CHILDREN'S DIABETES SERVICES

Approved: July 2018
Minor Update: July 2020

childhealthbc.ca

CHILD HEALTH BC

LEAD BENEFACTOR

save on foods

Children's Diabetes Tiers of Service

Contents

1.0 Diabetes: Rates of Incidence, Prevalence & Adherence to Guidelines

In the 9-year period between 1998/99 and 2006/17, there were, on average, 1,948 children less than 20 years old living with diabetes. There were, on average, 304 new cases per year. See Table 1.

Table 1: BC Prevalence & Incidence Statistics, Children <20 Years Old

Diabetes	BC Prevalence (1998/99 to 2006/07 average)	BC Incidence (1998/99 to 2006/07 average)
Type 1	1,800	260 new cases per year
Type 2	148	44 new cases per year

Source: Kruger, H and Amed, S, 2010.

Adherence to guidelines

A study of BC children diagnosed with Type 1 diabetes over a 7-year period (Amed et al, 2013) reported:

- Mean age at diagnosis of type 1 diabetes was 10.2 years (study included 1,472 children representing 5,883 person years under age 20 at the time of their diabetes diagnosis).
- 39% of person-years had good adherence[1] to guidelines (7% had optimal and 32% had good adherence). 61% did not have good adherence (7% had minimal[2] and 54% had poor[3] adherence).
- The proportion of person-years at goal (optimal of good adherence) was:
  - higher in females than males (41% vs 37.6%)
  - higher in younger children than older children (~42% in children up to age 14 and 28% in children 15 - 19 years).
  - higher in children whose diabetes care was provided by a specialist or in a shared specialist/GP model (54% each) than by a GP only (28%).
- No difference was found in the proportion of person-years at goal among individuals with and without an MSP subsidy.
- While there was a decreasing trend in proportion at goal as distance from BC Children's Hospital (BCCH) increased, this trend was not statistically significant.
- Individuals 4-years post-diagnosis were 78% less likely to be at goal compared with the year of diagnosis (52% at goal in the year of diagnosis vs 20% 4 years post-diagnosis). For every yearly increase in the age at diagnosis, the odds of being at goal decreased by 3.5%.

Refer to Appendix 1 for a list and caseloads of BC Diabetes Centres which serve children.

2.0 Primary Care Diabetes Providers

Table 2: Primary Care Providers in BC

Provider	Number in BC
Nurse Practitioners	300 Provide care to adults, children & families (none provide diabetes care within an interdisciplinary diabetes centre)
Family MDs	5,675 Provide care to children with diabetes (only a small proportion provide diabetes care within an interdisciplinary diabetes centre)
General pediatricians	175 Provide care to children with diabetes 20 - 30 provide diabetes care within an interdisciplinary diabetes centre (~11 clinics have pediatricians x 2 pediatricians per clinic).
Pediatric endocrinologists	12 7 at BCCH (5/7 provide diabetes care), 1 in North Shore/Victoria/Nanaimo (via outreach), 1 in North Shore/Campbell River/Port Moody/Terrace (via outreach) & 3 in Fraser Health

[1] Defined as optimal or good adherence to guidelines. Optimal adherence = 3 diabetes-related MD visits/yr, 3 hemoglobin A1c (HbA1c) tests/yr, 1 glucagon prescription dispensed/yr and appropriate screening for diabetes-related co-morbidities and complications). Good adherence = 2 diabetes-related physician visits/yr, 2 HbA1c tests/yr and appropriate screening for diabetes-related co-morbidities and complications).

[2] Minimal adherence = 2 MSP diabetes-related MD visits/yr and 2 HbA1c tests/yr.

[3] Poor adherence = <2 MSP diabetes-related MD visits/yr or 2 HbA1c tests/yr.

3.0 Scope of Module

Includes:

- Outpatient services (hospital or community-based) that provide diabetes care to children up to and including the point of transition to adult diabetes services.
- Inpatient diabetes services.

Excludes:

- General medical care provided to children in hospital or as outpatients that is not specific to diabetes. Refer to the medicine module for care that is not specific to diabetes.
- Diabetes care to children in emergency departments. Refer to emergency department module.

4.0 Recognition of the Tiers & Establishment of a Diabetes Network

This Diabetes Tiers of Service module recognizes 5 of the 6 tiers of service: T1 (outpatient only), T3 (inpatient only) T4, T5 and T6.

Tier	Generic Description	Diabetes Tiers Description
1	Prevention, Primary & Emergent Health Service	Prevention, Primary & Emergent Diabetes Service
2	General Health Service	
3	Child-Focused Health Service	Child-Focused Diabetes Service
4	Children's Designated Health Service	Children's Comprehensive Diabetes Service
5	Children's Regional Subspecialty Health Service	Children's Regional Diabetes Subspecialty Service
6	Children's Provincial Subspecialty Health Service	Children's Provincial Diabetes Subspecialty Service

Notes about the Diabetes Tiers of Service:

- The Tiers of Service document defines a future (not current) state model and is intended to support future planning of diabetes services for children in BC.
- The responsibilities and requirements at each tier are summative.
- The tier identified represents the highest tier of diabetes service which is available at that site.
- Service levels provided by a given team are expected to align with the service needs of children living in the team's geographic area of focus. For example, a T6 diabetes team (BC Children's Hospital) is expected to provide T4, T5 and T6 services. T4 services are required for children living in Vancouver, T5 services for children living in the Vancouver Coastal geographic area and T6 services for children living throughout the province.

Diabetes Tiers of Service provides a common language and methodology to describe the responsibilities and requirements at each tier. This common language will facilitate the establishment of a diabetes network. The goal of the network will be to build a strong provincial system of diabetes care and to reduce variation in services available to children with diabetes and their families. It will also strengthen the consistency and continuity of care across the province.

