SETTING
THE STAGE

CHILDREN & CRITICAL CARE SERVICES

MARCH 2023
(2020/21 Data)

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Children & Critical Care Services: Setting the Stage for Tiers Development

Contents

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Critical Care Services for Children: Setting the Stage for Tiers Development

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

1. Setting the Stage for Tiers Development (provides the context - ***this document***)
2. Tiers to Support System and Operational Planning (provides a description of the tiers and the corresponding responsibilities and requirements)

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

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

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

1.0 Providers of Critical Care Services for Children

Critical care services for children are provided by a range of physician specialists and subspecialists, in partnership with nurses, allied health and other members of the health care team. In many cases, the physicians have specific training in critical care medicine (CCM).

CCM is a relatively new Royal College of Physicians and Surgeons-recognized subspecialty. CCM has multiple different base specialties that serve as a route for entry including pediatrics, anesthesiology, cardiac surgery, emergency medicine and general surgery. Within CCM, there is an adult and a pediatric stream. In Canada, there are 21 Royal College accredited CCM training programs - 13 adult and 8 pediatric.[1] There are 13 pediatric CCM physicians in BC, 9 at BCCH and 4 in Victoria.

[1] Source: Canadian Critical Care Society website, March 2023.

2.0 Utilization of Intensive Care Units by Children

Highlights of the data used to inform the development of this module are provided in this section. Data is for 2020/21 and children ages 0 - 16.9 years unless otherwise stated.

Refer to Appendices 1 - 3 for detailed tables. Appendix 4 provides a summary of designated pediatric beds in BC, including pediatric ICU (PICU) beds. BCCH has 22 PICU beds and Victoria General has 5 beds. Additionally, the University Hospital of Northern BC (UHNBC) has 4 beds with the capacity for more intensive monitoring, up to and including continuous cardiorespiratory monitoring.

2.1 ICU Visits & Days

2.1.1 Visits and Days, 4-Year Trend

In 2020/21, 1,125 children were discharged from an ICU in BC (3.0 admissions per day). These children occupied 3,254 ICU bed days (8.9 beds per day) and had an average length of stay (ALOS) of 2.9 days. See Table 1 (Appendix 1 for details).

Table 1: ICU Visits & Days, Children 0 - 16.9 Yrs, 2016/17 to 2020/21 (CIHI)

Activity	2020/21	2019/20	2018/19	2017/18	Difference, 2019/20 - 2016/17
ICU Visits	1,125	1,590	1,643	1,630	-505
ICU Days	3,254	5,722	5,474	5,715	-2,461
ALOS	2.9	3.6	3.3	3.5	-0.6

2.1.2 Ages of Children Treated in ICU

The highest proportion of ICU visits and for children were between 2 and 13.9 years of age: 47% of total visits. The highest proportion of ICU days for children were less than 2 years of age: 45% of total days (for 40% of total visits). 11% of BC's children were in the less than 2 years age group, while 71% were in the 2 - 13.9 years age group. See Table 2 (Appendix 1 for details).

Table 1: ICU Visits & Days by Facility & Age of Child, Children 0 - 16.9 Yrs (CIHI, 2020/21)

Treating Hospital	ICU Visits					ICU Days				
	< 6 mos	6 mos to 1.9 yrs	2 - 13.9 Yrs	14 - 16.9 Yrs	Total	< 6 mos	6 mos to 1.9 yrs	2 - 13.9 Yrs	14 - 16.9 Yrs	Total
BCCH	170	116	327	75	688	763	386	1,004	186	**2,339**
Victoria General	33	31	101	30	195	68	67	191	80	**406**
UHNBC (Prince George)	45	20	46	14	125	128	29	100	24	**281**
Other BC Hospitals	18	16	50	33	117	27	22	66	113	**228**
Total	**266**	**183**	**524**	**152**	**1,125**	**986**	**504**	**1,361**	**403**	**3,254**
% Visits/Days	**24%**	**16%**	**47%**	**14%**	**100%**	**30%**	**15%**	**42%**	**12%**	**100%**
% BC's Child Population	**11%**		**71%**	**18%**	**100%**	**11%**		**71%**	**18%**	**100%**

2.1.3 Visits and Days by Treating Hospital

The highest number of ICU visits and days for children were at BC Children's Hospital (BCCH), Victoria General Hospital (Vic Gen) and University Hospital of Northern BC (UHNBC). Combined, these represented 89% of total ICU visits and 93% of total ICU days. See Table 3 (Appendix 1 for details).

Table 2: ICU Visits & Days by Facility, Children 0 - 16.9 Yrs, (CIHI, 2020/21)

Treating Hospital	ICU Visits		ICU Days	
	#	% Prov Total	#	% Prov Total
BCCH	688	61%	2,339	72%
Victoria General	195	17%	406	12%
UHNBC (Prince George)	125	11%	281	9%
Other BC Hospitals	117	10%	228	7%
Total	**1,125**	**100%**	**3,254**	**100%**

2.1.4 Visits and Days by Location of Child's Home Residence

The highest proportion of visits and days were by children living in the Fraser Health Authority (FHA): 29% of total visits and 31% of total days. FHA has more children than any other HA.

On a per capita basis, children living in Northern Health utilized an ICU more often than children living in the other health authorities.

See Table 4 (Appendix 2 for details).

