

CHILDREN'S CANCER SERVICES

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Children's Cancer Services: Tiers to Support System & Operational Planning

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Contents

1.0	Children's Cancers and Overview of Services in BC.....	2
2.0	Children's Cancer Tiers of Service	3
2.1	Module Development.....	3
2.2	Module Scope	4
2.3	Recognition of the Tiers.....	5
3.0	Responsibilities & Requirements by Tier of Service	5
3.1	Clinical Services.....	8
3.1.1	Service Reach & Description	8
3.1.2	Responsibilities.....	9
3.1.3	Requirements.....	17
3.2	Knowledge Sharing & Transfer/Training.....	26
3.3	Quality Improvement & Research	28
4.0	References	30
	Appendix 1: Relevant BCCH Guidelines	32

Children's Cancer Services: Tiers to Support System & Operational Planning

1.0 Children's Cancers and Overview of Services in BC

Childhood cancer is a rare disease. The overall incidence has remained relatively stable, although there has been a dramatic decline in death rates since 1985 due to improvements in treatment. Cancer rates are highest among children from birth to four years of age and are higher in boys than girls. **In British Columbia (BC), every year about 150 new cases of cancer are diagnosed in children under age 17** (one child in 8,000). Over 82% of children diagnosed with cancer will survive at least 5 years after diagnosis.

The most common cancer diagnosis is acute lymphoblastic leukemia (30%), which is also the diagnosis which requires an extended (3 years) regimen of low risk chemotherapy. It is a significant burden for these children and their families to travel to Vancouver monthly for 3 years. In order to provide care to children closer to their home, some aspects of care are delegated to regional and local teams according to the capacity of the team and the risk involved in treatment, particularly when the diagnosis is acute lymphoblastic leukemia (ALL).

Table 1 shows the most common types of childhood cancers and their incidence.

Table 1: Childhood Cancers & Incidence

Cancer	Incidence	Est # in BC per Yr	Cancer	Incidence	Est # in BC per Yr
Leukemia	30%	45	Sarcoma	7%	10
Brain	19%	29	Retinoblastoma	3%	4
Lymphoma	13%	20	Liver	1%	1
Kidney	6%	9	Others	8%	12
Neuroblastoma	8%	12			
Bone cancer	5%	8	TOTAL	100%	150

Source: BCCA website at <http://www.bccancer.bc.ca/health-info/types-of-cancer/childhood-cancer>

In British Columbia (BC), children’s cancer services operate on a centralized model, with BC Children’s Hospital (BCCH) being the provincial (Tier 6) pediatric oncology referral center.

Diagnosis and initiation of cancer treatment occurs at BCCH. Where possible, children return home after treatment is initiated and their ongoing care is provided by regional and/or local providers **under the direction and support of BCCH**. The goal is to provide high-quality, safe and effective clinical and supportive care in an appropriate environment as close to a child’s home as possible. There are currently 16 pediatric oncologists in BC (14 at BCCH, 2 part-time in Surrey and 1 part-time in Victoria).

The most common type of treatment for childhood cancer is chemotherapy and biological therapy;¹ however, other modalities, such as immunological therapy, surgery, radiation and blood and marrow transplantation (BMT) may also be used, either alone or in conjunction with chemotherapy. The management and administration of chemotherapy is complex. Severe and sometimes life-threatening adverse reactions, including multi-organ toxicity, immunosuppression and infection, can occur as a result of the highly toxic nature of the drugs used. Because the volumes are low, *inpatient* chemotherapy is only provided at T6 (BCCH), as are surgical, radiation and BMT treatments. Cancer treatments provided to very young children are also only provided at BCCH.

Children's cancer services involve close interactions with radiation oncology and surgical services. Children's radiation services are provided at BC Cancer Agency's (BCCA) radiotherapy facility by medical specialists with credentials in radiation oncology and expertise in pediatrics. Surgical oncology involves procedures such as tumor biopsies, tumor resections and insertion and removal of vascular access devices (central venous catheters and implanted ports). Most surgical services are provided by pediatric surgeons and pediatric subspecialty surgeons.

BCCA provides funding and support to community-based cancer services for *adults* through the regional health authorities' [Communities Oncology Network](#). These services are typically provided in clinics in community/regional hospitals (www.bccancer.bc.ca/our-services/centres-clinics/locations). In some situations, the knowledge and experience of the adult-focused team provides an option to safely deliver low-risk chemotherapy to children closer to home. The local clinic/hospital must be in agreement with the arrangement (it is not an expectation of these clinics/hospitals) and the care is directed and supported by the T6 (BCCH) team. Regional Cancer Centers (e.g., Surrey, Prince George) are not involved in the care of pediatric patients.

2.0 Children's Cancer Tiers of Service

2.1 Module Development

The initial version of this module (2012) was developed by an interdisciplinary working group which consisted of representatives from all health authorities, three pediatric oncologists, a family physician and Child Health BC (18 participants in total plus a meeting facilitator and administrative support).

In addition to this provincial working group, feedback on the initial version of this module was sought from:

- Health Authorities (via representatives on working group)
- Division of Oncology/Hematology
- Pediatric Oncology Hematology Network (POHN)
- Systemic Practice Leader at BC Cancer Agency

¹ For the purposes of this document, chemotherapy and biological therapy is collectively referred to as "chemotherapy."

The current version of this module is an update on the initial version. The "substance" of the module has stayed the same but changes have been made to better align the children's cancer module with the more recently completed children's medicine, surgery and emergency department modules. The current version differentiates between general (Tiers 1-4) and subspecialty (Tiers 5-6) services. The majority of children's cancer services are subspecialty in nature.

This module was informed by previous work done in Canada (BC Children's,^{1,2,3} Ontario⁴ and the Atlantic provinces⁵) and internationally, notably in Queensland.⁶ B.C. data was used where it was available, as were relevant BC and Canadian standards and guidelines (e.g., Accreditation Canada standards,⁷ Provincial Privileging Hematology/Oncology/HSCT Clinical Privileges,⁸ Royal College of Physicians and Surgeons Objectives of Training in the subspecialty of Pediatric Hematology/Oncology,⁹ Canadian nursing standards on chemotherapy administration¹⁰) and relevant international standards, guidelines and literature (e.g., Cancer Facts & Figures 2017¹¹ and American¹² and Australian¹⁰ nursing standards for chemotherapy administration, article on pediatric chemotherapy competence¹³).

This module was submitted and accepted by the Child Health BC Steering Committee.

2.2 Module Scope

This module focuses on inpatient and hospital-based outpatient services provided to children with cancer up to and including the point of transition to adult services. In general, this includes:

- Children with newly diagnosed cancer up to their 17th birthday (16 years + 364 days).² This may be extended to include children older than 16 years (e.g., 17 and 18 year olds) if the pediatric protocol is anticipated to have better outcomes than the adult protocol for specific cancer diagnoses.
- Children are transitioned to adult services at age 18 - 21 or after 5 years off-treatment, whichever is later.

The Children's Cancer module does not include:

- Services provided in private family physician, pediatrician, pediatric subspecialists & therapists' offices (beyond the scope of influence of the tiers of service initiative).
- Services provided to children with non-malignant hematological disorders such as hemophilia, bleeding and thrombotic disorders, non-aplastic anemias and patients requiring transfusion. Refer to the medicine module.
- Services provided to children requiring general medical care in hospital or as outpatients that is not cancer-specific. Refer to the medicine module.
- Services provided in emergency departments. Refer to the emergency department module.

² BC Children's Hospital. Administration manual: Admission age, BCCH and Sunny Hill Hospital for Children. 2010.