5.0 Development of Module

National/international standards/guidelines were considered in designing the Diabetes Tiers of Service and in identifying the responsibilities and requirements at each tier to provide a **safe, sustainable** and **appropriate** level of service. Refer to Appendix 2 for a summary of the standards/guidelines relevant to the organization/delivery of diabetes care to children. A jurisdictional review and environmental scan of BC Diabetes Centres also contributed to the development of this module and is available under a separate cover.

This module is organized into the following sections:

4.1 Clinical Services
- 4.1.1 Outpatient Services: Service reach & description; responsibilities; requirements
- 4.1.2 Inpatient Services: Service reach & description; responsibilities; requirements

4.2 Knowledge Sharing & Transfer/Training

4.3 Quality Improvement & Research

6.0 Tiers of Children's Diabetes Services

6.1 Clinical Services

6.1.1 Outpatient Services

6.1.1.1 Service Reach & Description

	Prevention, Primary & Emergent Diabetes Service	Children's Comprehensive Diabetes Service	Children's Regional Diabetes Subspecialty Service	Children's Provincial Diabetes Subspecialty Service
	T1	**T4**	**T5**	**T6**
Service reach	Local community.	Multiple local health areas/health service delivery area (HSDA).	Health authority.	Province.
Service description	Diabetes care provided by a local care provider. e.g., family physician, pediatrician or nurse practitioner. Diabetes care may also be provided by nurses & other providers when the expectation aligns with their scope of practice. Diabetes care provided by a T1 provider(s) is directed and supported by a T4/T5/T6 diabetes team. A T1 provider is most likely utilized in geographic areas where it is unrealistic for children/families to travel to a T4/T5/T6 diabetes team 4 times per year.	Diabetes care provided by an interdisciplinary diabetes team. The practice of individual team members may include both adults and children (exception: pediatrician). The pediatric caseload of a T4 diabetes team focuses primarily on children who have few or no medical complications & their families (psychosocial issues may be present). For reasons of geographic proximity, children who have significant medical complications may be managed by a T4 team in consultation & with the support of a T5/T6 team.	Diabetes care provided by an interdisciplinary *pediatric* diabetes team. The practice of individual team members is exclusively or predominantly with children. The caseload of a T5 diabetes team focuses on children who have significant medical complications & their families (psychosocial &/or significant psychiatric issues which impact their diabetes management may be present). For reasons of geographic proximity, some children may be managed in conjunction with a T1 provider or T4 diabetes team. In these cases, the T5 team provides the overall direction for care. For reasons of geographic proximity, children who have multiple, significant medical complications may be managed by a T5 team in consultation & with the support of a T6 team.	Diabetes care provided by an interdisciplinary *pediatric* diabetes team. The practice of individual team members is exclusively with children. The caseload of a T6 team focuses on children who have multiple, significant medical complications & their families (psychosocial &/or significant psychiatric issues which impact their diabetes management may be present). Multiple pediatric subspecialty teams are usually involved. For reasons of geographic proximity, some children may be managed in conjunction with a T1 provider or T4/T5 diabetes team. In these cases, the T6 team provides the overall direction for care.

6.1.1.2 Responsibilities

	Prevention, Primary & Emergent Diabetes Service	Children's Comprehensive Diabetes Service	Children's Regional Diabetes Subspecialty Service	Children's Provincial Diabetes Subspecialty Service
	T1	**T4**	**T5**	**T6**
Initial assessment	Conducts initial assessment of children who have Type 1 and Type 2 diabetes. Refers children to T4/T5/T6 diabetes team for initial education & management.	Conducts interdisciplinary assessments in children with Type 1 and Type 2 diabetes who have few or no medical complications. Medical complications, if present, can be managed locally. For children with significant medical complications &/or significant psychiatric issues which impact their diabetes management, consults with &/or refers to T5/T6 diabetes team.	Conducts interdisciplinary assessments in children with Type 1 & Type 2 diabetes who have significant medical complications &/or psychiatric issues which impact their diabetes management. Examples include children with: • Insulin resistance syndromes • Morbid obesity associated with type 2 diabetes. • Very high Hgb A1C (>9%). • Lipid abnormalities. • Microalbuminuria. • Eating disorders. For children with multiple, significant medical complications &/or psychiatric issues who require the ongoing involvement of multiple pediatric subspecialty teams, consults with &/or refers to T6 diabetes team. e.g., children with diabetes caused by or associated with a chronic disease such as cystic fibrosis or high dose steroid use or an unrelated complex chronic disease such as cardiopathy.	Conducts interdisciplinary assessments in children with Type 1 & Type 2 diabetes who have multiple, significant medical complications &/or psychiatric issues which impact their diabetes management. These children usually require the involvement of multiple pediatric subspecialty teams (e.g., neonatal diabetes, survivors of childhood cancers, etc).