Table 3: ICU Visits & Days by HA of Child's Home Residence, Children 0 - 16.9 Yrs (CIHI, 2020/21)

HA of Child's Home Residence	ICU Visits		ICU Days		% BC Child Pop'n
	#	% Prov Visits	#	% Prov Days	
IHA	182	16%	555	17%	15%
FHA	315	29%	1,000	31%	42%
VCH	153	14%	550	17%	20%
VIHA	254	23%	604	19%	15%
NHA	200	18%	491	15%	7%
Total, BC as Home Residence	**1,104**	**100%**	**3,200**	**100%**	**100%**
Out of Prov/Unknown	21		54		
Total, All	**1,125**		**3,254**		

2.2 Reasons for ICU Visits

2.2.1 Mode of Entry

The most common routes of entry to ICU by children were direct entry or via emergency. A smaller number were admitted via a clinic or day care surgery from within the same hospital.

Table 4: Mode of Entry of ICU Visits, Children 0 - 16.9 Yrs (CIHI, 2020/21)

Treating Hospital	ICU Visits				
	Direct[1]	ED	Clinic	Day Surgery	Total
BCCH	456	223	8	1	688
Victoria General	116	78	1	0	195
UHNBC (Prince George)	61	18	46	0	125
Other BC Hospitals	21	93	1	2	117
Total	**654**	**412**	**56**	**3**	**1,125**
% Prov Visits	**58%**	**37%**	**5%**	**0%**	**100%**

[1] Direct entry includes:

- Children admitted to ICU from another area within the same hospital (e.g., medical unit, OR, etc), excluding the Emergency Department or a clinic; and
- Children admitted to ICU from another hospital.

2.2.2 Major Clinical Categories/Case Mix Groups

The most common clinical categories for admission to ICU in 2020/21 were: circulatory (17%) and nervous system (13%), and trauma/injury/poisoning and toxic effects of drugs (11%). See Table 6. This differs from previous years when respiratory issues were the most common category (23% in 2019/20).

The most common case mix groups were major cardiothoracic interventions (11%), major cardiothoracic intervention with pump (7%), poisoning/toxic effects of drug (4%) and seizure disorder (4%). See Appendix 3 for details.

Table 5: Visits by Major Clinical Category, Children 0 - 16.9 Yrs (CIHI, 2020/21)

Major Clinical Category (MCC)	ICU Visits		ICU Days	
	#	% Total ICU D/C'es	#	% Total ICU Days
Diseases & Disorders of the Circulatory System	196	17%	397	12%
Diseases & Disorders of the Nervous System	141	13%	344	11%
Significant Trauma, Injury, Poisoning & Toxic Effects of Drugs	123	11%	276	8%
Newborns & Neonates with Conditions Orig in Perinatal Period	111	10%	515	16%
Diseases & Disorders of Ear, Nose, Mouth & Throat	106	9%	162	5%
Diseases & Disorders of the Respiratory System	104	9%	635	20%
Diseases & Disorders of the Endocrine System, Nutrition & Metabolism	104	9%	192	6%
Diseases & Disorders of the Digestive System	58	5%	115	4%
Diseases & Disorders of the MS System & Connective Tissue	56	5%	230	7%
Diseases & Disorders of the Kidney, Urinary Tract & Male Reproductive System	29	3%	49	2%
Multisystemic or Unspecified Site Infections	28	2%	106	3%

Major Clinical Category (MCC)	ICU Visits		ICU Days	
	#	% Total ICU D/C'es	#	% Total ICU Days
Other Reasons for Hospitalization	27	2%	96	3%
Diseases & Disorders of the Blood & Lymphatic System	23	2%	97	3%
Diseases & Disorders of the Skin, Subcutaneous Tissue & Breast	6	1%	12	0%
Diseases & Disorders of the Hepatobiliary System & Pancreas	5	0%	19	1%
Burns	4	0%	4	0%
Diseases & Disorders of the Eye	3	0%	3	0%
Miscellaneous CMG & Ungroupable Data	1	0%	2	0%
Total, All MCCs	**1,125**	**100%**	**3,254**	**100%**

2.3 HA of Treating Hospital versus Location of Child's Home Residence

57% of children accessed ICU services in a hospital in their home HA. This ranged from 0.5% of children living in Fraser to 96% living in Vancouver Coastal. See Table 7.

Table 6: HA of Treating Hospital versus Location of Child's Home Residence (CIHI, 2020/21)