2.3 Recognition of the Tiers

The *Child Health Tiers of Service Framework* includes 6 tiers of service. The Children's Cancer module recognizes 3 of the 6 tiers: T3, T4, T5 and T6. **T3 is grayed out throughout the module to identify it as an adult, not pediatric, focused service.**

Tier	Child Health Framework Tiers of Service	Children's Cancer Tiers of Service
T1	Prevention, Primary & Emergent MH Service	
T2	General Health Service	
T3	Child-Focused Health Service	Adult-Focused Cancer Service (Community Oncology Network Service - BCCA)
T4	Children's Comprehensive Health Service	Children's Comprehensive Cancer Service
T5	Children's Enhanced & Regional Subspecialty Health Service	Children's Regional Subspecialty Cancer Service
T6	Children's Provincial Subspecialty MH Service	Children's Provincial Subspecialty Cancer Service

Notes about the Children's Cancer Tiers of Service:

- This module defines a future (not current) state model and is intended to support future planning of cancer services for children in BC.
- The responsibilities and requirements at each tier are summative.
- 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, in which specific agreements are made between T6 providers and providers in a local community to provide care/treatment to a child on a case-by-case basis in a community that would not normally care for such children. These exceptions are appropriate where the resources (trained personnel, equipment, etc) are available and such arrangements would allow the child to receive care closer to home. These special situations are **not** the focus of this module.

3.0 Responsibilities & Requirements by Tier of Service

This module, **Children's Cancer: Tiers to Support System & Operational Planning**, describes the responsibilities and requirements at each tier to provide a **safe, sustainable** and **appropriate** level of service to children with cancer.

The **Children's Cancer Tiers** module **builds on and is intended to be used in conjunction with the Children's Medicine Tiers** module. Specifically:

A T4 Children's Cancer Service requires a minimum of a T4 Children's Medical Service, including:

- Pediatrician on-call 24/7
- Dedicated pediatric inpatient unit
- General pediatric outpatient clinic

- Child-friendly clinic(s) and outpatient treatment/procedure space and infrastructure. May be shared with adults.

A T5 Children's Cancer Service requires a minimum of a T5 Children's Medical Service, including:

- Pediatrician (or designate) on-site 24/7
- Dedicated pediatric inpatient unit
- On-site T5 Pediatric Intensive Care Unit (PICU)
- Pediatric subspecialists are available for consultation in higher volume subspecialties which includes but is not limited to neurology and cardiology. Availability is typically days, M-F
- General pediatric outpatient clinic and regularly occurring pediatric subspecialty clinics available on-site for higher volume subspecialties which include but are not limited to cardiology, diabetes, GI medicine and neurology. Clinics may be staffed by local pediatric subspecialty providers or via outreach from T6
- Pediatric outpatient clinic and treatment/procedure space that is used exclusively by children

A T6 Children's Cancer Service requires a minimum of a T6 Children's Medical Service, including:

- Pediatrician (or designate) on-site 24/7
- Dedicated pediatric inpatient unit
- On-site T6 Pediatric Intensive Care Unit (PICU)
- Full range of pediatric subspecialists available for on-site patient management and consultation 24/7
- Broad range of pediatric specialty/subspecialty clinics on-site
- Coordinates and provides pediatric subspecialty outreach clinics (on-site or virtual care) throughout the province

Common to all tiers of children's cancer services:

- A physician, nurse and pharmacist must be identified at each centre to take responsibility for ensuring levels of care and standards are maintained and for communicating with BCCH.
- Chemotherapy orders must be written by a physician or pharmacist familiar with the chemotherapy agents being prescribed, their indications, their adverse reactions and patient's treatment protocols. All orders must be co-signed by a physician with the same level of familiarity with chemotherapy.
- Chemotherapy checklist must be double checked by two chemotherapy-competent nurses or a chemotherapy-competent nurse and a pharmacist or physician familiar with chemotherapy.
- Patients receiving drugs that may result in a delayed anaphylactic reaction (e.g., Erwinia Asparaginase) must be observed and monitored throughout the risk period (risk period as defined by the protocol). Staff competent to manage anaphylaxis must be available on site during this period.
- Nurses must be competent in chemotherapy administration and experienced in the prompt assessment and management of treatment related complications (e.g., anaphylaxis, extravasation, sepsis). Only nurses certified in central line care should access central lines.
- Processes must be in place to ensure appropriate documentation and communication at all care levels. Accessibility and availability are important aspects of good communication.

- Children may receive selected outpatient-based chemotherapy within an inpatient based protocol at T3-T5 centres if clinics have the expertise, are able to monitor treatment-related toxicities and emergencies and have the agreement of T6.

This module is organized into the following sections:

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

3.1 Clinical Services

3.1.1 Service Reach & Description

	Adult-Focused Cancer Service (Community Oncology Network Service - BCCA)	Comprehensive Children's Cancer Service	Children's Regional Subspecialty Cancer Service	Children's Provincial Subspecialty Cancer Service
	T3	T4	T5	T6
Service reach	Multiple local health areas/ health service delivery area.	Health service delivery area/ health authority.	Health authority.	Province.
Service description	<p>At the request of T6, provides cancer care to children on a case-by-case basis to facilitate care closer to home. Care is provided in an adult-focused community oncology clinic & care is directed & supported by T6. At a minimum, the local providers include a chemotherapy-certified nurse (adult) and a general practitioner (GP) oncologist/nurse practitioner (NP) oncologist.</p> <p>Administers intravenous (IV) chemotherapy agents on an <i>outpatient</i> basis in collaboration & at the direction of T6.</p> <p>Initiates selected chemotherapy agents on day 1 of a new cycle/phase in collaboration & at the direction of T6.</p> <p>Does not initiate chemotherapy for children with newly diagnosed or relapsed cancer.</p>	<p><i>Interdisciplinary team</i> provides cancer care to children under the direction & support of T6. Chemotherapy-competent pediatric nurse(s) & pediatrician experienced in chemotherapy form the "core" of the team. Clinical pharmacist is available during clinics for telephone consultation & can attend on-site, if required. Other team members are available on a case-by-case basis.</p> <p>Administers a broader range of chemotherapy agents than at T3. Chemotherapy is administered on an <i>outpatient</i> basis in collaboration & at the direction of T6.</p> <p>Initiates selected chemotherapy agents on day 1 of a new cycle/phase in collaboration & at the direction of the T6 centre.</p> <p>Does not initiate chemotherapy for children with newly diagnosed or relapsed cancer.</p>	<p><i>Interdisciplinary pediatric subspecialty team</i> provides cancer care to children in collaboration with T6. Chemotherapy-competent pediatric nurse(s), pediatric oncologist & clinical pharmacist form the "core" of the team. Other team members are available on a case-by-case basis.</p> <p>Administers a broader range of <i>outpatient</i> chemotherapy agents than at T4. Chemotherapy is administered on an <i>outpatient</i> basis in collaboration with T6. Capacity is available for intrathecal chemotherapy administration.</p> <p>Initiates chemotherapy agents on day 1 of a new cycle/phase for agents administered at T5.</p> <p>Does not initiate chemotherapy for children with newly diagnosed or relapsed cancer.</p>	<p><i>Interdisciplinary pediatric subspecialty team</i> diagnoses, plans & initiates cancer treatments & directs cancer care for all children in BC, regardless of the location the care is provided (at BCCH or in a local community). Most team members practice exclusively with children who have cancer.</p> <p>Administers chemotherapy agents to all children in BC who require chemotherapy on an <i>inpatient</i> basis. Also administers oral & <i>high-risk &/or complex</i> IV and intrathecal chemotherapy agents (in addition to agents administered at T5) on an <i>outpatient</i> basis. Includes high intensity therapies that may cause immediate & significant toxicities &/or reactions.</p> <p>Initiates chemotherapy agents for:</p> <ul style="list-style-type: none"> • Children on day 1 of a new cycle/phase. • All children in BC with newly diagnosed or relapsed cancer. <p>Provincial centre for:</p> <ul style="list-style-type: none"> • Pediatric bone marrow transplantation (BMT). • Oncology-related surgical interventions (diagnostic & therapeutic). • Radiation therapy (via BC Cancer Agency).