	Prevention, Primary & Emergent Diabetes Service	Children's Comprehensive Diabetes Service	Children's Regional Diabetes Subspecialty Service	Children's Provincial Diabetes Subspecialty Service
	T1	**T4**	**T5**	**T6**
Initial education & management		Provides initial education & treatment to children newly diagnosed with Type 1 and Type 2 diabetes who have few or no complications & their families. Consults with &/or refers children with significant medical complications &/or significant psychiatric issues impacting their diabetes management to T5/T6 for initial education & treatment. Provides education & treatment according to current guidelines.[4] Typically includes: • Medical management: injectable & oral medications. • Nutrition management. • Promoting regular physical activity. • Teaching stress reduction strategies. • Teaching healthy weight strategies (particularly for Type 2 diabetes). • Teaching & supporting self/family management of diabetes (e.g., travel, sick day management, management of special life events, etc). Initial education & treatment for medically stable children is available in an outpatient setting.	Provides initial education & treatment to children newly diagnosed with Type 1 and Type 2 diabetes who have significant medical complications &/or psychiatric issues impacting their diabetes management & their families. Consults with &/or refers children with multiple, significant complications to T6 for initial education & treatment. Provides consultation to T1 providers & T4 diabetes teams in the treatment of children with significant medical complications &/or psychiatric issues which impact their diabetes management. Education & treatment are provided according to current guidelines (as per T4).[4] Initial education & treatment for medically stable children is available in an outpatient setting.	Provides initial education & treatment to children newly diagnosed with Type 1 and Type 2 diabetes who have multiple, significant medical complications &/or psychiatric issues impacting their diabetes management & their families. Coordinates care with other co-located pediatric subspecialty teams, as required. Provides consultation to T1 providers & T4/T5 diabetes teams in the treatment of children with multiple, significant medical complications &/or psychiatric issues impacting their diabetes management. Education & treatment are provided according to current guidelines (as per T4).[4] Initial education & treatment for medically stable children is available in an outpatient setting.

[4] Canadian Diabetes Association Clinical Practice Guidelines at: http://guidelines.diabetes.ca; International Society for Pediatric and Adolescent Diabetes, 2014 Consensus Guidelines. http://web.ispad.org/.

	Prevention, Primary & Emergent Diabetes Service	Children's Comprehensive Diabetes Service	Children's Regional Diabetes Subspecialty Service	Children's Provincial Diabetes Subspecialty Service
	T1	**T4**	**T5**	**T6**
Ongoing assessment, education & management	In collaboration with the T4/T5/T6 team, provides ongoing monitoring for children with Type 1 and Type 2 diabetes in between visits to the child's T4/T5/T6 team. Consults with and communicates changes to the child's T4/T5/T6 team.	Develops plan for ongoing monitoring. Where appropriate, works collaboratively with T1 providers in the child's local community to develop the plan. Plan describes the care requirements, schedule of visits & roles of the diabetes care team vs local care provider. Provides education & manages children starting on insulin pumps. Familiar with insulin pumps & can interpret blood glucose results & make insulin adjustments. Manages related medical care. See Appendix 3 for specific knowledge and skill requirements. Provides education & manages children on continuous blood glucose (CBG) monitors. Familiar with blood glucose monitors & utilizes results to make insulin adjustments. Manages related medical care. See Appendix 3 for specific knowledge and skill requirements. Screens for co-morbidities and diabetes-related complications. Refers to appropriate personnel/resources. Clinics work with children/parents to make changes in the treatment plan (e.g., insulin adjustments, carbohydrate ratios, etc). Clinics simultaneously communicate to Nursing Support Services when there is a significant change to the treatment plan (e.g. MDI to pump, conventional to MDI) or at minimum annually. In a timely way, Nursing Support Services, in partnership with children/parents/guardians, updates the child's care plan at school & coordinate the required changes. Provides regular updates (i.e., after each visit & inpatient admission) on the status of the child's diabetes & treatment plan to the child's T1 diabetes care provider (if applicable). If no T1 provider, updates the primary care provider.	Same as T4 plus: Manages co-morbidities and diabetes-related complications. Refers to other pediatric subspecialists as required (subspecialists may be co-located or at T6).	Same as T5 plus: Manages co-morbidities and diabetes-related complications in children with diabetes who require the involvement of multiple pediatric subspecialty teams.

	Prevention, Primary & Emergent Diabetes Service	Children's Comprehensive Diabetes Service	Children's Regional Diabetes Subspecialty Service	Children's Provincial Diabetes Subspecialty Service
	T1	T4	T5	T6
Nutrition counselling		Conducts initial nutrition assessment & develops nutrition treatment plan. Updates initial assessment & treatment plan annually & more often, if required. Provides nutrition education to children with Type 1 and Type 2 diabetes & their families. Education is age-specific & supports healthy eating patterns & feeding relationships. Provides practical tips for meal planning & carbohydrate counting to children & their families. Provides information about community-based nutrition resources, including culturally relevant resources. Monitors growth & development.	Same functions as T4 but children may have increased nutritional &/or medical complexities (e.g., eating disorder, celiac, nutrient deficiency).	Same as T5 but nutrition care planning may involve multiple pediatric subspecialty teams (e.g., complex feeding disorders).
Psychosocial support		Conducts initial psychosocial assessment of children & their families. Reviews status at each contact. Supports children & their families in adjusting to their diagnosis & changes in lifestyle & impacts on family & close relationships that result from the diagnosis. Facilitates development of positive coping strategies. Provides logistical support to children and their families in areas such as funding of equipment & travel, completion of forms, appropriate housing, etc. Considers socioeconomic status & local supports, as able. Provides time-limited 1:1 counselling for children & their families in acute emotional distress. Refers children/families to specialized mental health resources (e.g., local mental health team), if required.	Same as T4 plus: Provides time-limited 1:1 consultation for complicated psychological situations which impact the management of their diabetes (e.g., anxiety, depression).	Same as T5 plus: Provides time-limited 1:1 consultation for very complicated psychological situations which impact the management of their diabetes. Often involves multiple pediatric subspecialty teams.

