements, if specified).

HAs to identify specific procedures appropriate to perform at each facility. Decisions will reflect the tier designation & consider factors identified in Appendix 1 (Table 1.1.a).

Note 1: Risk of transporting the child is greater than the risk of performing the procedure locally. Assumes availability of resources (trained personnel, equipment, etc).
Note 2: Specific high complexity procedures available at T5 is determined by the HA & considers factors identified in Appendix 1 (Table 1.1.a). The range of procedures available at T5 is narrower than the range at T6.
Note 3: Full range of high complexity procedures is available.

Tier 2: General Surgical Service

T2: Service Descriptions & responsibilities	
Service reach:	Serves children that live in the community health service area(s)/local health area (LHA).
Service responsibilities:	• Performs low complexity procedures on healthy children (ASA 1 - 2) ages 2 & over on a planned, daycare basis. Range of procedures depends on the availability of local & outreach surgeons. Refer to Appendix 2 for procedures that rural & remote T2 services should be prepared (but not limited) to perform. • Performs life & limb procedures on an unplanned/emergency basis on higher risk children when the risk of transport is greater than the risk of performing the procedure locally if resources are available (trained personnel, equipment, etc) (general surgery procedures at rural & remote sites are the most common). • Provides routine inpatient care including assessment, care planning, treatments, monitoring, teaching & discharge planning (see Tiers in Full for details). Post-anesthetic care unit (PACU) staffing is based on the National Association of PeriAnesthesia Nurses of Canada (NAPANc) Standards for Practice. .[vii, 24] • Pediatric surgical case volumes are usually less than 200 procedures per year.
Knowledge sharing & transfer/ training:	• Hospital/HA privileging policies are consistent with provincial privileging policies, including pediatric-specific requirements for physicians that provide care to children. • Facilitates access to learning activities that support the maintenance of pediatric surgery & anesthesia competencies. e.g., on-line access to child health guidelines/reference materials/continuing education courses (e.g., PALS) & participation in relevant HA & provincial learning activities (e.g., pediatric rounds & conferences).
Quality improvement/ research:	• Participates in QI structures & processes within the HA, including reviews of at-risk surgical & anesthesia cases. If child involved, physicians & staff with pediatric surgical/anesthesia expertise participate in the review, as appropriate. Implements recommendations. • Participates in regional & provincial initiatives to improve the quality & safety of children's surgical care.

[vii] Due to the wide range of practice settings, acuity, and individual considerations no single published ratio for nursing staffing is automatically applicable in all settings where children receive care. When creating safe staffing guidelines, factors that may need to be considered include assessment of the patient needs, acuity of the patient population, availability of specialized equipment and resources such as Child Life, competency, and level of education of staff, and family/caregiver involvement. NAPANc recommends that a minimum of two competent nurses, one who is competent in PeriAnesthesia nursing, should be present when a child is in Phase I, with or without the presence of a parent.

T2: Service requirements

- Types of surgery & anesthesia providers depend on local availability. At a minimum, rural & remote sites have a general or family practice physician with enhanced surgical skills available (not 24/7). Transfer algorithm in place at times when surgical or anesthesia provider is not available.
- Pediatrician from *within HA* available by phone or virtual care to discuss cases 24/7 x 365. No expectation for on-site pediatrician.
- RNs assigned to children have "pediatric skills" (see glossary). Practice predominantly involves adults. No expectation for dedicated pediatric inpatient resources/beds.
- Psychosocial & allied health providers available on request for individual cases. Practice is predominantly with adults.

Tier 3: Child-Focused Surgical Service

T3: Service Descriptions & responsibilities

Service reach:	Serves children that live in multiple local health areas &/or the health service delivery area (HSDA).

Service responsibilities:	• Performs low complexity procedures on healthy children (ASA 1 - 2) ages 2 & over. Procedures are performed on an inpatient & daycare basis & may be planned or unplanned. Range of procedures depends on local surgeon availability. Refer to Appendix 2 for procedures that T3 services should be prepared (but not limited) to perform.
	• Performs life & limb procedures on an unplanned/emergency basis on higher risk children when the risk of transport is greater than the risk of performing the procedure locally if resources are available (trained personnel, equipment, etc) (general surgery procedures at rural & remote sites are the most common).
	• Offers inpatient nursing procedures/treatments which include:
	  • Standard assessment & monitoring.
	  • Care planning, teaching & discharge planning.
	  • Initiation & maintenance of continuous intravenous infusions with pre-mixed electrolytes.
	  • Administration of a range of intermittent IV medications via syringe and mini bag (e.g., antibiotics, opiates).
	  • Maintenance of PICC lines.
	  • Infusion of blood & blood products.
	  • Insertion, replacement & maintenance of NG tubes for short-term hydration. Maintains and replaces established G-tubes.
	• Pediatric case volumes (minimum): 200 surgical procedures; AND 500 med/surg inpatient/day care visits/yr OR 500 med/surg inpatient days.