	Adult-Focused Cancer Service (Community Oncology Network Service - BCCA)	Comprehensive Children's Cancer Service	Children's Regional Subspecialty Cancer Service	Children's Provincial Subspecialty Cancer Service
	T3	T4	T5	T6
Service description cont'd	No on-site inpatient capacity. Refers to T6.	On-site pediatric inpatient unit provides the capacity to admit children with <i>moderate severity</i> disease/treatment related complications/symptoms. Outpatient clinic & chemotherapy treatment space(s) may be shared with adults.	On-site pediatric inpatient unit provides the capacity to admit children with <i>moderate severity</i> disease/treatment related complications/ symptoms. Outpatient clinic & chemotherapy treatment space(s) is dedicated to children.	On-site pediatric oncology inpatient unit provides the capacity to admit children with <i>high severity</i> disease/treatment related complications/symptoms. Outpatient clinic has chemotherapy & other treatment space(s) dedicated to children with cancer.

3.1.2 Responsibilities

		Adult-Focused Cancer Service	Comprehensive Children's Cancer Service	Children's Regional Subspecialty Cancer Service	Children's Provincial Subspecialty Cancer Service
		T3	T4	T5	T6
1	Referral, diagnosis, treatment planning & initiation of treatment	Refers children with suspected cancer diagnoses (new or relapsed) to T6.	Same as T3.	Same as T4.	<p>Receives referrals for all children in BC with suspected cancer diagnoses (new or recurrent). The most common childhood cancers are acute lymphoblastic leukemia, brain tumors & lymphoma.</p> <p>Diagnoses, plans & initiates cancer treatments & directs cancer care for all children in BC, regardless of the location the care is provided (at BCCH or in a local community).</p> <p>Performs all bone marrow aspirations & biopsies for BC Children, as required.</p> <p>Makes requests to T3-T5 to provide services for children with a definitive cancer diagnosis who have been assigned to an established treatment protocol.</p>

		Adult-Focused Cancer Service	Comprehensive Children's Cancer Service	Children's Regional Subspecialty Cancer Service	Children's Provincial Subspecialty Cancer Service
		T3	T4	T5	T6
2	Ongoing assessment & management	<p>Receives requests from T6 to provide cancer care to children on a case-by-case basis to facilitate care closer to home. Requests are for children with a definitive diagnosis who have been assigned to an established treatment protocol.</p> <p>Assesses and manages children with cancer using <i>established</i> treatment protocols & with direction & support from T6.</p> <p>Refers/consults with T6, as required.</p>	Same as T3.	<p>Receives requests from T6 to provide cancer care to children on a case-by-case basis to facilitate care closer to home. Requests are for children with a definitive diagnosis who have been assigned to an established treatment protocol.</p> <p>Assesses and manages children with cancer using <i>established</i> treatment protocols in collaboration with T6.</p>	<p>Assesses and manages children with cancer using <i>established</i> treatment protocols & protocols in various stages of <i>evaluation/research</i>.</p> <p>Provides direction & support to T3-T5, as required.</p>
3	Chemotherapy				
	a. Prescribing	<p>Prescribes chemotherapy agents based on assigned protocols & direction from T6.</p> <p>Refers dosage adjustments to T6.</p>	Same as T3.	<p>Prescribes chemotherapy agents based on assigned protocols & collaboration with T6.</p> <p>Adjusts dosages as required.</p>	<p>Assigns chemotherapy protocols for all children in BC with cancer. Directs/works collaboratively with T3-T5 centres to implement the protocols.</p> <p>Prescribes chemotherapy agents based on assigned protocols to children receiving care at T6.</p> <p>Adjusts dosages as required.</p>

	Adult-Focused Cancer Service	Comprehensive Children's Cancer Service	Children's Regional Subspecialty Cancer Service	Children's Provincial Subspecialty Cancer Service
	T3	T4	T5	T6
b. Administering & monitoring	<p>Administers intravenous (IV) chemotherapy agents on an <i>outpatient</i> basis in collaboration & at the direction of T6.</p> <p>Initiates selected chemotherapy agents on day 1 of a new cycle/phase in collaboration & at the direction of T6.</p> <p>Does not initiate chemotherapy for children with newly diagnosed or relapsed cancer.</p> <p>Follows established guidelines for (refer to Appendix 1):</p> <ul style="list-style-type: none"> Administering chemotherapy agents. Managing extravasation. Wearing personal protective equipment. Handling hazardous drug & accidental exposure/spills. <p>Monitors effects of chemotherapy agents.</p>	<p>Same as T3 plus:</p> <p>Administers a broader range of chemotherapy agents than at T3. Chemotherapy is administered on an <i>outpatient</i> basis & in collaboration & at the direction of T6.</p> <p>Initiates selected chemotherapy agents on day 1 of a new cycle/phase in collaboration & at the direction of T6.</p> <p>Does not initiate chemotherapy for children with newly diagnosed or relapsed cancer.</p>	<p>Same as T4 plus:</p> <p>Administers a broader range of <i>outpatient</i> chemotherapy agents than at T4. Chemotherapy is administered on an <i>outpatient</i> basis in collaboration with T6. Capacity is available for intrathecal chemotherapy administration.</p> <p>Pediatric oncologist is available on-site when selected high-risk IV and intrathecal chemotherapy agents are being administered.</p> <p>Initiates chemotherapy agents on day 1 of a new cycle/phase for agents appropriate to be administered at T5.</p> <p>Does not initiate chemotherapy for children with newly diagnosed or relapsed cancer.</p>	<p>In addition to chemotherapy agents administered at T5, administers:</p> <ul style="list-style-type: none"> Chemotherapy agents that require an <i>inpatient</i> stay. <i>High-risk &/or complex</i> IV and intrathecal chemotherapy agents on an <i>outpatient</i> basis. Intensive myelosuppressive chemotherapy (e.g., acute myeloid leukemia treatment; bone marrow preparation & transplants). Chemotherapy agents to children: <ul style="list-style-type: none"> Participating in phase II studies (evaluating efficacy). Receiving investigational new drugs (INDs). Participating in specified research studies. Receiving drugs administered under Health Canada's Special Access Program (SAP).³ While these drugs are usually administered at T6, T6 may, under certain circumstances, direct & support administration at T3-T5. <p>Chemotherapy agents include high intensity therapies that may cause immediate & significant toxicities &/or reactions (anaphylactic, seizures, cerebral edema).</p> <p>With a few exceptions (see T3-T5), administers initial (first cycle) courses for all children in BC with cancer (new & relapsed).</p> <p>Monitors effects of chemo/biotherapies.</p>

³ The Special Access Program (SAP) allows practitioners to request access to drugs that are unavailable for sale in Canada. This access is limited to patients with serious or life-threatening conditions or on a compassionate or emergency basis when conventional therapists have failed, are unsuitable or are unavailable.