	Prevention, Primary & Emergent Diabetes Service	Children's Comprehensive Diabetes Service	Children's Regional Diabetes Subspecialty Service	Children's Provincial Diabetes Subspecialty Service
	T1	**T4**	**T5**	**T6**
Psychosocial support cont'd		Encourages the utilization of community-based resources to provide psychosocial/mental health support to children who have diabetes & their families. Builds capacity amongst the diabetes team in providing psychosocial and culturally/spiritually relevant support to patients & their families & in recognizing situations referral to specialized resources.	See previous page.	See previous page.
Resource for children/families with questions/ concerns	Procedures in place for children/families on a T1 provider's caseload to receive diabetes-related telephone advice: a. If urgent, 24/7 in accordance with HA procedures. b. If non-urgent, within 2 business days by the T1 provider or a member of the "home" diabetes team (T4/T5/T6). Contact information & expectations are clearly communicated to children/families.	Procedures in place for children/families on the diabetes team's caseload to receive diabetes-related telephone advice: a. If urgent, 24/7 in accordance with HA procedures. b. If non-urgent, within 2 business days by a member of the diabetes team. Contact information & expectations are clearly communicated to children/families.	Same as T4.	Same as T5 plus: In collaboration with T4 & T5, develops resources and tools to support T1/T4/T5/T6 providers/teams in responding to diabetes-related questions from children/families. e.g., patient/family handouts, education modules, etc.

	Prevention, Primary & Emergent Diabetes Service	Children's Comprehensive Diabetes Service	Children's Regional Diabetes Subspecialty Service	Children's Provincial Diabetes Subspecialty Service
	T1	**T4**	**T5**	**T6**
Resource for providers		Procedures in place for providers *within the HA* to receive diabetes-related telephone advice: a. If urgent, 24/7 in accordance with HA procedures. b. If non-urgent, within 2 business days by a member of the diabetes team. Upon request, liaises with schools, camps & other local care providers (e.g., Public Health Nurses, Nursing Support Services) to provide expert advice on the care of children with diabetes.	Same as T4.	Same as T5 plus: Procedures in place for providers *within the province* to receive diabetes-related advice: b. If urgent, 24/7 by pediatric diabetes subspecialist. c. If non-urgent, within 2 business days by a member of the diabetes team. In collaboration with T4 & T5, develops resources and tools to support T1/T4/T5 providers/teams in providing appropriate diabetes-related care. e.g., guidelines, protocols, education modules, etc.
Outreach		May provide outreach services to children/families *within the HA* for children with Type 1 & 2 diabetes who have few or no medical complications. Outreach may be on-site (visiting clinic - depending on distances & volume) &/or via telehealth. Develops capacity within the local geographic area & HA to support the care of children with diabetes.	May provide outreach services to children/families *within the province* for children with type 1 & 2 diabetes. Focus of service is on children with significant medical complications &/or psychiatric issues which impact their diabetes management. Outreach may be on-site (visiting clinic, likely as part of a larger visiting endocrinology clinic) &/or via telehealth. Develops capacity within the HA & province to support the care of children with diabetes.	Same as T5.

	Prevention, Primary & Emergent Diabetes Service	Children's Comprehensive Diabetes Service	Children's Regional Diabetes Subspecialty Service	Children's Provincial Diabetes Subspecialty Service
	T1	**T4**	**T5**	**T6**
Transition		Develops transition plan & oversees the transfer of youth to the appropriate adult service (family physician, adult internal medicine or endocrine specialist +/- diabetes centre). Pathways documented for transition from pediatric to adult diabetes services.	Same as T4.	Same as T5.

6.1.1.3 Requirements

	Prevention, Primary & Emergent Diabetes Service	Children's Comprehensive Diabetes Service	Children's Regional Diabetes Subspecialty Service	Children's Provincial Diabetes Subspecialty Service
	T1	**T4**	**T5**	**T6**
Physicians & interdisciplinary team	Locally-based community care provider who has general knowledge about diabetes care in children. e.g., family physician, pediatrician or nurse practitioner. Diabetes care may also be provided by nurses & other providers when the expectation aligns with their scope of practice. A T1 provider is most likely to be utilized in geographic areas where it is unrealistic for children/families to travel to a T4/T5/T6 diabetes team 4 times per year.	Available during clinics: Pediatrician specializing in diabetes or a physician with a special interest (and training) in childhood & adolescent diabetes. Specialized knowledge & skills are maintained through ongoing clinical experience working in an interdisciplinary diabetes team & completing a minimum of 15 diabetes-specific CME continuing medical education (CME) credits per cycle.	Available during clinics: Pediatric endocrinologist: • Pediatric endocrinologist has joint appointment with the UBC Department of Pediatrics, Endocrinology Division & the local HA/hospital. • Pediatric endocrinologist maintains active linkages (in-person &/or virtually using technology) with the UBC Department of Pediatrics, Endocrinology Division (e.g., participates in rounds, case reviews, journal club, etc).	Same as T5 plus: The practice of individual team members is exclusively with children/families. Access to child & youth psychiatrist. Pediatric endocrinologist available 24/7 to provide telephone advice to care providers throughout the province on the management of urgent diabetes-related issues.

	Prevention, Primary & Emergent Diabetes Service	Children's Comprehensive Diabetes Service	Children's Regional Diabetes Subspecialty Service	Children's Provincial Diabetes Subspecialty Service
	T1	**T4**	**T5**	**T6**
Physicians & interdisciplinary team cont'd		RN, & dietitian (RD) who specialize in diabetes & have acquired general pediatric knowledge & skills through consistent exposure to children in their clinic/outreach work. Either the RN or dietitian is a Certified Diabetes Educator (CDE).[5] RN or RD is competent to make insulin adjustments as per HA's insulin dose adjustment policy & RN/RD scope of practice. MD, RN & dietitian (RD) are knowledgeable about the theoretical and practical aspects of insulin pump management and continuous blood glucose monitoring. See Appendix 3 for specific knowledge and skill requirements.	RN(s) & dietitian(s) who specialize in pediatric diabetes. RN(s) & dietitian(s) are Certified Diabetes Educators (CDE).[5] RN(s) & RD(s) are competent to make insulin adjustments as per HA's insulin dose adjustment policy & RN/RD scope of practice. MD(s), RN(s) & dietitian(s) (RD(s)) are knowledgeable about the theoretical and practical aspects of insulin pump management and continuous blood glucose monitoring. See Appendix 3 for specific knowledge and skill requirements.	