Knowledge sharing & transfer/ training:	• Hospital/HA privileging policies are consistent with provincial privileging policies, including pediatric specific requirements for physicians that provide care to children. • Facilitates access to learning activities that support the maintenance of pediatric surgery & anesthesia competencies, including the practice of critical skills (e.g., simulation, clinical experience with T3/T6 service. • If designated by UBC, provides *non-pediatric specific* surgical placements/learning experiences for medical students & family practice, surgery & anesthesiology residents.
Quality improvement/ research:	• Participates in QI structures & processes within the HA, including reviews of at-risk surgical & anesthesia cases. If child involved, physicians & staff with pediatric & surgical/anesthesia expertise participate in the review, as appropriate. Implements recommendations. Provides pediatric &/or surgical/anesthesia expertise for T2 case reviews, if requested. • Participates in regional & provincial initiatives to improve the quality & safety of children's surgical care.

T3: Service requirements

- General or family practice physician with enhanced surgical skills available on-call 24/7 & available on-site as needed.
- Anesthesia provider (specialist or family practice physician) on-call 24/7 & available on-site as needed.
- Adult surgery specialists in general surgery, dental surgery, ophthalmology, orthopedics, ENT, plastics & urology strive to be available on-call 24/7 & available on-site as needed. Transfer algorithm in place at times that surgeon is not available (e.g., vacations).
- Pediatrician on-call 24/7 & available on-site as needed.
- "Safe pediatric beds" available (see glossary).
- RNs assigned to children have "pediatric skills" (see glossary) and are regularly exposed to hospitalized children. Practice is predominantly with adults but includes some children. Formalized pediatric orientation & ongoing education offered.
- Interdisciplinary team (psychosocial & allied health providers) available days, M-F on request for individual cases. Members have general pediatric knowledge & skills (most have predominantly adult practices). May be hospital-based or based in the community with in-hospital services provided via a service agreement.

Tier 4: Comprehensive Surgical Service for Children

T4: Service Descriptions & responsibilities

Service reach:	Serves children that live in the health service delivery area/health authority.

Service responsibilities:	• Surgery specialists available 24/7 x 365 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.
	• Performs a broad range of low complexity procedures on healthy children (ASA 1 & 2) ages 6 mos & over.
	• Procedures are performed on an inpatient & daycare basis & may be planned or unplanned. Pediatric subspecialty and/or high acuity/close observation/ICU services are not expected to be required.
	• Capacity to perform endotracheal intubation 24/7 (on-site MD or RT).
	• Offers a broad range of inpatient nursing procedures/treatments, many of which are commonly not available at T3, including:
	  • Initiation of peripherally inserted central catheter (PICC) lines.
	  • Insertion & maintenance of central venous catheters (CVCs).
	  • Accessing & maintenance of venous access devices.
	  • Initiation & maintenance of high risk continuous peripheral IV infusions (e.g., insulin).
	  • Administration of analgesics via: (a) continuous IV to children ages 2 & over; & (b) patient controlled IV route.
	  • Insertion, replacement & maintenance of NG tubes required for nutritional management. Teaches children/families about home enteral nutrition.
	  • Replacement of established surgically placed J-tubes (in OR). Establishes & replaces NJ tubes (in radiology).
	  • Initiation, administration & monitoring of TPN.
	• Collaborates with providers in the child's home community to develop & implement discharge plans. May involve referrals to pediatric specialists/specialty teams (e.g., nursing support services, at-home program, specialty clinics).
	• Pediatric case volumes (minimum): 500 surgical procedures; AND 1,000 med/surg inpatient/day care visits/yr OR 1,500 med/surg inpatient days.

Knowledge sharing & transfer/ training:	• Hospital/HA privileging policies are consistent with provincial privileging policies, including pediatric specific requirements for physicians that provide care to children. • In collaboration with T5/T6, develops & shares educational resources & offers regional learning activities that support the maintenance of pediatric surgical & anesthesia competencies.

	• If designated by UBC, provides *non-pediatric specific* surgical placements/learning experiences for medical students & family practice, surgical & anesthesiology residents. • Provides *pediatric-specific* med/surg placements/experiences for nursing, allied health & other health care providers.
Quality improvement/ research:	• QI structures & processes in place to specifically review & improve the safety & quality of children's surgical/anesthesia care within the HA. QI program includes the elements outlined in Appendix 1. • In collaboration with T5/T6, tracks pediatric surgery & anesthesia-specific safety & quality indicators within the HA (i.e., NSQIP or similar approach). See Appendix 1 for examples of indicators. • In collaboration with T5, leads pediatric surgical/anesthesia initiatives quality improvement initiatives within the HA. Participates in provincial initiatives.