		Adult-Focused Cancer Service	Comprehensive Children's Cancer Service	Children's Regional Subspecialty Cancer Service	Children's Provincial Subspecialty Cancer Service
		T3	T4	T5	T6
	c. Vascular access device initiation & management	<p>Performs care for <i>established</i> vascular access devices when providing chemotherapy (e.g., flushes, heparin lock, blood draws):</p> <ul style="list-style-type: none"> • Central venous catheters (CVCs) (see Appendix 1 for link to BCCH guideline). • Implanted ports. • Peripherally inserted central catheters (PICCs). 	<p>Same as T3 plus:</p> <p>Inserts & maintains Insuflon subcutaneous catheter devices (see Appendix 1 for link to BCCH guideline)</p>	Same as T4.	<p>Same as T5 plus:</p> <p>Arranges for insertion/creation & removal of vascular access devices for all children with cancer in BC (e.g., CVCs, implanted ports & PICCs). Procedures are performed on-site.</p>
4	Bone marrow transplantation (BMT)				<p>Provides pre, intra & post-BMT care: pre-BMT testing, specialist visits, arranges for inpatient bed, administers chemotherapy, arranges for radiotherapy, administers stem cells (allogeneic or autologous) & monitors post-BMT.</p> <p>If autologous transplant, collects stem cells using peripheral blood stem cell collection (cell separator machine) or bone marrow harvest procedure. Organizes growth factor injections & regular blood tests prior to procedure.</p> <p>If allogeneic transplant, prepares donor for collection of stem cells (cell separator machine). If adult, makes arrangements with Vancouver General Hospital for collection of stem cells.</p>

		Adult-Focused Cancer Service	Comprehensive Children's Cancer Service	Children's Regional Subspecialty Cancer Service	Children's Provincial Subspecialty Cancer Service
		T3	T4	T5	T6
5	Supportive care				
	a. Pain & symptom management	<p>In consultation with T6, provides <i>outpatient</i> care to children with <i>low complexity</i> pain & symptoms. May include the administration of weight-based doses of analgesics & symptom management medications.</p> <p>Refers children with more complex pain & symptom issues to T6.</p>	<p>Provides care to children with <i>moderate complexity</i> pain & symptoms:</p> <ul style="list-style-type: none"> Assesses pain & other symptoms using age & developmentally appropriate assessment tool(s). Provides age & developmental stage appropriate non-pharmacological pain & symptom relieving interventions. Administers weight-based doses of analgesics & symptom management medications. <p>If inpatient care is required, admits to on-site pediatric unit.</p> <p>Refers children with more complex pain & symptom issues to T6.</p>	<p>Same as T4 plus:</p> <p>Provides care to children with <i>relatively high complexity</i> pain & symptoms.</p> <p>Refers children to onsite pain & symptom management team, as required (for adults & children).</p>	<p>Same as T5 plus:</p> <p>Provides care to children with <i>high complexity</i> pain & symptoms.</p> <p>Refers children to onsite pain & symptom management team, as required (exclusively for).</p> <p>If inpatient care is required, admits to on-site pediatric oncology unit.</p>
	b. Management of disease/treatment related complications	<p>Provides initial care to stabilize children with disease/treatment related complications.</p> <p>Refers/transfers to T6 for ongoing care (e.g., fever & neutropenia).</p>	<p>Provides care for children with <i>low to moderate severity</i> disease/treatment related complications. Consults with & keeps T6 informed.</p> <p>Examples:</p> <ul style="list-style-type: none"> Fever & neutropenia (refer to Appendix 1) Nausea & vomiting (antiemetics) & Pentamidine administration) IV acyclovir administration for varicella zoster <p>If inpatient care is required, admits to on-site pediatric unit.</p>	<p>Same as T4.</p>	<p>Upon request, advises T3-T5 on the management of disease/treatment related complications.</p> <p>Provides care for children with <i>high severity</i> disease/treatment related complications. e.g., multi-organ toxicity.</p> <p>If inpatient care is required, admits to on-site pediatric oncology unit or Pediatric Intensive Care Unit (PICU).</p>

		Adult-Focused Cancer Service	Comprehensive Children's Cancer Service	Children's Regional Subspecialty Cancer Service	Children's Provincial Subspecialty Cancer Service
		T3	T4	T5	T6
	c. Psychosocial & spiritual support	Provides support to children/families with <i>routine</i> psychosocial/emotional needs (e.g., provides information about what to expect during treatment; tip sheets/picture books on helping children get through blood work/treatments). Consults with &/or refers children/families with <i>complex</i> psychosocial/emotional needs to T6 team.	Same as T3.	Same as T4 plus: Provides specialized counselling for children/families with <i>complex</i> psychosocial/emotional needs.	Same as T5 plus: Available by telephone to providers throughout the province for consultation on ways to support the psychosocial/emotional needs of children/families with cancer. Available by telephone or telehealth on a consultative basis to children/families from throughout BC (T3-T5) with cancer who have complex psychosocial/emotional needs.
	d. Nutritional support	Helps parents troubleshoot the care of a child's NG &/or G tube.	Same as T3 plus: • Inserts NG tubes.	Same as T4.	Same as T5 plus: • Establishes & replaces G tubes. • Establishes GJ tubes (in radiology). • Establishes NJ tubes (in radiology) • Provides TPN (inpatients only)
6	Surgical services				Arranges surgical interventions (diagnostic & therapeutic) with pediatric surgery subspecialty teams at BCCH. Includes insertion/creation & removal of venous access devices.
7	Radiation services				Arranges radiation therapy with radiotherapy service at BCCA.

		Adult-Focused Cancer Service	Comprehensive Children's Cancer Service	Children's Regional Subspecialty Cancer Service	Children's Provincial Subspecialty Cancer Service
		T3	T4	T5	T6
8	Palliative care/end-of-life (EOL) care	Refers children/families to T6 to develop plan for palliative/EOL care.	<p>Works with children/families & T6 to develop plan for palliative/EOL care. As appropriate, involves the team at Canuck Place (provincial pediatric palliative care program).</p> <p>Palliative/EOL care may be provided in/at:</p> <ul style="list-style-type: none"> • Hospital (BCCH or community hospital) • Hospice (Canuck Place) • Home <p>If the child/family decides to remain in their home community, a team/practitioner is identified who will take responsibility for the care of the child, with support from T6 (BCCH & Canuck Place). e.g., local palliative care team or pediatrician/general practitioner.</p>	Same as T4.	<p>Works with children/families & local providers to develop plan for palliative/EOL care. As appropriate, involves the team at Canuck Place (provincial pediatric palliative care program).</p> <p>Makes arrangements as per the identified plan.</p>
9	Long-term follow-up & transition		As directed by T6, provides follow-up care of children for 2 years post-completion of treatment (i.e., off-treatment). Arranges for tests/procedures, as required. Involves local providers, as required (e.g., pediatricians).	<p>In collaboration with T6, provides follow-up care of children for 2 years post-completion of treatment (i.e., off-treatment). Arranges for tests/procedures, as required (e.g., removal of central lines, discontinuation of Septra). Involves local providers, as required (e.g., pediatricians).</p> <p>Arranges long-term follow-up care with local pediatrician/GP/NP for children who are stable & off-treatment for ≥ 2 years. Available to local pediatrician/GP/NP as a resource.</p>	<p>Provides follow-up care &/or directs/collaborates with T4-T5 teams on the follow-up care of children for 2 years post-completion of treatment (off-treatment). Arranges for tests/procedures, as required (e.g., removal of central lines, discontinuation of Septra).</p> <p>Arranges long-term follow-up care for children who are stable & off-treatment for >2 years via:</p> <ul style="list-style-type: none"> • Outreach clinic (in-person or via telehealth) (e.g., Prince George, Kelowna & Kamloops); OR • Local pediatrician/GP/NP. Remains available as a resource.