HA of Treating Hospital	Child's Home Residence					Total Visits, excl Other	Other	Total Visits, incl Other	% Prov Visits
	Interior	Fraser	Van Coastal	Van Island	Northern				
Interior	**80**	**0**	**0**	**0**	**1**	**81**	**0**	**81**	**7%**
Cariboo Memorial Hospital	20					**20**		**20**	2%
East Kootenay Regional Hospital	8					**8**		**8**	1%
Kelowna General Hospital	18				1	**19**		**19**	2%
Kootenay Bound Regional Hospital	12					**12**		**12**	1%
Penticton Regional Hospital	7					**7**		**7**	1%
Royal Inland Hospital	5					**5**		**5**	0%
Vernon Jubilee Hospital	10					**10**		**10**	1%
Fraser		**2**				**2**		**2**	**0%**
Royal Columbian Hospital		2				**2**		**2**	0%
Vancouver Coastal	**3**	**1**	**1**	**3**	**0**	**8**	**1**	**9**	**1%**
Powell River General Hospital			1			**1**		**1**	0%
St. Paul's Hospital						**0**	1	**1**	0%
Vancouver General Hospital	3	1		3		**7**		**7**	1%
Vancouver Island	**0**	**0**	**1**	**195**	**0**	**196**	**1**	**197**	**18%**
Victoria General Hospital			1	193		**194**	1	**195**	17%
West Coast General Hospital				2		**2**		**2**	0%
Northern	**1**	**0**	**0**	**1**	**146**	**148**	**0**	**148**	**13%**
Dawson Creek and District Hospital					2	**2**		**2**	0%
Fort St. John General Hospital					2	**2**		**2**	0%
Mills Memorial Hospital					16	**16**		**16**	1%
Prince George Regional Hospital	1			1	123	**125**		**125**	11%
Prince Rupert Regional Hospital					3	**3**		**3**	0%
Provincial Health Services Authority	**98**	**312**	**151**	**55**	**53**	**669**	**19**	**688**	**61%**
B.C. Children's Hospital	98	312	151	55	53	**669**	19	**688**	
Total ICU Visits, BC	**182**	**315**	**153**	**254**	**200**	**1,104**	**21**	**1,125**	**100%**
% Treated in Home HA	**44%**	**0.6%**	**99%**	**77%**	**73%**	**52%**			
% BC ICU Child Visits	**16%**	**29%**	**14%**	**23%**	**18%**	**100%**			
% BC Population	**15%**	**42%**	**20%**	**15%**	**7%**	**100%**			

Note: For the purposes of this table, children from VCH that were admitted to either a VCH hospital or BCCH were assumed to have received the service in their home HA.

3.0 Literature on Volumes & Outcomes

In preparation for development of the original Children & Critical Care Tiers module in 2019, a literature search was undertaken on the relationship between volumes and outcomes in adult, pediatric and neonatal ICUs. Most of the literature focused on adult and not pediatric or neonatal ICUs.

Although the literature is conflicting, most studies suggest a positive relationship between volumes and outcomes (higher volumes, better outcomes). Some noted the relationship existed only for high risk/complexity patients.

Adult ICUs:

- Most studies/literature reviews suggest there is a relationship between volumes and outcomes (higher volumes, better outcomes),[1-5] although some report no relationship.[6-8]
- One literature review (n=20 studies) suggested there was a high volume threshold at which point the risk benefit is lost (more than 450 cases per year per diagnostic category and more than 711 cases not specific to a diagnostic category). Optimal ICU performance was noted to be between low and high volumes.[1]
- One systematic review and meta-analysis (n=29 studies) found that 63% of the studies reported a statistically significant association between higher admission volumes and improved outcomes. The magnitude of the benefits was greatest in selected high risk conditions (cardiovascular, respiratory, severe sepsis, hepato– G.I., neurologic and postoperative admission diagnoses).[9]
- Two individual studies that focused on specific patient groups only (e.g., renal, subarachnoid hemorrhage) concluded a positive volume/outcome relationship.[10,11]
- One study of 29 ICUs in Spain reported no relationship between volumes and outcomes.[12] Another concluded the benefit was seen only in high-risk patients[13] and another only with certain diagnoses.[14]
- One study concluded the number of pressure ulcer prevalence and catheter-related bloodstream infection rates were higher in larger hospitals.[15]
- One study showed that reduced ICU bed availability was associated with increased rates of ICU readmission and ward cardiac arrest.[16] One literature review identified 70 - 75% to be the optimal ICU occupancy rate.[17] Another study did not show a relationship between ICU bed availability and occupancy.[18]

Pediatric ICUs:

- There are less studies/literature reviews published on volume and outcomes in pediatric ICUs.
- 3 articles show a relationship between PICU volume and morbidity/mortality (higher volumes, better outcomes):
  - Tilford's study[19] examined the volumes & outcomes in 16 PICUs that ranged from 4 - 20 beds (147 - 1,246 admissions/yr, with an average of 863/yr). The study reported significant effects of patient volume on both risk-adjusted mortality and patient length of stay. A 100% increase in PICU volume decreased both risk-adjusted mortality (adjusted odds ratio: .95) and reduced length of stay (incident rat ratio: .98). Factors such as fellowship training programs, university hospital affiliation, number of PICU beds and children's hospital affiliation had no effect on risk-adjusted mortality or patient length of stay.
  - Marcin's study[20] examined the volumes & outcomes in 15 PICUs (152 - 2,156 admissions/yr). On average, admission to higher-volume PICUs was associated with lower severity-adjusted mortality (odds ratio = 0.68 per 100 patient increase in volume). However, although severity-adjusted mortality rates decreased as annual PICU admission volumes increased, there was a slight increase in mortality rates among PICUs with very high annual admission volumes. This suggests that, although increasing PICU volumes are on average associated with lower mortality rates, there may be a point at which increasing volume not only does not result in further reductions in severity-adjusted mortality rates, but may be associated with some increase in mortality rates. The lowest severity-adjusted mortality rates were among PICUs with annual admission volumes between 992 and 1,491.
  - Ruttman's[21] study examined the relationship between diagnostic diversity within a PICU and mortality risk. The study concluded no relationship although did note a small but significant volume effect present. A volume increase of 10 patients/month was associated with a 4% decrease of the adjusted mortality odds ratio.
- One PICU article showed a relationship between ICU volume and LOS (higher volume, shorter LOS) for critically ill children with acute asthma.[24]
- One PICU study (Markovitz[22]) examined the volumes & outcomes in 92 PICUs (186,643 patients). For patients with low severity of illness, PICU volume was not a related to mortality. For patients with high severity of illness, PICU volume is inversely related to mortality (i.e., higher PICU volumes were associated with higher risk– adjusted mortality). Potential explanations included differences in quality of care, issues with unmeasured con founding or calibration of existing severity of illness scores. Kahn[23] in a later article noted the relationship was conditional on severity of illness and that the association between higher volume and higher risk of death was largely confined to more acutely ill patients. He proposed that the study results could be attributable to limitations in the study design, including differing case-mixes between high volume and low volume PICU's.