T4: Service requirements

Personnel:

- Surgery specialists from all specialties on-call 24/7 & available on-site as needed to assess & manage children with all types of surgical conditions except cardiac or neurosurgery-related.
- Anesthesiologist on-call 24/7 & available on-site as needed to provide anesthesia to children, including children ages 6 mos - 2 yrs.
- Pediatrician on-call 24/7 & available on-site as needed.
- RNs have "pediatric skills" (see glossary) & are continuously exposed to hospitalized children. RN practice is exclusively or primarily with children. Formalized pediatric orientation & ongoing education offered.
- Other members of the interdisciplinary team (psychosocial & allied health providers) available days, M-F (some on extended hours). Team members have general pediatric knowledge & skills (most have practices which include adults & children).
- Pain management team & wound/ostomy RN available on-site days, M-F (for adults & children).

Facilities:

- Dedicated pediatric inpatient resources/unit.

Outpatients:

- General pediatric outpatient clinic may be utilized to provide specific aspects of pre & post-op care (e.g., dressing changes, IV antibiotics or assessment by OT, PT, or dietitian).

Tier 5: Regional Surgical Service for Children

T5: Service Descriptions & responsibilities	
Service reach:	Serves children that live throughout the health authority (HA) (regional referral centre).

Service responsibilities:	• Surgery specialists available 24/7 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 T6 service.
	• Performs a broad range of medium complexity procedures & a limited range high complexity procedures (when relevant pediatric surgery specialist is available) on children of any age who may have modest medical complexities (ASA 3).
	• Inpatient nursing procedures/treatments & coordination of complex discharges as per T4 plus:
	  • Administers analgesics via continuous IV to children ages 6 mos & over.
	  • Makes decision & establishes G & J-tubes.
	  • Makes decisions & establishes GJ tubes (in radiology).
	  • Replaces established GJ tubes (in radiology).
	  • Provides oral motor & dietary assessment/consultation for children with feeding & swallowing difficulties.
	  • Inserts venous access devices (in the OR).
	  • Manages **complex** post-op complications, including children referred/transferred from T2, T3 & T4 services **within the HA.**
	  • Procedures & treatments relevant to T5 subspecialty services.
	• Provides pre- & post-op care for children with complex medical/surgical needs in a general pediatric outpatient clinic or, in some specialties, in a specialty-specific outpatient clinic.
	• Minimum case volumes, ages 0 – 16.9 yrs: Surgical procedures, (day care & inpatient), 1,000 cases/yr (including neonates); AND
	  • Med/surg visits: >2,000/yr (excl NICU); OR
	  • Med/surg inpatient days: >4,500/yr (excl NICU)

Knowledge sharing & transfer/ training:	• Same as T4 plus if designated by UBC, provides pediatric-specific placements/learning experiences for surgical & anesthesiology residents in specialties where pediatric specialists are physically present on site.
Quality improvement/ research:	• Same as T4 plus participates in research related to children's surgical & anesthesia care.

T5: Service requirements

Personnel:

- Surgery specialists from all specialties on-call 24/7 & available on-site as needed to assess and manage children with all types of surgical conditions except cardiac or neurosurgery-related.
- Pediatric surgery specialists available for some specialties (not 24/7 x 365). At a minimum, this includes a pediatric (general) surgeon and one other pediatric surgical subspecialist.
- Pediatric anesthesiologist on-call 24/7 and available on-site as needed.
- Pediatrician or pediatrician designate (e.g., resident) on-site 24/7. This does not include the ED physician.
- Pediatric medicine subspecialists available for on-site consultation in higher volume services (e.g., cardiology, neurology) - not 24/7.
- RN with pediatric assessment skills & knowledgeable about range of surgeries performed on-site available for scheduled pre-operative assessments and to provide pre-operative care on day of surgery.
- Post-anesthetic care RNs assigned to pediatric cases regularly recover children ages 0 – 16.9 yrs & children with modest medical complexities.
- Interdisciplinary team (psychosocial & allied health providers) available days, M-F (some on extended hours), including dietician on days, M-F. Respiratory Technologist available on-site 24/7. Members work exclusively or primarily with children.
- Pain management team & wound/ostomy RN available days, M-F (for adults & children).

Facilities:

- Space to complete pre-op assessment & prepare children on day of surgery. Space accommodates parents & meets requirements for "safe pediatric bed" (see glossary). Space is set-up for the exclusive use of children (e.g., pediatric med/surg day care or pediatric inpatient unit).
- Separate child-friendly space available for recovery of children in the immediate post-op period. Can accommodate parents.
- Dedicated pediatric inpatient resources/unit.
- On-site T5 NICU and T5 PICU.