		Adult-Focused Cancer Service	Comprehensive Children's Cancer Service	Children's Regional Subspecialty Cancer Service	Children's Provincial Subspecialty Cancer Service
		T3	T4	T5	T6
	Long-term follow-up & transition cont'd			At age 18 - 21 or after 5 years off-treatment (whichever is later), transitions children to appropriate adult service: GP, NP, adult BMT clinic or BCCA Late Effects, Assessment & Follow-Up (LEAF) Clinic.	At age 18 - 21 or after 5 years off-treatment (whichever is later), transitions children to appropriate adult service: GP, NP, adult BMT clinic or BCCA Late Effects, Assessment & Follow-Up (LEAF) Clinic.
10	Provincial resource				Provides children's cancer-related telephone consultation to providers throughout BC 24/7. Develops cancer-specific teaching materials for children & their families (e.g., symptom management, treatments, psychosocial supports, etc). Makes materials available to children/families & providers throughout the province.

3.1.3 Requirements

	Adult-Focused Cancer Service T3	Comprehensive Children's Cancer Service T4	Children's Regional Subspecialty Cancer Service T5	Children's Provincial Subspecialty Cancer Service T6
Providers				
Physicians / nurse practitioners (NPs)	<p><i>Outpatient clinic:</i></p> <ul style="list-style-type: none"> GP or NP who has completed BC Cancer Agency's GP in Oncology Training Program www.bccancer.bc.ca/health-professionals/networks/family-practice-oncology-network/general-practitioners-in-oncology-training-program). <p>Outside chemotherapy clinic times:</p> <ul style="list-style-type: none"> Clearly describable processes in place for children/families to: <ul style="list-style-type: none"> Receive a medical assessment & follow-up care for urgent issues. Receive answers to non-urgent questions. 	<p><i>Outpatient clinic:</i></p> <ul style="list-style-type: none"> Pediatrician experienced in chemotherapy available by telephone & to attend to child on-site if required. <p>Outside chemotherapy clinic times:</p> <ul style="list-style-type: none"> Same as T3. 	<p><i>Outpatient clinic:</i></p> <ul style="list-style-type: none"> Pediatric oncologist available on-site when specified high-risk IV and intrathecal chemotherapy is being administered. At other times, pediatric oncologist available by telephone & to attend to child on-site if required. <p>Outside chemotherapy clinic times:</p> <ul style="list-style-type: none"> Same as T3. 	<p><i>Inpatients & outpatient clinics:</i></p> <ul style="list-style-type: none"> Pediatric oncologist available on-site days, M-F. Pediatric oncologist on-call 24/7 & available on-site as needed. Available to take calls from patients/families receiving treatment at T6 & to providers throughout the province. Pediatric oncology fellow(s) &/or pediatric resident(s) doing a pediatric oncology rotation may also be available & perform functions assigned by pediatric oncologists. Radiation oncologist with paediatric expertise (at BCCA) available days M-F. Clinical associates (GPs, pediatricians & NPs) available days M-F. Full range of paediatric sub-specialists available 24/7 (e.g., intensivists, surgeons, pathologist, radiologist).

	Adult-Focused Cancer Service T3	Comprehensive Children's Cancer Service T4	Children's Regional Subspecialty Cancer Service T5	Children's Provincial Subspecialty Cancer Service T6
Nurses	<p><i>Outpatient clinic:</i></p> <ul style="list-style-type: none"> Adult oncology RN(s) certified in chemotherapy (www.bccancer.bc.ca/health-professionals/education-development/nursing/chemotherapy-certification-program) and central line care available during clinic hours. Familiar with nursing related procedures (see Appendix 1): <ul style="list-style-type: none"> Administering chemotherapy agents Managing extravasation. Wearing personal protective equipment. Handling hazardous drug & accidental exposure/spills. 	<p><i>Outpatient clinic:</i></p> <p>Initial competencies:</p> <ul style="list-style-type: none"> Chemotherapy-competent pediatric RN(s)⁴ certified in central line care available during clinic hours. To become chemotherapy-competent requires completion of: <ul style="list-style-type: none"> Advanced Oncology Workshop (2 days). Principles of chemo and research protocol (1 day). Clinical preceptorship & completion of checklist (2 days in BCCH oncology clinic). Written exam & achieve $\geq 80\%$. <p>Maintenance of competencies (annually):</p> <ul style="list-style-type: none"> Review www.pedsoncologyeducation.com; & Complete interactive case #4: www.pedsoncologyeducation.com/interactiveCasesLeukemia.asp Each RN is expected to do annual self-assessment based on the above stated competencies. <p>Nursing related procedures</p> <ul style="list-style-type: none"> Same as identified for T3. 	<p><i>Outpatient clinic:</i></p> <p>Same as T4 plus:</p> <ul style="list-style-type: none"> RN(s) is familiar with IT related nursing procedures (see Appendix 1). Pediatric nurse educator available to support general pediatric care. <p>Optional: Once chemotherapy-competent, RN(s) is encouraged to complete the Association of Pediatric Hematology/Oncology Nurses (APHON) Chemotherapy & Biotherapy provider course (22.5 hr in-person workshop offered annually at BCCH).</p>	<p><i>Inpatients:</i></p> <p>Pediatric oncology RNs available 24/7.</p> <p>Pediatric oncology RN requirements:</p> <p><u>0 – 3 months:</u> Completion of:</p> <ul style="list-style-type: none"> T6 pediatric nursing orientation (68 hrs) Unit orientation by Clinical Nurse Educator (CNE) (4 hrs) 12 x 12 hr "buddy" shifts Shadow shift with CNE Simulation validation day (4 hrs) At 3 months, prepare for probationary review with leader Certification in central line care <p><u>3 months:</u> Completion of:</p> <ul style="list-style-type: none"> Probationary review including review of foundational competencies & development of learning plan, as required <p><u>6 – 12 mos:</u> Completion of:</p> <ul style="list-style-type: none"> T6 advanced oncology workshop (15 hrs) APHON Chemotherapy & Biotherapy provider course (22.5 hrs) & exam. Validation of chemotherapy skills/competencies by CNE.

⁴ Refer to BCCH website for the requirements to become chemotherapy-competent: www.bcchildrens.ca/Oncology-Site/Documents/2018%20Chemotherapy%20Administration%20Competencies%20for%20Community%20Pediatric%20RNs.pdf.

	Adult-Focused Cancer Service T3	Comprehensive Children's Cancer Service T4	Children's Regional Subspecialty Cancer Service T5	Children's Provincial Subspecialty Cancer Service T6
Nurses cont'd				<p><u>12 – 24 mos:</u> Completion of : APHON Certification: T6 Bone Marrow Transplant (BMT)</p> <ul style="list-style-type: none"> • BMT course based on the APHON credentialing program (22.5 hrs) • Validation of BMT skills/competencies by CNE (2 x 8 hrs with child on Day 0 of bone marrow/stem cell transplant) <p><u>Annual Continuing Education</u></p> <ul style="list-style-type: none"> • Continuing Education Days (15h/year) <p><u>Every 3 years thereafter:</u></p> <ul style="list-style-type: none"> • APHON Chemotherapy Certification renewal <p><i>Outpatient clinic:</i></p> <p>Pediatric oncology RNs available during clinic hours, days M-F.</p> <p>Pediatric oncology RN requirements: Same as for T6 RN inpatient requirements.</p> <p><i>Shared (outpatients & inpatients):</i></p> <ul style="list-style-type: none"> • Pediatric oncology nurse clinician. • Pediatric oncology nurse educator. Educator has completed the APHON Pediatric Chemotherapy & Biotherapy Instructor Course. • Advanced practice nurse(s)/nurse practitioner(s). • Pediatric oncology long-term follow-up RN(s). • Research nurse coordinator. • Network coordinator.