Neonatal ICUs:

- 3 articles in the NICU literature showed a relationship between higher volumes and better outcomes.[25,26]

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Appendix 1: ICU Visits & Days, All BC Hospitals, 2020/21 & 2019/20 (Children Ages 16.9 & Under)

HA of Treating Hosp	Treating Hospital	2020/21									2019/20								
		Visits						Days			Visits						Days		
		< 6 mos	6 mos - 1.9 Yrs	2 - 13.9 Yrs	14 - 16.9 Yrs	Total	% Total	Pt Days	% Tot	Avg LOS	< 6 mos	< 2 Yrs	2 - 13.9 Yrs	14 - 16.9 Yrs	Total	% Total	Pt Days	% Tot	Avg LOS
IHA	Cariboo Memorial Hospital		1	17	2	20	2%	28	1%	1.4	9	19	15	3	46	3%	95	2%	2.1
	East Kootenay Regional Hospital	1	2	1	4	8	1%	12	0%	1.5		3	7	5	15	1%	27	0%	1.8
	Kelowna General Hospital	5	4	6	4	19	2%	22	1%	1.2	1	4	16	9	30	2%	40	1%	1.3
	Kootenay Boundary Reg Hospital	1	3	3	5	12	1%	12	0%	1.0		1	4	4	9	1%	10	0%	1.1
	Penticton Regional Hospital			6	1	7	1%	10	0%	1.4	2		8	1	11	1%	24	0%	2.2
	Royal Inland Hospital				5	5	0%	34	1%	6.8	1	4	3	2	10	1%	24	0%	2.4
	Shuswap Lake General Hospital					0	0%		0%	-						0%		0%	-
	Vernon Jubilee Hospital		2	6	2	10	1%	12	0%	1.2		1	6		7	0%	7	0%	1.0
FHA	Abbotsford Regional Hosp					0	0%		0%	-				1	1	0%	2	0%	2.0
	Burnaby Hosp					0	0%		0%	-						0%		0%	-
	Chilliwack Gen Hosp					0	0%		0%	-						0%		0%	-
	Langley Memorial Hospital					0	0%		0%	-						0%		0%	-
	Ridge Meadows					0	0%		0%	-						0%		0%	-
	Royal Columbian Hosp				2	2	0%	20	1%	10.0				1	1	0%	6	0%	6.0
	Surrey Memorial					0	0%		0%	-						0%		0%	-
VCH	Lion's Gate Hosp					0	0%		0%	-						0%		0%	-
	Mt St Joseph Hosp					0	0%		0%	-						0%		0%	-
	Powell River Gen Hosp				1	1	0%	1	0%	1.0			2	2	4	0%	12	0%	3.0
	Richmond Hosp					0	0%		0%	-						0%		0%	-
	Sechelt Hosp					0	0%		0%	-						0%		0%	-
	St Paul's Hosp	1				1	0%	2	0%	2.0						0%		0%	-
	Vancouver Gen Hosp			3	4	7	1%	37	1%	5.3				5	5	0%	48	1%	9.6
VIHA	Cowichan District Hosp					0	0%		0%	-						0%		0%	-
	Nanaimo Reg Gen Hosp					0	0%		0%	-						0%		0%	-
	North Island Hosp - Comox Valley					0	0%		0%	-						0%		0%	-
	Royal Jubilee Hosp					0	0%		0%	-						0%		0%	-
	St Joseph's Hosp					0	0%		0%	-						0%		0%	-
	Victoria General Hosp	33	31	101	30	195	17%	406	12%	2.1	73	45	144	39	301	19%	1157	20%	3.8
	West Coast Gen Hosp	1		1		2	0%	3	0%	1.5		4	3	1	8	1%	11	0%	1.4
NHA	Dawson Creek Hosp			2		2	0%	2	0%	1.0		3	1	1	5	0%	5	0%	1.0
	Ft St John Hosp			1	1	2	0%	2	0%	1.0	10	5	12	2	29	2%	78	1%	2.7
	GR Baker Hosp					0	0%		0%				1		1	0%	1	0%	
	Mills Memorial	9	4	2	1	16	1%	28	1%	1.8	9	8	13	1	31	2%	60	1%	1.9
	Prince Rupert Hosp			2	1	3	0%	3	0%	1.0	2		3	1	6	0%	8	0%	1.3
	Univ Hosp of N BC	45	20	46	14	125	11%	281	9%	2.2	49	44	75	14	182	11%	470	8%	2.6
PHSA	BC Children's Hosp	170	116	327	75	688	61%	2,339	72%	3.4	213	162	402	111	888	56%	3637	64%	4.1
Total		**266**	**183**	**524**	**152**	**1,125**	**100%**	**3,254**	**100%**	**2.9**	**369**	**303**	**715**	**203**	**1,590**	**100%**	**5,722**	**100%**	**3.6**
% Total		**24%**	**16%**	**47%**	**14%**	**100%**					**23%**	**19%**	**45%**	**13%**	**100%**				
% BC's Child Population		**11%**		**71%**	**18%**	**100%**					**11%**		**71%**	**18%**	**100%**				