Outpatient clinics:

- General pediatric outpatient clinic available.
- Some specialty-specific outpatient clinics available for children with complex needs.
- RNs & others members of the interdisciplinary team assigned to subspecialty clinics have "enhanced skills" in the relevant subspecialty area(s).

Tier 6: Provincial Surgical Service for Children

T6: Service Descriptions & responsibilities	
Service reach:	Serves children that live throughout the province.

Service responsibilities:	• Pediatric surgery specialists available 24/7 to assess & definitively manage children of all ages & medical complexities with any type of surgical condition, including multi-system trauma.
	• Performs a broad range of high complexity procedures on children of any age. Many will have underlying medical conditions.
	• Inpatient nursing procedures/treatments are the same as T5 plus:
	  • Manages pain that requires an extended & innovative range of options, including regional analgesia/anesthesia (e.g., epidurals).
	  • Manages **complex** post-op complications, including children referred/transferred from T2 - T5 services **throughout the province.**
	  • Procedures & treatments relevant to T6 subspecialty services.
	• Collaborates with providers in the child's home community to develop & implement complex discharge plans that often involve multiple pediatric specialists/programs, resources & equipment needs (e.g., NG or CVC care at home, home ventilation, home TPN, etc).
	• Provides outpatient care for children with complex needs in a broad range of specialty-specific clinics.
	• Minimum case volumes, ages 0 – 16.9 yrs: Surgical procedures, (day care & inpatient), 4,000 cases/yr (including neonates); AND
	  • Med/surg visits: >8,000/yr (excl NICU); OR
	  • Med/surg inpatient days: >20,000/yr (excl NICU)

Knowledge sharing & transfer/ training:	• Designated by UBC as a training site to provide pediatric-specific surgical & anesthesia placements/ learning experiences for medical students, residents & pediatric medicine & surgery subspecialty residents/fellows. • In conjunction with UBC, develops model for training pediatric surgery, pediatric specialty surgery & pediatric specialty anesthesiology residents & fellows in BC. • Develops & shares educational resources & partners with HAs, provincial & national organizations to offer province-wide learning activities that support the maintenance of physician & staff pediatric surgical & anesthesia competencies. • Organizes provincial activities that support the maintenance of physician & staff competencies in pediatric surgery & anesthesia. e.g., pediatric rounds & conferences. • Provides pediatric surgery & anesthesia clinical experiences for T1-T5 physicians & staff (on-site &/or via simulation or outreach).
Quality improvement/ research:	• QI structures & processes in place to specifically review & improve the safety & quality of children's surgical/anesthesia care within the T6 service. Refer to Appendix 1 for specifics.

- Participates in the American College of Surgeons National Surgery Quality Improvement Program (NSQIP), pediatric stream.
- In collaboration with T4/T5, tracks pediatric surgery & anesthesia-specific safety & quality indicators at a provincial level. See Appendix 1.
- Leads provincial initiatives to improve the quality & safety of children's surgical care.
- Concepts of child & family-centred care are incorporated into programming (see glossary).
- In collaboration with CHBC & HAs, develops & disseminates guidelines on relevant topics related to children's surgical & anesthesia care.
- Obtains child/youth/family feedback on services provided. Incorporates feedback, as appropriate.
- Conducts & supports others to conduct interprofessional research related to children's surgical & anesthesia care. Disseminates research findings. Helps T2-T5 providers integrate research findings into practice.

T6: Service requirements

Physicians:

- Pediatric surgery specialists available on-call 24/7 to provide advice to health care providers throughout the province on pediatric surgery-related topics.
- Pediatric surgery specialists, including pediatric surgical support for the trauma team, on-call 24/7 & available on-site as needed.
- Pediatric anesthesiologist on-call 24/7 and available on-site as needed.
- Pediatrician or pediatrician designate (e.g., resident) on-site 24/7. This does not include the ED physician.
- Pediatric subspecialty medicine physicians available on-call 24/7 & available on-site as needed.

Registered Nurses:

- Pediatric RN with extensive pediatric surgery knowledge available for pre-operative assessments days, M-F.
- Pediatric RNs with extensive pediatric surgery knowledge available to check children in & provide pre-operative care on day of surgery.
- Pediatric OR RNs 24/7.
- Pediatric anesthetic care RNs 24/7.
- Pediatric educator(s) assigned to pediatric unit(s).

Psychosocial professionals: Pediatric social worker(s), psychologist(s), child life specialist & music therapist available days, M-F. Practice is exclusively or primarily with children.

Allied health:

- Pediatric RT available on-site 24/7.
- Pediatric PT available days, M-F.

- Pediatric OT available days, M-F.
- Pediatric SLP available days, M-F.
- Pediatric Dietician available days, M-F.
- Pediatric OT or SLP available to perform swallowing assessment days, M-F.
- Clinical pharmacy specialist(s) in pediatrics available on-site days, M-F. Outside these hours, general pharmacist with pediatric expertise available on-call for telephone consultation.
- Pediatric pain management team & wound/ostomy RN available on-site days, M-F.