	Adult-Focused Cancer Service	Comprehensive Children's Cancer Service	Children's Regional Subspecialty Cancer Service	Children's Provincial Subspecialty Cancer Service
	T3	T4	T5	T6
Allied health & other	<p>Access to T6 team by telephone on days, M-F, including:</p> <ul style="list-style-type: none"> Clinical pharmacist who specializes in pediatric oncology. Pediatric social worker. <p>Access to onsite T3 pharmacist with oncology knowledge, experience & skills (adult-focused oncology service).</p>	<p>Person(s) with general pediatric knowledge & skills is available on a limited, consultation basis to come to the clinic upon request to assess & treat specific children. May not be a consistent person.</p> <ul style="list-style-type: none"> Social worker. Dietitian. Physiotherapist (PT) or occupational therapist (OT). Pain management team (for adults & children). <p>Clinical pharmacist is available during clinics for telephone consultation & can attend on-site, if required. Pharmacist has oncology knowledge, experience & skills & has general pediatric knowledge.</p>	<p>Same as T4 plus:</p> <p>Person(s) with general pediatric knowledge & skills is available on a limited, consultation basis to come to the clinic upon request to assess & treat specific children. May not be a consistent person.</p> <ul style="list-style-type: none"> Pediatric psychologist. Child life specialist. <p>Clinical pharmacist regularly attends clinics.</p>	<p>Inpatients & outpatients:</p> <p>Consistent person(s) assigned & available on-site to participate in scheduled rounds/clinics & support inpatient care. Staff has "enhanced skills" in pediatric oncology.</p> <ul style="list-style-type: none"> Social worker. Dietitian. Clinical Pharmacy Specialist. Physiotherapist (PT). Occupational therapist (OT). Speech/language specialist. Psychologist. Respiratory therapist (RT). Child life specialist. <p>Additional oncology-specific resources:</p> <ul style="list-style-type: none"> Pediatric pain management team. Network medical consultant. Clinical research associates. Parent/patient advocate.

	Adult-Focused Cancer Service T3	Comprehensive Children's Cancer Service T4	Children's Regional Subspecialty Cancer Service T5	Children's Provincial Subspecialty Cancer Service T6
Facilities				
Ambulatory space	<p>Access to ambulatory clinic for assessments (may be used by adults & children).</p> <p>Access to day treatment area for procedures such as administration of chemotherapy agents, transfusion of blood & blood components, blood draws & IV antibiotics (may be used by adults & children).</p> <p>Ability to isolate a child if required.</p>	Same as T3.	<p>Pediatric-specific oncology ambulatory clinic.</p> <p>Pediatric-specific oncology day treatment area.</p>	<p>Same as T5 plus:</p> <p>Access to on-site cell separator unit (for autologous transplants & therapeutic apheresis).</p> <p>Access to stem cell collection services at Vancouver General Hospital (adult donors).</p>
Inpatient beds		<p>On-site pediatric inpatient unit to admit children with disease/treatment related complications/symptoms.</p> <p>Ability to isolate a child if required.</p>	Same as T4.	<p>On-site pediatric oncology inpatient unit to admit children with disease/treatment related complications/symptoms.</p> <p>Ability to isolate a child if required.</p> <p>Accommodation for parents & children to stay during treatment.</p>
Pediatric intensive care (PICU)			T5 PICU.	T6 PICU.
Pharmacy	<p>Meets National Association of Pharmacy Regulatory Authorities (NAPRA) Standards for Pharmacy Compounding of Hazardous Sterile Preparations (by May 2021): https://napra.ca/sites/default/files/2017-09/Mdl_Stnds_Pharmacy_Compounding_Hazardous_Sterile_Preparations_No_v2016_Revised_b.pdf</p>	Same as T3.	Same as T4.	Same as T5.

	Adult-Focused Cancer Service	Comprehensive Children's Cancer Service	Children's Regional Subspecialty Cancer Service	Children's Provincial Subspecialty Cancer Service
	T3	T4	T5	T6
Pharmacy cont'd	<p>NAPRA Standards include:</p> <ul style="list-style-type: none"> • Clean room & anteroom with defined pressure gradients. • Appropriately trained & sufficient numbers of Registered Pharmacists &/or Regulated Pharmacy Technicians to prepare required chemotherapy agents. 			
Medications	<p>Access to adjuvant & supportive care medications as required (also required for adult oncology service) in a formulation suitable to be administered to children.</p> <p>Storage of medications should follow the recommendations in the Institute for Safe Medication Practices (ISMP). www.ismp-canada.org/index.htm.</p> <p>Dedicated secure area/location recommended for storage of chemotherapy agents in (a) pharmacy and (b) medication room.</p>	Same as T3.	<p>Same as T4 plus:</p> <p>Clearly describable process in place between pharmacy & the administering unit to separate the handling/ administration of IT and other forms of chemotherapy.</p>	<p>Same as T5 plus:</p> <ul style="list-style-type: none"> • Phase II chemotherapy agents. • Investigational new drugs (INDs). <p>Obtains drugs administered under the special access program (SAP). While these drugs are usually administered at T6, T6 may, under certain circumstances, direct & support administration at T3-T5.</p>
Specialty services				Pediatric dialysis facilities.
Surgical suite				Dedicated pediatric surgical suite for diagnostic & therapeutic surgical procedures.
Radiotherapy				Access to radiotherapy services with paediatric expertise (BCCA).
Equipment	<ul style="list-style-type: none"> • Access to pediatric equipment such as IV infusion pumps, BP machine with age appropriate cuffs and thermometer (oral/axilla/temporal options). • Access to pediatric resuscitation equipment (e.g., oxygen, suction, ambu bag, crash cart, pediatric drugs). • Hazardous & biohazardous disposal equipment available in clinic (also required for adult oncology service). 	Same as T3.	Same as T4.	Same as T5.

	Adult-Focused Cancer Service T3	Comprehensive Children's Cancer Service T4	Children's Regional Subspecialty Cancer Service T5	Children's Provincial Subspecialty Cancer Service T6
Minimum service volumes	Service volumes sufficient for MDs & RNs to maintain competence in chemotherapy.	<p>No minimum number of new outpatient clinic patients, visits or chemo administrations required (volumes are dependent on home residence of new & active cases).</p> <p>Individual RNs are required to complete an annual self-assessment - refer to: www.bcchildrens.ca/Oncology-Site/Documents/2018%20Chemotherapy%20Administration%20Competencies%20for%20Community%20Pediatric%20RNs.pdf</p>	<p>Same as T4 PLUS:</p> <p>Minimum outpatients volumes:⁵</p> <ul style="list-style-type: none"> • New patients/yr (new diagnoses): 15 • Visits/yr: 600 • Chemo drugs administered/yr: 500 	<p>Inpatients: Competencies are acquired & maintained through practicing a dedicated pediatric oncology unit.</p> <p>Minimum outpatients volumes:</p> <ul style="list-style-type: none"> • New patients/yr (new diagnoses): 100 • Visits/yr: 6,500

⁵ If a facility meets all responsibilities and requirements for T5 EXCEPT the minimum volumes in a given year, suggestions to mitigate the insufficient volume include: (1) working with T6 to create opportunities to gain clinical exposure at T6 to maintain knowledge & skills; (2) participating in enhanced continuing education programs, including simulation learning. Systems are in place to review regularly review oncological outcomes (refer to section 3.3).

Table 2: Specialist/Subspecialist Physician Interdependencies

✓24/7 = Available for on-site consultation as needed.