Orange = PICU available

Appendix 2: ICU Visits & Days by Location of Child's Home Residence, 2020/21

(Children Ages 16.9 & Under)

Pt HA	Treating Hosp	Visits	Days	% Visits	% Days	% Prov Child Pop'n
IHA	B.C. Children's Hospital	98	393			
	Cariboo Memorial Hospital	20	28			
	Kelowna General Hospital	18	20			
	Kootenay Boundary Regional Hospital	12	12			
	Vernon Jubilee Hospital	10	12			
	East Kootenay Regional Hospital	8	12			
	Penticton Regional Hospital	7	10			
	Royal Inland Hospital	5	34			
	Vancouver General Hospital	3	30			
	Prince George Regional Hospital	1	4			
	IHA Total	**182**	**555**	**16%**	**17%**	**15%**
FHA	B.C. Children's Hospital	312	977			
	Royal Columbian Hospital	2	20			
	Vancouver General Hospital	1	3			
	FHA Total	**315**	**1000**	**28%**	**31%**	**42%**
VCH	B.C. Children's Hospital	151	548			
	Victoria General Hospital	1	1			
	Powell River General Hospital	1	1			
	Van Coastal Total	**153**	**550**	**14%**	**17%**	**20%**
Island H	Victoria General Hospital	193	399			
	B.C. Children's Hospital	55	197			
	Vancouver General Hospital	3	4			
	West Coast General Hospital	2	3			
	Prince George Regional Hospital	1	1			
	Island H Total	**254**	**604**	**23%**	**19%**	**15%**
NHA	Prince George Regional Hospital	123	276			
	B.C. Children's Hospital	53	178			
	Mills Memorial Hospital	16	28			
	Prince Rupert Regional Hospital	3	3			
	Dawson Creek and Dist Hospital	2	2			
	Fort St. John General Hospital	2	2			
	Kelowna General Hospital	1	2			
	NHA Total	**200**	**491**	**18%**	**15%**	**7%**
OOP/ Unspec	B.C. Children's Hospital	19	46			
	Victoria General Hospital	1	6			
	St. Paul's Hospital	1	2			
	OOP/Unknown Total	**21**	**54**	**2%**	**2%**	-
BC Total		**1,125**	**3,254**	**100%**	**100%**	**100%**

Appendix 3: ICU Visits by Major Clinical Category & Case Mix, 2020/21

(Children Ages 16.9 & Under)

Major Clinical Category/Case Mix Group	ICU Visits		ICU Days	
	#	% Total	#	% Total
Diseases & Disorders of the Circulatory System	**196**	**17%**	**397**	**12%**
Major Cardiothoracic Intervention with Pump	103		170	
Major Cardiothoracic Intervention without Pump	20		23	
Other/Miscellaneous Vascular Intervention	12		33	
Other/Miscellaneous Cardiac Disorder	11		42	
Minor Cardiothoracic Intervention	8		21	
Myocardial Infarction/Shock/Arrest without Coronary Angiogram	7		26	
Percutaneous Transluminal Cardiothoracic Intervention except Percutaneous Coronary Intervention	7		20	
Cardiac Valve Replacement	6		11	
Syncope	4		7	
Congenital Cardiac Disorder	3		17	
Arrhythmia without Coronary Angiogram	3		3	
Pacemaker Implantation	2		3	
Other/Miscellaneous Vascular Disease	2		4	
Heart Failure without Coronary Angiogram	2		9	
Bypass/Extraction of Vein/Artery of Limb	1		2	
Abdominal Aorta Intervention	1		1	
Cardiac Valve Repair except Percutaneous Transluminal Approach	1		1	
Management/Removal of Pacemaker/Defibrillator/Leads	1		1	
Implantation of Cardioverter/Defibrillator	1		2	
Angina (except Unstable)/Chest Pain without Coronary Angiogram	1		1	
Diseases & Disorders of the Nervous System	**141**	**13%**	**344**	**11%**
Seizure Disorder, except Status Epilepticus	44		71	
Excision/Repair of Brain	26		31	
Status Epilepticus	17		31	
Insertion of Shunt/Brain Monitor	11		23	
Other Disorder of Central Nervous System	7		30	
Intracranial Vessel Intervention except Extraction	5		46	
MCC 01 Unrelated Intervention	4		45	
Neuromuscular Disorder	3		4	
Ischemic Event of Central Nervous System	3		17	
Major Nerve Intervention or Intervention on other Site	3		4	
Infection/Inflammation of Central Nervous System except Meningitis	3		11	
Other Dysfunction of Central Nervous System	2		2	
Management of Nervous System Device/Other Minor Intervention	2		7	
Other Vascular Intervention with Nervous System Diagnosis	2		2	
Meningitis except Viral	2		3	
Neuropathy/Polyneuropathy	2		6	
Hemorrhagic Event of Central Nervous System	1		3	
Other Degenerative Disease of Nervous System	1		2	
Viral Meningitis	1		4	
Benign & Uncertain/Unknown Behaviour Neoplasms, Central Nervous System	1		1	
Drainage/Release of Brain	1		1	