Facilities:

- Space to complete pre-op assessment & prepare children on day of surgery. Space accommodates parents & meets requirements for "safe pediatric bed.". Space is set-up for the exclusive use of children (e.g., pediatric med/surg day care or pediatric inpatient unit.
- ORs are set-up for the exclusive use of children. Space can accommodate parents during induction of anesthesia.
- Post-anesthetic care space for recovery of children immediately post-op is set-up for the exclusive use of children (equipment, pictures on the wall, etc). Can accommodate parents.
- Dedicated pediatric inpatient resources/ teaching units, grouped by specialties/subspecialties.
- On-site T6 NICU and on-site T6 PICU.

Outpatient clinics:

- Broad range of specialty-specific outpatient clinics available on-site for children with complex needs. Many involve more than one type of physician specialist. e.g., Cardiac Surgery, Cleft Palate/Craniofacial/Jaw Clinic, Scoliosis Clinic, Burns Clinic, Vascular Anomalies Clinic, Complex Feeding Clinic, Congenital Malformation Clinic. Pediatric RN(s) assigned to specialty clinics have “enhanced skills” in the relevant subspecialty area(s).
- Child-friendly virtual care enabled outpatient space & infrastructure Space is exclusively used by children. Pediatric subspecialty teams co-located or in close proximity.

4.0 References

1. Hanley G. Summary of the evidence volume-outcome relationship in pediatric surgery. http://Childhealthbc.ca/tiers-service/childrens-surgical-services. 2013:1-15.

2. Queensland Health. Surgical services - children's. CSCF v3.2. https://www.health.qld.gov.au/__data/assets/pdf_file/0025/444436/cscf-surgical-childrens.pdf. 2014:1-22.

3. Queensland Health. Anaesthetic services - children's. CSCF v3.2. https://www.health.qld.gov.au/__data/assets/pdf_file/0018/444510/cscf-anaesthetic-childrens.pdf. 2014:1-18.

4. NSW Department of Health. Children and adolescents - admission to services designated level 1-3 paediatric medicine & surgery. https://www1.health.nsw.gov.au/pds/ActivePDSDocuments/PD2010_032.pdf. 2010;PD2010_032.

5. NSW Department of Health. Guidelines for networking of paediatric services in NSW; http://www.nchn.org.au/a2k/docs/GuidelinesforNetworkingofPaediatricServicesinNSWDecember2002.pdf. 2002.

6. NSW Department of Health. NSW health guide to the role delineation of clinical health services. https://www.health.nsw.gov.au/services/pages/role-delineation-of-clinical-services.aspx. 2019:1-164.

7. NSW Department of Health. Guidelines for care in acute care settings. https://www1.health.nsw.gov.au/pds/ActivePDSDocuments/PD2010_034.pdf. 2010;PD2010_034.

8. 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; https://www.accypn.org.au/wp-content/uploads/ACHS_Standard1_2008.pdf. 2008:1-12.

9. UK Department of Health. Getting the right start: National service framework for children - standard for hospital services; https://Assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/199953/getting_the_right_start_-_National_Service_Framework_for_Children_Standard_for_Hospital_Services.pdf. 2003;31352.

10. UK Department of Health. Commissioning safe and sustainable specialised paediatric services: A framework of critical inter-

dependencies. http://www.symmetricpartnership.co.uk/userfiles/documents/Spec_Paeds_Final_Oct_08_dh_088069.pdf. 2008;288254:1-36.

11. National Health Services (NHS) England. NHS standard contract for paediatric surgery: Surgery (and surgical pathology, anaesthesia & pain. https://www.england.nhs.uk/wp-content/uploads/2013/06/e02-paed-surg-surgi-path-anaes.pdf. 2013:1-24.

12. Children's Surgical Forum of The Royal College of Surgeons of England. Standards for children's surgery; https://www.rcseng.ac.uk/library-and-publications/rcs-publications/docs/standards-for-childrens-surgery/?_id=31E24D1C16CF4BAB8A21B17515B32FC3&_z=z. 2013:1-32.

13. The Royal College of Surgeons, (UK). Children's surgical forum: Ensuring the provision of general paediatric surgery in the district general hospital; https://www.rcseng.ac.uk/library-and-publications/rcs-publications/docs/ensuring-the-provision-of-general-paediatric-surgery-in-the-district-general-hospital/. 2010:1-11.

14. American College of Surgeons. Optimal resources for children's surgical care; https://www.facs.org/-/media/files/quality-programs/csv/acs-csv_standardsmanual.ashx. 2015:1-98.