[5] Becoming a CDE requires a minimum of 800 hours of practice in diabetes education within the past 3 years and successful completion of an exam. Maintaining a CDE designation requires successfully re-writing the CDE exam every 5 years or meeting the requirements of the Certification Maintenance by Credit Portfolio. www.cdecb.ca.

	Prevention, Primary & Emergent Diabetes Service	Children's Comprehensive Diabetes Service	Children's Regional Diabetes Subspecialty Service	Children's Provincial Diabetes Subspecialty Service
	T1	T4	T5	T6
Physicians & interdisciplinary team cont'd		Social worker/counsellor/mental health worker who has expertise in pediatrics and/or chronic illness. Referral algorithm is in place to access further psychosocial and psychological services, as required (e.g., local mental health team and community-based services). The practice of individual team members may include both adults and children (exception: pediatrician). Orientation of diabetes team includes review of relevant pediatric standards, pediatric-specific protocols, pediatric-specific equipment & the management of pediatric emergencies. Available upon request/referral: • Certified Insulin Pump Trainer[6] • Pharmacist (by phone)	Social worker who has expertise in pediatrics and chronic illness. The practice of individual team members is exclusively or predominantly with children/families. Orientation of diabetes team includes review of relevant pediatric standards, pediatric-specific protocols, pediatric-specific equipment & the management of pediatric emergencies. Available upon request/referral: • Certified insulin pump trainer[6] • Pharmacist (by phone) • Psychologist who has specific expertise in pediatrics & knowledge of childhood diabetes & chronic illness.	

[6] A Certified Pump Trainer (CPT) is a person who has been certified by a pump manufacturer to provide initial education to children/families that have purchased a pump to get them up and running. CPTs are required to submit paperwork to the manufacturer once the education has been completed, which initiates the pump warranty. Some CPT's will travel to other communities to do pump trainings. CPTs are not responsible for ongoing insulin dose adjustments unless doing so in their capacity as a member of the diabetes team. CPTs Specific duties include:

- Receives doctor's orders for the pump settings (pump specific order form)
- Meets with the family one time to provide technical education about the pump
- Provides minimal follow-up to the family (2 phone calls to 1 week of follow-up)
- Transitions patient back to their physician (including a discharge letter) with a timeline of when the physician should follow up with family
- Submits training paperwork to the manufacturer

	Prevention, Primary & Emergent Diabetes Service	Children's Comprehensive Diabetes Service	Children's Regional Diabetes Subspecialty Service	Children's Provincial Diabetes Subspecialty Service
	T1	T4	T5	T6
Facilities		Telehealth-enabled diabetes clinic. Clinic may serve both adults & children. Telehealth facilities & infrastructure available in designated locations within the HA.	Telehealth-enabled diabetes clinic serving children only. Telehealth facilities & infrastructure available in designated locations within the HA. Access to telehealth facilities & infrastructure in designated locations throughout the province (for outreach).	Telehealth-enabled diabetes clinic serving children only. Access to telehealth facilities & infrastructure in designated locations throughout the province (for outreach).
Minimum pediatric caseloads/visit volumes		Team caseload (i.e., primary responsibility for diabetes care): 150 children (600 visits per year[7]). Services may be provided on-site (in diabetes clinic) or via outreach/telehealth. In order to provide appropriate access to diabetes services, team caseloads may be lower in more sparsely populated areas. In these situations, structures are in place to pair up teams with lower volumes and teams with higher volumes to share educational & quality improvement opportunities (on-site or virtually). A minimum caseload of 50 children is recommended to maintain team competencies in diabetes care.	Team caseload (i.e., primary responsibility for diabetes care): 200 children (800 visits per year). Estimated make-up of caseload: • 150 children (600 visits per year) will require T4 services; & • 50 children (200 visits per year) will require T5 services. In addition, the team will provide T5 subspecialty consultation (but not assume primary responsibility for diabetes care) for referred children. Estimated to be 100 visits per year. Total: 900 visits per year of which 300 visits will be T5 visits. Services may be provided on-site (in diabetes clinic) or via outreach/telehealth.	Team caseload (i.e., primary responsibility for diabetes care): 250 children (1,000 visits per year). Estimated make-up of caseload: • 150 children (600 visits per year) will require T4 services; & • 100 children (400 visits per year) require T5/T6 services. In addition, the team will provide T6 subspecialty consultation (but not assume primary responsibility for diabetes care) for referred children. Estimated to be 400 visits per year. Total: 1,400 visits per year of which 800 visits will be T5/T6 visits. Services may be provided on-site (in diabetes clinic) or via outreach/telehealth.

[7] 50 children x 4 visits/yr = 200 visits/yr or 4 visits/wk.