Significant Trauma, Injury, Poisoning & Toxic Effects of Drugs	**123**	**11%**	**276**	**8%**
Poisoning/Toxic Effect of Drug	50		70	
Single Injury to Internal Organ	9		16	
Single Intracranial Injury	9		14	
Skull/Intracranial Intervention with Trauma/Complication of Treatment	9		16	
Concussion	5		5	
Fracture of Skull/Facial Bone	4		5	
Major Thoraco-abdominal/Vascular Intervention with Trauma/Complication of Treatment	4		9	
Open Wound/Other/Unspecified Minor Injury	4		4	
Post-Operative Complication except Hemorrhage	3		10	
Intracranial Injury with Injury to Other Organ	3		9	
Multiple Intracranial Injury	3		9	
Other Thoraco-abdominal Intervention with Trauma/Complication of Treatment	3		11	
Spinal Injury	2		17	
Ear/Nose/Throat Intervention with Trauma/Complication of Treatment	2		3	
Spinal Intervention with Trauma/Complication of Treatment	2		46	
Fixation/Repair Hip/Femur	2		4	
Significant Injury/Exposure to Element	2		6	
Multiple Injuries to Internal Organ	1		3	
Reduction/Fixation/Repair Upper Body/Limb except Fixation/Repair of Shoulder	1		2	
Post-Operative Hemorrhage	1		1	
Fracture/Dislocation/Rupture of Pelvis/Sacrum/Coccyx	1		2	
Replacement/Fixation/Repair of Tibia/Fibula/Knee	1		1	
Organ Transplant with Trauma/Complication of Treatment	1		5	
Skin/Soft Tissue Intervention with Trauma with Flap/Graft	1		8	
Newborns & Neonates with Conditions Originating in Perinatal Period	**111**	**10%**	**515**	**16%**
Newborn/Neonate 1500+ gm with Major Cardiovascular Intervention	33		266	
Newborn/Neonate 2500+ grams, Other Minor Problem	20		64	
Newborn/Neonate 2500+ grams, Septicemia/Other Neonatal Infection	8		21	
Newborn/Neonate 2500+ grams, Other Respiratory Problem	7		9	
Newborn/Neonate 2500+ grams, Cardiovascular Anomaly	7		14	
Newborn/Neonate 2500+ grams, Other Major Problem	6		30	
Newborn/Neonate 2500+ grams, Other Moderate Problem	6		7	
Newborn/Neonate 2500+ grams, Anomaly of Nervous/Resp/Digestive System	4		7	
Newborn/Neonate 2000-2499 grams, Gestational Age 37+ Weeks	4		18	
Newborn/Neonate 2500+ grams, Major Respiratory Complication	4		15	
Newborn/Neonate 1500+ grams with Major Gastro/Respiratory Intervention	3		9	
Newborn/Neonate 2500+ grams, Other Congenital Anomaly	3		10	
Newborn/Neonate 2500+ grams, Aspiration Syndrome/Fetal Asphyxia	2		4	
Newborn/Neonate 2000-2499 grams, Gestational Age 35-36 Weeks	2		37	
Newborn/Neonate 1500-1999 grams, Gestational Age 35+ Weeks	1		1	
Newborn/Neonate 2500+ grams, Jaundice	1		3	
Diseases & Disorders of Ear, Nose, Mouth & Throat	**106**	**9%**	**162**	**5%**
Oral Cavity/Pharynx Intervention	42		53	
Hard/Soft Palate/Gingiva Intervention	13		17	
Glottis Intervention	13		18	
Influenza/Acute Upper Respiratory Infection	7		14	
Disease of Oral Cavity/Salivary Gland/Jaw	6		6	
Miscellaneous Ear/Nose/Throat Disorder	5		11	
Larynx/Trachea Intervention with Ear/Nose/Throat Diagnosis	4		5	

Diseases & Disorders of Ear, Nose, Mouth & Throat cont'd				
Skin Intervention with Ear/Nose/Throat Diagnosis	3		4	
Other Ear Intervention	3		3	
Sleep Apnea	2		4	
Tonsillitis/Pharyngitis	2		2	
Other Musculoskeletal Intervention on Head	2		5	
Croup	2		2	
Lymphatic Intervention with Ear/Nose/Throat Diagnosis	2		18	
Diseases & Disorders of the Respiratory System	**104**	**9%**	**635**	**20%**
Upper/Lower Respiratory Infection	18		82	
Asthma	16		25	
Other Respiratory Diagnosis	12		19	
Symptom/Sign of Respiratory System	11		55	
Other Respiratory Intervention	10		146	
Respiratory Failure	9		58	
Aspiration Pneumonia	7		23	
MCC 04 Unrelated Intervention	4		91	
Other Intervention with Respiratory Diagnosis	4		36	
Infectious/Parasitic Disease of Respiratory System	3		8	
Open Lung Resection	3		3	
Bacterial Pneumonia	2		38	
Viral/Unspecified Pneumonia	2		25	
Endoscopic Lung Resection	2		4	
Lymph Node Excision/Biopsy with Respiratory Diagnosis	1		22	
Diseases & Disorders of the Endocrine System, Nutrition & Metabolism	**104**	**9%**	**192**	**6%**
Diabetes	68		95	
Disorder related to Nutrition	14		34	
Disorder of Metabolism	5		25	
Disorder of Fluid/Electrolyte Balance	3		9	
Pituitary/Pineal Gland Intervention	2		4	
MCC 10 Unrelated Intervention	2		6	
Adrenal Gland Intervention	2		2	
Disease/Disorder of Adrenal/Pituitary Gland	2		7	
Other Pancreas Intervention	1		1	
Thyroid/Parathyroid/Thymus Gland Intervention	1		4	
Dehydration	1		1	
Disease/Disorder of Thyroid/Parathyroid	1		2	
Disease/Disorder of Pancreas	1		1	
Other Intervention with Endocrine System Diagnosis	1		1	
Diseases & Disorders of the Digestive System	**58**	**5%**	**115**	**4%**
Non-Complex Hernia Repair	8		9	
Minor Upper Gastrointestinal Intervention	6		9	
Open Large Intestine/Rectum Resection without Colostomy, Planned	5		17	
Non-severe Enteritis	5		15	
Non-Major Excision/Repair of Upper Gastrointestinal Tract, Unplanned	4		9	
Complicated Appendectomy	4		9	
Gastrointestinal Obstruction	3		4	
Symptom/Sign of Digestive System	3		3	
Open Large Intestine/Rectum Resection without Colostomy, Unplanned	3		3	
Colostomy/Enterostomy	3		17	
Non-Major Excision/Repair of Upper Gastrointestinal Tract, Planned	3		3	