15. BC Medical Quality Initiative. Family practice anesthesia dictionary. http://Bcmqi.ca/Published%20Dictionaries/FamilyPracticeAnesthesia(2019-07)%20-%20rv.pdf. 2019:1-15. http://bcmqi.ca/Published%20Dictionaries/FamilyPracticeAnesthesia(2019-07)%20-%20rv.pdf. Accessed May 1, 2021.

16. BC Medical Quality Initiative. Family practice enhanced surgical skills dictionary. http://Bcmqi.ca/Published%20Dictionaries/Family%20Practice%20Enhanced%20Surgical%20Skills%20(2021-03).pdf. [June 28, 2019]. 2021:1-13.

17. BC Medical Quality Initiative. Anesthesiology clinical privileges. http://Bcmqi.ca/Published%20Dictionaries/anesthesiology(2019-07).pdf. 2019:1-23.

18. BC Medical Quality Initiative. General surgery, pediatric surgery & other surgery subspecialty documents. http://Bcmqi.ca/Published%20Dictionaries/GeneralSurgery(2017-09).pdf. 2017:1-19.

19. Royal College of Physicians and Surgeons. Pediatric surgery competencies; file:///C:/Users/user/downloads/pediatric-surgery-competencies-e%20(6).pdf. 2021:1-23.

20. Royal College of Physicians and Surgeons of Canada. General surgery competencies; file:///C:/Users/user/downloads/general-surgery-competencies-e%20(1).pdf. 2020:1-33.

21. American Operating Room Nurses. Position statement on perioperative safe staffing and on-call practices. file:///C:/Users/user/downloads/PosStat-personnel-safe-staffing-on-call-practices.pdf. 2014:1-14.

22. Operating Room Nurses Association of Canada. ORNAC standards, guidelines, and position statements for perioperative registered nurses. 15th ed. https://www.csagroup.org/store/product/ORNAC-2021/. 2021.

23. American Society of Anesthesiologists. ASA physical status classification system. file:///C:/Users/user/downloads/asa-physical-status-classification-system.pdf. 2020:1-4.

24. National Association of PeriAnethesia Nurses of Canada, (NAPAN). Resources 6 - PeriAnesthesia care of the pediatric client in all perianesthesia, 4th edition phases; http://Napanc.ca/assets/forms/Resource%206-%20%20PeriAnesthesia%20Care%20of%20the%20Pediatric%20Client%20(1).pdf. 2020:1-47.

25. U.S. Department of Health and Human Sciences. Pediatric quality indicators overview; http://www.qualityindicators.ahrq.gov/modules/pdi_resources.aspx. Agency for Healthcare Research and Quality Web site. http://www.qualityindicators.ahrq.gov/modules/pdi_resources.aspx. Accessed May 1, 2021.

26. BC Children's Hospital. Pediatric foundations online modules; https://Ubccpd.ca/course/pediatric-foundations. Provincial Health Services Authority Web site. https://ubccpd.ca/course/pediatric-foundations. Updated 2021. Accessed May 1, 2021.

27. Institute for Healthcare Improvement, the National Initiative of Children's Healthcare Quality & the Institute for Patient- and Family-Centered Care. Patient- and family-centered care organizational self-assessment tool; http://www.ihi.org/resources/pages/tools/PatientFamilyCenteredCareOrganizationalSelfAssessmentTool.aspx. 2013.

28. Welsh Assembly Government. All Wales universal standards for children and young people's specialised healthcare services. http://www.wales.nhs.uk/sites3/documents/355/All%20Wales%20Universal%20Standards%20for%20Children%20and%20Young%20People's%20Specialised%20Healthcare%20Services%20-english.pdf. 2008:1-28.

29. Agency for Healthcare Research and Quality. Guide to patient and family engagement; https://www.ahrq.gov/research/findings/final-reports/ptfamilyscan/ptfamily3b.html#Strategies. https://www.ahrq.gov/ Web site. https://www.ahrq.gov/research/findings/final-reports/ptfamilyscan/ptfamily3b.html#Strategies. Updated 2018. Accessed May 1, 2021.

Appendix 1: Quality Improvement Program Requirements, T4, T5 & T6

Table 1.1: Elements of a QI Program

QI Program Specific to Children's Surgical Care:

- Is a confidential quality improvement activity that is protected by all provincial & federal statutes.
- Is integrated with all appropriate HA/hospital quality improvement & safety programs & with the HA Board quality committee or equivalent.
- Has a specific focus on improving children's surgical care.
- Involves representatives of all surgical disciplines that provide care to children, as well as anesthesiology, pediatrics, neonatology, radiology & the Emergency Department.
- Is led by a physician leader for surgery, children's surgery or designate.
- Functions include:
  - Determining specific procedures appropriate to perform within each surgical specialty at each facility based on the tier designation of the service & the guidelines provided in this document. See Table 1.1.a (below) for criteria to consider.
  - Tracking safety & quality indicators & addresses related issues. See Tables 1.2 & 1.3 (below) for examples of indicators.