6.1.2 Inpatient Services

6.1.2.1 Service Reach & Description

6.1.2.2 Responsibilities

	Child-Focused Diabetes Service	Children's Comprehensive Diabetes Service	Children's Regional Diabetes Subspecialty Service	Children's Provincial Diabetes Subspecialty Service
	T3	**T4**	**T5**	**T6**
Service reach	Multiple local health areas/health service delivery area.	Health service delivery area/ health authority.	Health authority.	Province.
Care & management	Provides diabetes care to children ages 2 yrs & older who are not in DKA &: • Are awaiting entry into an outpatient diabetes program (i.e., newly diagnosed). • Require admission for stabilization of their diabetes during times of challenging psychosocial &/or family dynamics. • Require admission for other conditions unrelated to diabetes that may affect diabetes control (e.g., surgery). May provide diabetes care to children in DKA while awaiting transport/transfer to T5/T6. Care is provided in consultation with T5/T6. Consults with the child's T4/T5/T6 outpatient diabetes team about the treatment & discharge plan. Refer to the Medicine module for specific activities (e.g., monitoring, deteriorating/emergency situations, mental health crises, child & family teaching, discharge planning, parenteral fluid & medication management, nutrition management, psychosocial & spiritual support).	Same as T3 plus: Provides diabetes care to children ages 2 & older who have relatively common complications such as: • Uncomplicated DKA (i.e., DKA in the absence of altered level of consciousness, cardiovascular instability, severe dehydration with evidence of renal compromise or severe electrolyte disturbances). • Metabolic instability. e.g., recurring fasting hyperglycemia or hypoglycemia that is refractory to outpatient therapy. Consults with the child's T4/T5/T6 outpatient diabetes team about the treatment & discharge plan.	Same as T4 plus Provides diabetes care to children ages 2 & older with relatively common complications, including complicated DKA. Provides diabetes care to children under age 2 with relatively common complications, including uncomplicated DKA. Consults with the child's T4/T5/T6 outpatient diabetes team about the treatment & discharge plan.	Provides diabetes care to children of all ages with: • Complicated DKA or persistent neurological symptoms after treatment of hypoglycemia. • Chronic complications of diabetes requiring intensive treatment, often by multiple pediatric subspecialty teams. • Medical or surgical problems that complicate the treatment of diabetes (e.g., severe eating disorder, need for prolonged TPN, etc). Consults with the child's T4/T5/T6 outpatient diabetes team about the treatment & discharge plan.

6.1.2.2 Requirements

	Child-Focused Diabetes Service	Children's Comprehensive Diabetes Service	Children's Regional Diabetes Subspecialty Service	Children's Provincial Diabetes Subspecialty Service
	T3	**T4**	**T5**	**T6**
Requirements				
Physicians & staff (interdisciplinary team)	As per T3 in the Medicine module. e.g., Pediatrician available on-call 24/7; interdisciplinary team works predominantly with adults but is available on request for individual cases, etc. Access to T4/T5/T6 outpatient diabetes team on-site or via telehealth/telephone for consultation.	As per T4 in the Medicine module. e.g., pediatrician available on-call 24/7; interdisciplinary team regularly provides care to children, etc. T4 outpatient diabetes team on-site for consultation.	As per T5 in the Medicine module. e.g., pediatrician available on-site 24/7; interdisciplinary team regularly provides care to children; on-site PICU, etc. Pediatric endocrinologist available for on-site consultation - not 24/7 (most responsible MD is a pediatrician, neonatologist or intensivist). T5 outpatient diabetes team on-site for consultation.	As per T6 in the Medicine module. e.g., pediatrician (or resident) on-site 24/7 pediatric interdisciplinary team, inpatient units grouped by specialties/subspecialties, full range of pediatric subspecialists (including pediatric endocrinologist) available on-call 24/7 & available for on-site consultation as needed, etc. Pediatric endocrinologist available 24/7 for on-site consultation (may be the most responsible MD). T6 outpatient diabetes team on-site for consultation.
Facilities	As per T3 in Medicine module. e.g., designated pediatric inpatient beds.	As per T4 in Medicine module. e.g., designated pediatric inpatient unit, pediatric clinic in shared adult/pediatric outpatient space.	As per T5 in Medicine module. e.g., designated pediatric inpatient unit, pediatric outpatient clinic used exclusively by children.	As per T6 in Medicine module. e.g., pediatric inpatient units grouped by specialty/subspecialty, pediatric subspecialty outpatient clinics.

6.2 Knowledge Sharing & Transfer/Training

Prevention, Primary & Emergent Diabetes Service	Child-Focused Diabetes Service	Children's Comprehensive Diabetes Service	Children's Regional Diabetes Subspecialty Service	Children's Provincial Diabetes Subspecialty Service
T1	**T3**	**T4**	**T5**	**T6**
Physicians & staff (interdisciplinary team): Accesses learning activities that support the maintenance of physician & staff competencies in diabetes. e.g., on-line access to guidelines/ reference materials/ continuing education courses & participation in HA & provincial learning activities relevant to diabetes & child health (e.g., pediatric rounds and conferences).	*Physicians & staff (interdisciplinary team):* Same as T1 plus: Organizes &/or participates in HA activities that support the maintenance of physician & staff competencies in the care of children with diabetes.	*Physicians & staff (interdisciplinary team):* Same as T3.	*Physicians & staff (interdisciplinary team):* Same as T4 plus: Builds clinical capacity in pediatric diabetes care amongst health care providers within the HA through activities such as collaborative outreach clinics (with local pediatricians) and clinical telehealth sessions. *Students, residents & fellows:* Creates opportunities to expose a broad range of undergraduate, graduate & post-graduate health care students to the care of children with diabetes.	*Physicians & staff (interdisciplinary team):* Same as T5 plus: Builds clinical capacity in pediatric diabetes care amongst health care providers within the province through activities such as collaborative outreach clinics (with local pediatricians) and clinical telehealth sessions. Organizes &/or participates in province-wide learning activities that support the maintenance of physician & staff competencies in the care of children with diabetes. e.g., pediatric rounds and conferences. Creates educational programs & mechanisms to deliver support for guidelines & evidence-based care in diabetes. *Students, residents & fellows:* • Provides outpatient experiences/placements in the care of children with diabetes for a broad range of undergraduate, graduate & post-graduate health care students. • Designated by UBC as the primary training site for pediatric endocrinology. Training includes rotations in outpatient diabetes clinic.