Diseases & Disorders of the Digestive System cont'd				
Simple Removal of Upper Gastrointestinal Foreign Body	2		2	
Gastrointestinal Hemorrhage	2		2	
Other Gastrointestinal Disorder	1		3	
MCC 06 Unrelated Intervention	1		2	
Other Intervention with Gastrointestinal Diagnosis	1		1	
Intervention on Anus Excluding Reconstruction	1		1	
Major Intervention on Esophagus	1		4	
Esophagitis/Gastritis/Miscellaneous Digestive Disease	1		1	
Complex Hernia Repair	1		1	
Diseases & Disorders of the Musculoskeletal System & Connective Tissue	**56**	**5%**	**230**	**7%**
C1/C2/Thoracic Spine Intervention	16		87	
Systemic Connective Tissue Disorder	6		20	
Osteotomy of Lower Limb except Foot	6		24	
Spinal Vertebrae Intervention	5		23	
Craniofacial Bone Intervention with Musculoskeletal Diagnosis	5		9	
Other Soft Tissue Disorder	2		2	
Major Foot Intervention except Soft Tissue without Infection	2		4	
Pain/Stiffness, except Back	2		5	
MCC 08 Unrelated Intervention	2		25	
Other Musculoskeletal Disorder	2		4	
Resection/Amputation of Pelvis/Leg without Infection	1		1	
Soft Tissue Intervention of Lower Limb	1		1	
Skin Intervention with Musculoskeletal Diagnosis	1		1	
Inflammatory and Reactive Arthropathy	1		2	
Orthopedic Aftercare	1		2	
Resection/Amputation of Pelvis/Leg with Infection	1		9	
Back Pain/Strain	1		2	
Other Major MSK Intervention with Malignant Neoplasm	1		**9**	
Diseases & Disorders of the Kidney, Urinary Tract & Male Reproductive System	**29**	**3%**	**49**	**2%**
Lower Urinary Tract Infection	13		26	
Kidney Transplant	4		7	
Major Intervention on Upper Urinary Tract	4		4	
Upper Urinary Tract Infection	2		2	
Renal Failure	2		4	
Kidney Disease	2		3	
Intervention related to Dialysis	1		2	
Non-Major Intervention on Male Reproductive System	1		1	
Multisystemic or Unspecified Site Infections	**28**	**2%**	**106**	**3%**
Other Infectious/Parasitic Disease	11		38	
Other/Unspecified Sepsis/Shock	10		30	
Fever	4		13	
Multisystemic/Unspecified Site Infection with Intervention	2		24	
Other/Unspecified Viral Illness	1		1	
Other Reasons for Hospitalization	**27**	**2%**	**96**	**3%**
Other Factor Causing Hospitalization	5		12	
Rehabilitation	5		14	
General Symptom/Sign	4		6	
Observation/Evaluation	4		4	
Convalescence	3		5	
Other Admission with Non-Major Intervention	3		52	

Other Reasons for Hospitalization cont'd				
Other Admission with Major Intervention	2		2	
Pain Management Planning	1		1	
Diseases & Disorders of the Blood & Lymphatic System	**23**	**2%**	**97**	**3%**
Intervention with Blood/Lymphatic System Diagnosis except Neoplasm	4		37	
Intervention with Other Blood Malignant Neoplasm	3		10	
Lymphoma	3		8	
Acute Leukemia except Myeloid	3		4	
Other Disease/Disorder of Blood/Lymphatic System	2		21	
Other Anemia	2		2	
Bone Marrow/Stem Cell Transplant	1		2	
Purpura/Other Hemorrhagic Disorder	1		7	
Other Leukemia	1		1	
Chemotherapy/Radiotherapy Admission for Neoplasm	1		1	
Coagulation Defect	1		1	
Intervention with Lymphoma	1		3	
Diseases & Disorders of the Skin, Subcutaneous Tissue & Breast	**6**	**1%**	**12**	**0%**
Other Disease/Disorder of Skin/Subcutaneous Tissue	2		2	
Cellulitis	1		2	
Trauma of Skin/Subcutaneous Tissue/Breast	1		1	
MCC 09 Unrelated Intervention	1		1	
Muscle/Tendon/Soft Tissue Intervention with Skin Diagnosis	1		6	
Diseases & Disorders of the Hepatobiliary System & Pancreas	**5**	**0%**	**19**	**1%**
Major Hepatobiliary Intervention	2		2	
Liver Disease except Cirrhosis/Malignancy	1		1	
Hepatobiliary/Pancreatic Malignancy	1		15	
Laparoscopic Cholecystectomy with/without Common Bile Duct Exploration	1		1	
Burns	**4**	**0%**	**4**	**0%**
Non-Extensive Burn	4		4	
Diseases & Disorders of the Eye	**3**	**0%**	**3**	**0%**
Major Ophthalmology Disorder	2		2	
Other Ophthalmology Disorder	1		1	
Miscellaneous CMG & Ungroupable Data	**1**	**0%**	**2**	**0%**
Ungroupable	1		2	
Grand Total	**1,125**	**100%**	**3,254**	**100%**