Table 1.1.a: Examples of Safety Indicators Specific to Children's Surgical Care

Criteria to Consider in Determining Specific Procedures Appropriate to Perform within each Surgical Specialty at Each Facility within an HA

- Availability of surgeons credentialled to perform a given procedure as per the local credentialling/privileging process;
- Availability of anesthesia providers credentialled to provide anesthesia to children as per the local credentialling/privileging process;
- Availability of nurses & other staff trained & comfortable in providing care to children pre, intra & post-operatively for a given procedure;
- Availability of clinical diagnostic & support services and pediatric equipment required for a given procedure;
- Availability of parent/child educational resources for a given procedure;
- Availability of appropriate post-operative environment for a given procedure if an inpatient stay is anticipated (e.g., general pediatric unit, NICU, PICU);
- Site capacity to manage foreseeable complications of a given procedure (e.g., co-location of specialists/sub-specialists, equipment, clinical diagnostic & support services, etc); &
- Distance for parents/children to travel if a procedure is not available locally.

Table 1.2: Examples of Safety Indicators Specific to Children's Surgical Care

- Cardiac or respiratory arrest, acute change in respiratory support or administration of emergency vasoactive medications in the OR or within 72 hours postoperatively.
- Unplanned reintubation in the OR, post anesthesia care unit or within 72 hours postoperatively.
- Foreign body left in during procedure.

- Major perioperative anesthetic event or complication: clinically significant laryngospasm, bradycardia, hypotension, apnea, O2 desaturation) & requiring intervention.
- Unanticipated event resulting in death or serious injury (i.e., wrong site surgery, wrong patient, wrong procedure, retained foreign body).
- Unplanned return to the OR within 72 hours of operation.
- Unscheduled admission to the hospital for inpatient care within 30 days.
- Unscheduled admission or transfer to the intensive care unit or a higher level of care within 72 hours of operation.
- Transfer to another institution for higher level of care within 72 hours of a procedure.
- Death within 30 days.

Table 1.3: Examples of Quality Indicators Specific to Children's Surgical Care

Process indicators	*Outcome indicators*
• Compliance with guidelines, protocols & pathways • Appropriateness of pre-hospital & ED triage/referral • Delay in assessment, diagnosis, technique or treatment • Appropriateness of documentation • Timeliness & availability of imaging reports • Timely participation of subspecialists • Availability of OR • Availability of family services • Consistency of outpatient follow-up	• Mortality • Morbidity (complications): e.g., postoperative pneumonia, embolism, pressure ulcers, infections (bloodstream, urinary tract, wound, etc), bleeding, wound dehiscence, transfusion reactions; admissions for perforated appendix • Functional and quality of life outcomes • Patient and family satisfaction • Length of stay and cost

Adapted from the American College of Surgeons, 2015 [14] and AHRQ Pediatric Quality Indicators web page. [25]

Appendix 2: Surgical Capability of T2 & T3 Surgical Services

This list identifies procedures appropriate for T2 and T3 surgical services to perform locally on healthy children ages 2 and over to avoid unnecessary transfers. This list is not limited - other procedures that are within the scope of a T2 and T3 service may also be performed at a given site.

The list was developed to support T2 and T3 in **planning** surgical services. Individual patient factors, including age and medical complexity, may require a child to be referred/transferred to a higher tier of service.

T3/T6 services are available anytime for telephone consultation about a specific case.

The list was developed from (1) work done in other jurisdictions (Australia and the UK); (2) Data from BC hospitals re procedures currently performed at hospitals providing T2 and T3 services; and (3) the expert opinion of the Pediatric Surgical Working Group.

		Healthy Children			
		T2*		T3	
		Ages 2 & Over			
Service	Procedure	Urban	Rural & remote**	Ages 2 & Over	Ages 14 & Over
Gen Surgery	Appendectomy		Y	Y	
	Cholecystectomy		Y	Y	
	Hernia repair		Y	Y	
	Drainage of abscess		Y	Y	
Dental	Excision/extraction, tooth			Y	
	Restoration, tooth			Y	
Opthalmol	Strabismus surgery			Y	
	Nasal-lacrimal duct surgery			Y	
	Chalazion surgery			Y	
Orthopedics	Closed reduction of fractures			Y	
	Arthroscopic knee procedures				Y
ENT	Tonsils & adenoids			Y	
	Ear tube insertion			Y	
	Release of tongue tie			Y	
	Reduction of nasal fracture			Y	
	Removal of foreign body in esophagus			Y (rural & remote sites only)	
Plastic Surgery	Hand fractures			Y	
Plastics/Gen Surg	Excision of skin lesion			Y	
Urology	Torsion of testis			Y	
Urol/Gen Surg	Circumcision			Y	
	Cystoscopy			Y (emergency only)	Y

*Assumes hospital provides a non-elective surgical service (a few T2 sites limit procedures on children to elective dental procedures on children only).
** Rural & remote is not defined by size of community but by travel time that may affect the care of the child. For this purpose, rural and remote means travel time to a T3-T6 service is more than 2 hours.