6.3 Quality Improvement & Research

Prevention, Primary & Emergent Diabetes Service	Child-Focused Diabetes Service	Children's Comprehensive Diabetes Service	Children's Regional Diabetes Subspecialty Service	Children's Provincial Diabetes Subspecialty Service
T1	**T3**	**T4**	**T5**	**T6**
Quality improvement: • Participates in the provincial approach to evaluation / quality improvement of diabetes care and contributes relevant data on indicators	*Quality improvement:* • Regularly reviews the quality of diabetes care provided to children, including case reviews. Implements recommendations. • Supports staff in the provision of guideline & evidence-based care in diabetes. • Participates in the provincial approach to evaluation / quality improvement of pediatric diabetes care and contributes relevant data on indicators.	*Quality improvement:* • Same as T3.	*Quality improvement:* • Same as T4 plus: • Works in collaboration with T6 to fulfill the responsibilities outlined under the T6 "provincial role." *Recruitment of subspecialists:* • Recruits pediatric endocrinologists in accordance with the provincial recruitment plan in consultation with T6. *Research:* • Participates in diabetes research.	*Quality improvement:* • Regularly reviews the quality of diabetes care provided to children, including case reviews. Implements recommendations. • Supports staff in the provision of guideline & evidence-based care in diabetes. *Provincial Quality Improvement role:* In collaboration/communication with CHBC & HAs: • Develops & disseminates guidelines & standards on diabetes-related care, including care provided in community-based settings. • Develops a provincial approach to evaluation / quality improvement of pediatric diabetes care. • Create structures and processes to support active linkages (in-person &/or virtually using technology) with T5 teams in relevant subspecialty. *Recruitment of subspecialists:* • Develops provincial plan for recruitment of pediatric endocrinologists, in collaboration with UBC, CHBC and local HAs. *Research:* • Actively participates in national and international diabetes networks. • Conducts & supports other to conduct research in diabetes.

Appendix 1: BC Diabetes Centres that Serve Children

Health Authority	Name	*Self-Reported Type 1 & 2 Pediatric Patients Followed*	New Patients per year*
FHA	Abbotsford Pediatric Diabetes Clinic	225	29
FHA	Surrey Paediatric Diabetes Clinic	147	19
FHA	Tri-Cities Diabetes Health Centre (Port Moody)	45	6
IHA	100 Mile House Diabetes Education Program	3	0
IHA	Cranbrook Wellness Centre	25	3
IHA	Diabetes Education centre (Kelowna)	85	11
IHA	Kootenay Boundary (Nelson)	6	1
IHA	Kootenay Boundary (Grand Forks)		0
IHA	Kootenay Boundary (Trail)	6	1
IHA	Nicola Valley Health Centre (Merritt)		0
IHA	Royal Inland Hospital (Kamloops)	77	10
IHA	Penticton	49	6
IHA	Vernon Diabetes Education Program	70	9
NH	Dawson Creek and District Diabetes Clinic	6	1
NH	Healthy Living Centre (Smithers)	15	2
NH	University Hosp of Northern B.C (Prince George)	95	12
PHSA	BC Children's Hospital Diabetes Clinic	767	100
VCH	North Shore (West Vancouver)	157	21
VIHA	Campbell River Hospital type 1 peds clinic	73	10
VIHA	NRGH Pediatric Diabetes Clinic (Nanaimo)	116	15
VIHA	VGH Pediatric Diabetes Clinic (Victoria)	325	43
	Total	2243	300

*calculated based on clinic size and provincial incidence

Appendix 2: Standards/Guidelines Relevant to the Organization/Delivery of Diabetes Care for Children & Adolescents

1.0 Canadian Diabetes Association Guidelines (2013)

Type 1 Diabetes in Children and Adolescents

Recommendations re delivery of care

1. All children with diabetes should have access to an experienced pediatric DHC team and specialized care starting at diagnosis [Grade D, Level 4].

2. Children with new-onset type 1 diabetes who are medically stable should receive their initial education and management in an outpatient setting, provided that appropriate personnel and daily communication with the DHC are available [Grade B, Level 1A (3)].

3. To ensure ongoing and adequate diabetes care, adolescents should receive care from a specialized program aimed at creating a well-prepared and supported transition to adult care that includes a transition coordinator, patient reminders, and support and education, with or without a joint pediatric and adult clinic [Grade C, Level 3 (132,133)].

Type 2 Diabetes in Children and Adolescents

Recommendations re delivery of care

- Nothing specific.

2.0 ISPAD Guidelines: Delivery of Ambulatory Diabetes Care to Children and Adolescents with Diabetes (2014)

From the outset, the child or adolescent with diabetes and relevant family should receive care from a multidisciplinary diabetes team comprised of specialists with training and expertise in both diabetes and pediatrics, knowledgeable of child, and adolescent development (E).

The multidisciplinary team is unlikely to be available in areas of low population density and where childhood diabetes rarely occurs. In these circumstances, care is likely to be provided by a locally based pediatrician or general (family) physician, who should have ready access to advice and expertise of the Diabetes Care Team in regional centers of excellence (1–3) (C, E).

The Diabetes Care Team should provide:

- Specialized hospital medical care.
- Expert comprehensive ambulatory care for diabetes and associated pediatric conditions.
- Introduction of new therapies and technologies as diabetes management evolves.

- Expert advice on issues related to diabetes such as exercise, travel, and other special life events.
- Advice for care at school, camps, and other venues where children with diabetes require care when away from home.
- Screening for co-morbid conditions, complications, and risk of complications.
- Emergency telephone or other support 24 h a day to patients and families.
- Extra attention, including psychosocial evaluation and support, is needed for children who are 'high risk', e.g., poor glycemic control [hemoglobin A1c (HbA1c) >8.5% (64 mmol/mol)] and/or frequent urgent visits or hospitalization.
- Advice and support to physicians and healthcare professionals who provide diabetes care where immediate access to a Diabetes Care Team is not possible (B, E).