Appendix 4: HA Operated & Contracted Child & Youth Inpatient Beds in BC

Sites are listed in alphabetical order within each HA.

HA	Hospital	General Pediatric Beds	Pediatric Observation Beds	Ped ICU Beds[2]	Child & Youth MH Beds	Youth SU Beds[3,4]	Total Ped Beds	NICU Beds
IHA[5]	A New Tomorrow (Kamloops)					8[6]	8	
	Bridge Youth Rec House (Kelowna)					14[7]	14	
	East Kootenay (Cranbrook)	2					2	
	Kelowna General	10			8		18	12
	Kootenay Boundary (Trail)	4					4	
	Penticton	4					4	
	Phoenix Centre (Kamloops)					5[8]	5	
	Royal Inland (Kamloops)	9			2		11	8
	Vernon	5					5	
FHA	Abbotsford Regional	12					12	10
	Burnaby						0	6
	Chilliwack General		4				4	
	Creekside Withdrawal Mgt Ctre (Surrey)					6	6	
	Langley Memorial	8					8	4
	Last Door Recovery Centre (N West)					4	4	
	Maple Ridge Treatment Centre					4[9]	4	
	Ridge Meadows		4				4	
	Royal Columbian	12					12	24
	Surrey Memorial	16			20		36	32
	Traverse (Chilliwack)					20	20	
VCHA	Carlile Centre (N Van)				10[10]		10	
	Lions Gate	10					10	6
	Peak House (Van)					8	8	
	Richmond		3[11]				3	6
	St Paul's						0	9
	Young Bears Lodge (Van)					5	5	

[2] Beds have capacity for invasive monitoring, inotropic drugs, and mechanical ventilation.
[3] Excludes beds in home-based settings and supportive recovery beds.
[4] Substance use beds are funded by the HA but operated by an external agency. Exceptions: Creekside (Surrey) and Nechako (Prince George) are funded & operated by the HA.
[5] Excludes Recovery Range (Fort Steele), ages 19 – 24 yrs.
[6] Facility-based treatment, ages 12 – 18 yrs.
[7] 14 beds: 4 withdrawal management & 10 facility treatment, ages 12 – 18 yrs.
[8] Withdrawal management, ages 12 – 24 yrs.
[9] Ages 18 – 24 yrs.
[10] Concurrent disorders, 13 – 18 yrs old.
[11] 3 funded beds (5 physical beds) staffed by 1 RN 24/7.

HA	Hospital	General Pediatric Beds	Pediatric Observation Beds	Ped ICU Beds[12]	Child & Youth MH Beds	Youth SU Beds[13], [14]	Total Ped Beds	NICU Beds
Island HA	Campbell River	3					3	
	Comox Valley	3					3	
	Cowichan District (Duncan)	4					4	
	Ledger House (Victoria)				14[15]		14	
	Nanaimo Regional	8					8	9
	Victoria General	20 (24)[16]		5			25	22
	Victoria Youth Empowerment Society Specialized Youth Detox					5[17]	5	
NHA	Nechako Centre (Prince George)					8[18]	8	
	University Hosp of Northern B.C.	12[19]			6[20]		18	9
PHSA	B.C. Children's Hospital	97		22	54[21]		173	
	B.C. Women's						0	60
TOTAL		**239**	**11**	**27**	**114**	**87**	**478**	**217**

Source: Survey of CHBC Regional Coordinators, March 2023.

Note: Several hospitals in BC do not have dedicated pediatric beds but admit children to beds on adult inpatient units. These hospitals are not included on the list above.

[12] Beds have capacity for invasive monitoring, inotropic drugs, and mechanical ventilation.
[13] Excludes beds in home-based settings and supportive recovery beds.
[14] Substance use beds are funded by the HA but operated by an external agency. Exceptions: Creekside (Surrey) and Nechako (Prince George) are funded & operated by the HA.
[15] 14 beds: 5 child, 6 youth & 3 special care (assessment/stabilization) beds.
[16] Planned seasonal increase to 24 beds Oct-April. 4 beds available with increased safety and monitoring for mental health.
[17] Short-term residential withdrawal management program, ages 13-18
[18] Includes 1 detox bed.
[19] 4 beds have the capacity for more intensive monitoring, up to and including continuous cardiorespiratory monitoring.
[20] 2 beds for planned admissions and 4 for crisis stabilization.
[21] Includes 14 beds at Looking Glass (up to age 24), a residential eating disorders program operated by PHSA (BC Mental Health & Substance Use Services and BCCH) in collaboration with the Looking Glass Foundation.