✓ M-F days = Available for on-site consultation days M-F (T5: minimum of 46 weeks/year).

Service	Availability		
	T4	T5	T6
Pediatrician	✓24/7	✓ Pediatrician or designate <u>on-site</u> ; excludes ED MD	✓ Pediatrician or designate <u>on-site</u> 24/7; excludes ED MD
Pediatric allergy			✓ M-F days
Anesthesiologist that provides care to children & adults	✓24/7		
Pediatric anesthesiologist		✓24/7	✓24/7
Pediatric biochemical/metabolic diseases			✓24/7
Pediatric cardiology		✓ M-F days	✓24/7
Pediatric critical care medicine		T5 PICU	T6 PICU
Pediatric dermatology			✓ M-F days
Developmental pediatrics/child development & rehab			✓ 24/7
Pediatric emergency medicine			✓24/7
Pediatric endocrinology			✓24/7
Pediatric gastroenterology			✓24/7
Surgeon that provides care to adults & children			
Pediatric general & subspecialty surgeons			✓ 24/7
Pediatric hematology/oncology		✓ M-F days	✓24/7
Pediatric immunology			✓24/7
Infectious diseases physician or infection control practitioner that provides consultation regarding children & adults	✓Telephone consultation available within HA 24/7	✓Telephone consultation available within HA 24/7	
Pediatric infectious diseases			✓24/7
Medical genetics			✓ M-F days
Neonatology			T4 NICU
Pediatric nephrology			✓24/7
Pediatric neurology		✓ M-F days	✓24/7
Pediatric radiation therapy			✓ M-F days (off-site access)
Child & adolescent psychiatrist		✓ M-F days	✓24/7
General psychiatrist	✓24/7	✓ Supplements child & adolescent psychiatrist availability to complete 24/7 coverage	
Pediatric radiologist		Diagnostics: ✓ M-F days	Diagnostics: ✓24/7 Interventional: M-F days

Service	Availability		
	T4	T5	T6
Radiologist that provides care to children & adults	✓ Diagnostics: 24/7 Interventional (older children): M-F days	✓ Diagnostics: Supplements pediatric radiologist availability to complete 24/7 coverage Interventional (older children): M-F days	
Pediatric radiologist + pediatric interventional radiologist			✓ 24/7
Pediatric respiratory medicine			✓ 24/7
Pediatric rheumatology			✓ 24/7
Pediatric urology			✓ 24/7

Note 1: Alternatively may have a clearly describable referral process to a nearby child protection medical specialist at T4, T5, or T6 site (within 1 hour driving distance)

Pediatric subspecialty trained physicians are:

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

3.2 Knowledge Sharing & Transfer/Training

	Adult-Focused Cancer Service T3	Comprehensive Children's Cancer Service T4	Children's Regional Subspecialty Cancer Service T5	Children's Provincial Subspecialty Cancer Service T6
Student learning				
Medical students, residents & fellows	No formalized student teaching responsibility for pediatric oncology care.	No formalized student teaching responsibility for pediatric oncology care. May offer opportunities which provide exposure for Royal College of Physicians and Surgeons of Canada (RCPS) pediatric specialty residents, medical students or other health care students to pediatric oncology.	Receives RCPSC pediatric oncology subspecialty residents from T6 centre & offers rotations under the supervision of a pediatric oncologist. Creates opportunities to expose RCPS pediatric specialty residents, undergrad med students & other health care students to inpatient & outpatient pediatric oncology care.	Develops overarching model and is responsible for training RCPSC pediatric oncology subspecialty residents/fellows in BC. T6 centre offers most of the subspecialty training for BC residents/fellows. Leads the training for the pediatric specialty oncology component of the RCPSC pediatric specialty residency program. Leads the training for the pediatric component of the radiotherapy residency specialty program. Creates opportunities to expose undergrad med students & other undergraduate and graduate health care students to inpatient & outpatient pediatric oncology care.
Nursing, allied health & other undergraduate, graduate & post-graduate students	No formalized student teaching responsibility for pediatric oncology care.	No formalized student teaching responsibility for pediatric oncology care.	Specific pediatric oncology outpatient experiences/placements may be available & are negotiated between the site & applicable learning institution.	Provides pediatric oncology experiences/placements for a broad range of undergraduate, graduate & post-graduate students. Specific experiences are negotiated between the site & applicable learning institution.
Continuing education				
Physicians	Facilitates access to learning activities that support the maintenance of physician/NP competencies in chemotherapy & oncology care as identified by BC Cancer Agency.	Mechanisms in place to regularly review physician education needs related to maintenance of pediatric oncology competencies. Facilitates physician access to learning activities based on	Same as T4.	Organizes provincial learning activities that support the maintenance of physician competencies in pediatric oncology care. Provides pediatric oncology clinical experiences for T4-T5 physicians (on-site &/or via simulation) upon request.

	Adult-Focused Cancer Service	Comprehensive Children's Cancer Service	Children's Regional Subspecialty Cancer Service	Children's Provincial Subspecialty Cancer Service
	T3	T4	T5	T6
		identified practice gaps, including the practice of critical clinical skills where limited opportunity exists in practice (e.g., simulation, clinical experience with T6 service).		Participates in the annual BCCA and/or UBC CME oncology conferences.
Nurses, allied health & other care providers	Facilitates access to learning activities that support the maintenance of physician/NP competencies in chemotherapy & oncology care as identified by BC Cancer Agency.	<p>Provides general pediatric education, including IV and central care.</p> <p>Mechanisms in place to regularly review staff education needs related to maintenance of pediatric oncology competencies as identified by T6.</p> <p>Facilitates access to learning activities that support the maintenance of staff competencies in pediatric oncology e.g., on-line access to guidelines/reference materials/ continuing education courses, practice of critical clinical skills where limited opportunity exists in practice (e.g., simulation, off-site clinical experiences).</p>	Same as T4.	<p>Same as T5 plus:</p> <ul style="list-style-type: none"> Establishes provincial standards for initial & maintenance of oncological skills at each tier of service. Creates educational programs & mechanisms for delivery across the province to support the educational standards. Provides educational opportunities (theory & practical experience) for staff in T3-T5 centres.

3.3 Quality Improvement & Research

	Adult-Focused Cancer Service	Comprehensive Children's Cancer Service	Children's Regional Subspecialty Cancer Service	Children's Provincial Subspecialty Cancer Service
	T3	T4	T5	T6
Quality improvement (QI)				
Structures & processes	<p>Regularly reviews the quality of cancer care provided, including case reviews. If child involved, physicians & staff with child health expertise participate in the review, as appropriate.</p> <p>Implements recommendations & evaluates the outcomes.</p>	<p>Same as T3 plus:</p> <p>Supports staff to provide care according to provincial pediatric standards for chemotherapy & oncological care.</p>	<p>HA QI structures & processes are in place to specifically review & improve the quality & safety of <i>children's cancer care</i>, including case reviews.</p> <p>Implements recommendations & evaluates the outcomes.</p>	<p>Same as t5 plus:</p> <p>Provides subspecialty child health expertise for T1-T5 case reviews, if requested.</p>
Quality indicators		<p>Contributes relevant data on provincial pediatric quality oncology indicators.</p> <p>Participates in provincial pediatric oncology improvement initiatives.</p>	<p>Same as Tier 4 plus:</p> <p>In collaboration with T6, establishes structures & processes to track provincial pediatric oncology quality indicators.</p>	<p>Develops a provincial approach to evaluation / quality improvement of pediatric cancer care.</p> <p>In collaboration with T5, establishes structures & processes to track provincial pediatric oncology quality indicators.</p> <p>Contributes relevant data on provincial quality indicators.</p> <p>Leads provincial pediatric oncology improvement initiatives.</p>
Child/family feedback		<p>Organizational mechanisms in place to obtain child/family feedback on the services provided. Incorporates feedback, as appropriate.</p>	<p>Same as T4.</p>	<p>Same as T5.</p>
System supports		<p>System supports are in place to enable health care providers to provide care that is consistent with current pediatric oncology guidelines.</p>	<p>Same as T4.</p>	<p>Same as T5 plus:</p> <p>In collaboration with CHBC & HAs, develops & disseminates guidelines on relevant pediatric oncology topics.</p>