Diabetes care is best delivered by a multidisciplinary team. The team should consist of:

- Pediatrician specializing in diabetes or endocrinology (preferred), or physician with a special interest (and training) in childhood and adolescent diabetes.
- Diabetes nurse specialist or diabetes nurse educator.
- Dietician (or nutritionist) (note: Registered Dietitian would be the equivalent in BC).
- Pediatric social worker with training in childhood diabetes and chronic illness.
- Psychologist trained in pediatrics and with knowledge of childhood diabetes and chronic illness (12).

Diabetes requires skilled self-management in the home and local environment. The Diabetes Care Team should have the resources to develop strong links, effective communication, and shared practices with:

- The child and family at home, and extended family members or guardian.
- The young person at day care, school, or college/university.
- Primary healthcare providers.
- Pediatricians and other healthcare providers in areas of low population density/low diabetes prevalence.

The organization of the Diabetes Care Team, its size, and its location will depend on geographical and demographic characteristics. In general, for members of the pediatric diabetes team to obtain sufficient experience, the number of patients should be at least 150. The number of practitioners depends on local circumstances; a suggested guide to optimal resource allocation per 100 patients: 1.0 diabetes nurse, 0.75 pediatric diabetologist, 0.5 dietitian, and 0.3 social worker/psychologist (16).

Teams from district or regional centers often organize outreach clinics to accommodate children and families living in remote areas. Adequate resources are needed to sustain such services (14, 15). In some areas, two-way telecommunication utilizing video – computer technology and local medical staff to facilitate the telemedicine visit allows for more efficient and effective distant care (13, 17, 18).

Appendix 3: Baseline Insulin Pump Therapy & Continuous Glucose Monitoring Knowledge & Skill Requirements for a Diabetes Team

A. Insulin Pump Therapy

Components of Insulin Pump Therapy:

- Relationship between continuous infusion of insulin and normal physiology
- The concept of basal and bolus insulin
- What is meant by Insulin Sensitivity Factor (ISF), insulin to carbohydrate (I/C) ratio and active insulin/insulin on board
- How to evaluate basal rates
- How to calculate, evaluate and adjust correction factor (ISF) and insulin to carbohydrate ratio

High blood sugar and DKA prevention:

- Causes of high BG related to continuous insulin infusion
- DKA prevention
- Correction formula for high BG and hyperglycemia protocol http://www.bcchildrens.ca/endocrinology-diabetes-site/documents/pumpdka.pdf

Other information:

- Potential site issues and troubleshooting
- Use of different infusion sets
- Time off the pump: http://www.bcchildrens.ca/endocrinology-diabetes-site/documents/offpump.pdf
- What is not clinic responsibility, such as:
    - purchase issues/choosing ordering pump
    - insurance/3rd party issues
    - ordering supplies

Clinical practice:

- How to look up appropriate reports
- Interpreting reports

Families should upload their pumps at home for clinical use; however some teams may provide that within their clinic. If so, MD, RN, or RD should know:

- How to upload pumps to Electronic Therapy Management Systems: Carelink® website www.carelink.minimed.com and Diasend® www.diasend.com

If a pump upload is not available, staff should know how/where to find:

- Home screen
- Button functions
- Main menu

- Bolus calculator setup (carbohydrate ratio, ISF, active insulin time, BG targets)
- Bolus history
- Basal rate settings
- Daily totals
- Temp basal rate

Families should be using a linked meter that sends BG information to the pump.

Manufacturer online resources:

www.medtronicdiabetes.ca/mylearning

www.animas.com/support/onetouch-ping-insulin-pump/howtouse

www.myomnipod.ca

Other resources:

BCCH Online IDA Module #7 Getting the Most out of Insulin Pump Therapy
http://learn.phsa.ca/BCCH/Insulin/module7a/

Basal rate checking worksheet: http://www.bcchildrens.ca/endocrinology-diabetes-site/documents/basalcheck.pdf

Handout #1 for families 'The Basics' http://www.bcchildrens.ca/endocrinology-diabetes-site/documents/pumpinfo.pdf

Handout #3 for families 'Required prep work' http://www.bcchildrens.ca/endocrinology-diabetes-site/documents/pumphomework.pdf

'Yikes the next patient in clinic has a pump' Diabetes communicator Oct 2010
http://www.bcchildrens.ca/NR/rdonlyres/E8E89839-AC3E-4A02-A539-6F738CBCDF34/48397/yikespump.pdf

'Pumping Insulin' (5th ed) by John Walsh

Understanding Insulin Pumps and Continuous Glucose Monitors by Peter Chase (Pink Panther book)

B. Continuous Glucose Monitoring

Components of Continuous Glucose Monitoring

- Sensor glucose versus blood glucose
- How to review/evaluate sensor data

Program responsibilities

- How to look up reports
- How to interpret reports

In clinical practice, it is helpful if MD/RN/RD knows:

- Efficacy of values (MARD) versus blood glucose readings
- Trends versus responding to each reading
- Trend arrows and response
- Differences between manufacturer sensors and efficacy

Appendix 4: Change Log

Document	Date	Description of Change
Initial approval (by CHBC Steering Committee)	July 2018	
Minor revision	July 2020	Section 4.0 Recognition of the Tiers: Updated the table to include 5 out of the 6 tiers of service: T1 (outpatient only), T3 (inpatient only), T4, T5 and T6. Section 6.1.2 Inpatient Services: Changed the title of the column from T1 to T3 (Child-Focused Diabetes Service) to correctly reflect inpatient tiers of service.