Appendix 3: 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, [6] BC Children's Pediatric Foundation Online Course [26] and BC Children's CAPE tools (2008-2010).

"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.

"Safe pediatric bed"

All hospitals that admit children must take steps to ensure the environment is as safe as possible for children. For a T2 service, this includes:

- Physical safety:
  - Area is physically safe for children with any potentially dangerous equipment, medications, chemicals or fluids out of reach or in locked cupboards.
  - Physical separation of children from adult patients is recommended. If physical separation is not possible, children 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. e.g., cribs with safe side rails and crib domes (if needed) for children 2 years of age or less.
- Psychological comfort:
  - Parents/primary caregivers are able to stay with their children 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 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 service:

- Psychological comfort:
  - Access to child-friendly bathrooms and space for changing diapers.
  - Facilities for breastfeeding and breast milk storage.
  - Safe space(s) and age-appropriate facilities/equipment for children and youth to play/be entertained. e.g., age-appropriate media, books or board games.

"Safe pediatric unit"

T3 to T6 services are required to have a "safe pediatric unit*(s)*" to provide inpatient care to children. In addition to the requirements for a safe bed, a "safe pediatric unit" includes:

- Physical safety:
  - Children 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 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.

- Mechanisms to promote safety amongst children and youth with mental health conditions, such as:
  - Regular site-wide safety risk assessments (as per WorkSafe BC violence risk assessments). e.g., Personal alarms or panic buttons available where required? Appropriate staffing to prevent staff working alone/in isolation).
  - Least restraint and seclusion procedures (see Provincial Least Restraint Guidelines, 2018).
  - Environmental/room and unit safety checks/rounds and documentation in alignment with BC Provincial Violence Prevention Curriculum.
  - Guidelines to ensure personal searches are conducted only as required for safety, as per trauma informed guidelines.

  Reference: *BC Children's Hospital (2019). 2019 ONCAIPS-BC Provincial Child & Adolescent Inpatient Mental Health Standards. BC Children's Hospital, Child and Adolescent Psychiatry.*

Child and family-centred care

Child and 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. [27]
  - Welsh Assembly Government, All Wales Universal Standards for Children and Young People's Specialised Healthcare Services, 2008. [28]
  - Maurer, M et al, Guide to Patient and Family Engagement (Agency for Healthcare Research and Quality), 2018. [29]

Appendix 4: Change Log

Document	Date	Description of Change
Initial approval (by CHBC Steering Committee & Provincial Surgical Executive Committee)	July 1, 2016	
Minor updates	2016 - 2018	Updates to align with other modules developed subsequently to the surgical module (e.g., critical care module)
Minor update	2020	Clinical service: • Service reach: Changed T2 from "local community/local health area" to "community health service area(s)/local health area" to match change in MOH designations. • Surgeons & anesthesia providers: To more accurately reflect the intent of the availability of pediatric surgical specialists available, added "at a minimum, this includes a pediatric (general) surgeon and one other pediatric surgical subspecialist." • Pre-admission care: Changed title to "Pre day of surgery screening & anesthesia consultation." Minor changes in text to add clarity for self-assessment. • Preoperative care: Changed title to "Day of surgery check-in & preoperative care." Minor changes in text to add clarity for self-assessment. • Post-anesthetic care unit: Changed title to "Post-anesthetic care immediately post-op." • Post-op care: Day care: Minor changes in text to add clarify for self-assessment. • Post-op care: Updated to align with medical module (e.g., nutrition management, deteriorating situations). Minor changes in text to add clarity for self-assessment. • Child & family-centred care: Moved into responsibilities from requirements.
Minor update	Sept 2021	• Changed titles of Tiers 4 – 6 (to simplify): Comprehensive Surgical Service for Children (T4), Regional Surgical Service for Children (T5), Provincial Surgical Service for Children (T6). • Table 1: Updated ASA descriptions (including examples) to match updated descriptions by the American Society of Anesthesiologists.

Document	Date	Description of Change
		• Updated requirements of anesthesiologists and surgeons to align with updated provincial privileging documents. • Updated the requirements for nursing staffing guidelines to align with updated NAPANc guidelines. • Pain management & psychosocial & spiritual support responsibilities: updated to align with medical module. • T6: Add responsibility for contacting patients/families post-discharge to follow-up on immediate post-operative concerns (e.g., pain, nausea).
Minor update	Dec 2021	Requirements: 2.0 Facilities: • Updated the NICU requirement for T5 and T6 to align with updated requirements in PSBC TOS documents.