	Adult-Focused Cancer Service T3	Comprehensive Children's Cancer Service T4	Children's Regional Subspecialty Cancer Service T5	Children's Provincial Subspecialty Cancer Service T6
Recruitment of subspecialists			Recruits pediatric oncologists in accordance with the provincial recruitment plan in consultation with T6.	Develops provincial plan for recruitment of pediatric oncologists, in collaboration with UBC, CHBC and local HAs.
Research				
Participation in research			Participates in pediatric cancer care research.	Conducts & supports others to conduct paediatric oncological research (individual MDs or staff or as part of COG studies).
Research networks				<ul style="list-style-type: none"> Member of national and international pediatric oncology research/quality improvement groups/networks (e.g., C¹⁷ Council; Child Oncology Group (COG)) Participates in C17 Council, COG and other protocols & research.

4.0 References

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Appendix 1: Relevant BCCH Guidelines

Links provided from ePOPS (electronic Policies, order sets, procedures and standards). ePOPs is the website for BC Children’s and Women’s clinical support documents (<http://policyandorders.cw.bc.ca>) .

Chemotherapy Administration

Chemotherapy/ Biotherapy Medication administration	http://policyandorders.cw.bc.ca/resource-gallery/Documents/Pharmacy,%20Therapeutics%20and%20Nutrition/Cytotoxic%20Chemotherapy%20and%20Biotherapy%20Administration.pdf
Completing chemotherapy checklist	http://policyandorders.cw.bc.ca/resource-gallery/Documents/Pharmacy,%20Therapeutics%20and%20Nutrition/Completing%20the%20Chemotherapy%20Checklist.pdf
Direct IV (Bolus) Chemo/Biotherapy Administration	http://policyandorders.cw.bc.ca/resource-gallery/Documents/BC%20Children's%20Hospital/CM.05.06%20Intravenous%20Chemotherapy%20Biotherapy%20Direct%20IV%20(Bolus)%20Administration.pdf
Hazardous Drugs: Handling Precautions	http://policyandorders.cw.bc.ca/resource-gallery/Documents/Pharmacy,%20Therapeutics%20and%20Nutrition/Prevention%20and%20Management%20of%20Infiltration%20and%20Extravasation.pdf
Personal Protective Equipment	http://policyandorders.cw.bc.ca/resource-gallery/Documents/Infection%20Control/IC.03.05_Personal_Protective_Equipment%20Revised%20FINAL%20November%202016.pdf
Hazardous / Cytotoxic Drug and Body Fluid Spill	http://2pod.phsa.ca/quality-safety/safety/exposure-prevention/Documents/cytotoxic-drug-body-spill-procedure-patient-care-areas.pdf?Web=1
Extravasation: prevention & management	http://policyandorders.cw.bc.ca/resource-gallery/Documents/Pharmacy,%20Therapeutics%20and%20Nutrition/Prevention%20and%20Management%20of%20Infiltration%20and%20Extravasation.pdf
Extravasation: assessment of versus other reactions	http://policyandorders.cw.bc.ca/resource-gallery/Documents/BC%20Children's%20Hospital/CV.01.16.A%20Appendix%20A%20Assessment%20of%20Extravasation%20Versus%20Other%20Reactions.pdf
Extravasation: flow sheet	http://policyandorders.cw.bc.ca/resource-gallery/Documents/Pharmacy,%20Therapeutics%20and%20Nutrition/Extravasation%20Flowsheet.pdf
Intrathecal chemo administration	http://policyandorders.cw.bc.ca/resource-gallery/Documents/Pharmacy,%20Therapeutics%20and%20Nutrition/Intrathecal%20Chemotherapy%20Administration.pdf http://policyandorders.cw.bc.ca/resource-gallery/Documents/BC%20Children's%20Hospital/CM.05.10%20Intrathecal%20Chemotherapy%20Administration.pdf

Supportive Care

Central Venous Line (CVL) dressing change	http://policyandorders.cw.bc.ca/resource-gallery/Documents/BC%20Children's%20Hospital/CV.03.15%20Central%20Venous%20Line%20(CVL)%20Dressing%20Change%20Cuffed%20Central%20Venous%20Catheter%20(CCVC),%20Cuffed%20Peripherally%20Inserted%20Cen.pdf
Changing the Needleless Connector on CVL's	http://policyandorders.cw.bc.ca/resource-gallery/Documents/BC%20Children's%20Hospital/CV.01.07%20Changing%20the%20Needleless%20Connector%20on%20Peripheral%20and%20Central%20Venous%20Lines.pdf
CVL- Blood Sampling- Vacutainer method	http://policyandorders.cw.bc.ca/resource-gallery/Documents/BC%20Children's%20Hospital/CV.03.05%20Blood%20Sampling%20from%20Central%20Venous%20Lines%20using%20Vacutainer%20Method.pdf
CVL Blood Sampling- Syringe method	http://policyandorders.cw.bc.ca/resource-gallery/Documents/BC%20Children's%20Hospital/CV.03.06%20Blood%20Sampling%20from%20Central%20Venous%20Lines%20using%20Syringe%20Method.pdf
Heparin Locking (CVL's)	http://policyandorders.cw.bc.ca/resource-gallery/Documents/Pharmacy,%20Therapeutics%20and%20Nutrition/Heparin%20Locking%20Central%20Venous%20Lines%20(CVLs).pdf
Insuflon insertion, medication admin, & removal	http://policyandorders.cw.bc.ca/resource-gallery/Documents/Pharmacy,%20Therapeutics%20and%20Nutrition/Indwelling%20Subcutaneous%20Catheter%20(Insuflon)%20Insertion%20Medication%20Administration%20and%20Removal.pdf
Insertion of NG tube	http://policyandorders.cw.bc.ca/resource-gallery/Documents/BC%20Children's%20Hospital/CC.12.15%20Nasogastric%20Tube%20Insertion.pdf
Confirming placement of NG tube	http://policyandorders.cw.bc.ca/resource-gallery/Documents/BC%20Children's%20Hospital/CC.12.15.A%20Confirming%20Nasogastric%20Tube%20Placement.pdf

BCCH Clinical Pathway: Fever +/- Neutropenia is a Medical Emergency
www.bcchildrens.ca/Oncology-Site/Documents/FeverandNeutropenia.pdf

Definition:

- Fever - Oral temperature >38.5°C (or >38°C x 2 readings taken 1 hour apart)
- Neutropenia- ANC 0.5 x 10⁹/L

Triage:

- Consider the following recommendations for empiric antibiotic use (CAVEAT: Individual Hospital Infection Control Policy may dictate other treatment based on the local hospital antibiotic sensitivity profile):
- The treating pediatric oncologist (after hours, the oncologist on call) should be notified when a child on active anticancer therapy develops a fever and neutropenia.
- Please notify BC Children's Hospital:
 - Weekdays (8am-4pm) Oncology clinic 604-875-2345 ext 7079
 - Afterhours, weekends and stat holidays: Oncologist on call 604-875-2161