

Developed by the BC Provincial Registered Dietitians Wound Sub-Committee in collaboration with Registered Dietitians from:



Title	Nutrition for Wound Prevention & Management: Guideline for Dietitians
Endorsement British Columbia & Yukon	<ul style="list-style-type: none"> • Pending: • Endorsed:
DST Indications for Use	<ul style="list-style-type: none"> • This Decision Support Tool (DST) guides Registered Dietitians in the key nutrition requirements for wound prevention and management for all wound etiologies for adult clients. • This DST does not cover nutritional requirements for: <ul style="list-style-type: none"> ○ Wound prevention and management for the pediatric population. ○ Burns greater than 10% total body surface area, please refer to provincial specialized burn centres (see Appendix A).
Practice Level British Columbia & Yukon	<p>British Columbia: entry level for Registered Dietitians.</p> <p>Yukon: refer to organizational policies and practice in accordance with regulatory body.</p>
Need to Know	<p>Wound healing</p> <ul style="list-style-type: none"> • Wound healing is an anabolic process requiring a steady supply of nutrients and fluid to the wound bed. Nutrients are required at all stages of the wound healing cascade and are vital to preserve skin integrity. • Nutrition is an important part of the care plan for prevention and treatment of all wounds. While a wound may result from a variety of different etiologies, (e.g., venous stasis, diabetes, arterial insufficiency, post-surgical, pressure injury, burns, skin tears, trauma, moisture associated skin damage, lymphedema, etc.), the nutrition considerations for prevention and treatment is the same. • Cultural considerations and understandings should guide assessment and care planning to support client preferences, cultural safety and relevance. <p>Malnutrition</p> <ul style="list-style-type: none"> • Poor nutrition and malnutrition can increase the risk of wound development, interrupt the healing process, reduce the tensile strength of a wound as it heals, contribute to wound chronicity and severity, and can increase the risk of infection.^{1, 2} • Malnutrition is usually diagnosed when two or more of the following nutrition characteristics are identified: unintentional weight loss, loss of muscle mass, loss of subcutaneous fat, fluid accumulation (that may mask weight loss), and diminished functional status (as measured by hand-grip strength).³ See validated malnutrition screening tools in Table 1. Risk factors contributing to malnutrition include poor appetite, the inability to eat or cook independently, pain, dehydration, dementia, disordered eating, dysphagia, gastrointestinal disorders, and food insecurity, among others. • When a client is identified with malnutrition and at risk of developing a wound, the nutritional focus is to optimize energy, protein, and fluid intake in order to maintain overall health and skin integrity.⁴ The nutritional approach includes promoting a balanced diet where intake meets the dietary reference intakes (DRIs) for macro- and micronutrients, emphasizing energy dense foods, liberalizing diet restrictions, correcting suspected or confirmed nutritional deficiencies through diet or vitamin-mineral supplementation and tailoring recommendations based on cultural and personal preferences. Nutrient needs are best met through a ‘food first’ approach, meaning offering nutrient-rich foods and fortified/enriched foods before offering oral nutrition supplements (ONS).

Note: This is a **controlled** document. A printed copy may not reflect the current, electronic version on the CLWK Intranet (www.clwk.ca). Any document appearing in paper form should always be checked against the electronic version prior to use; the electronic version is always the current version. This DST has been developed as a guide to support nursing practice in British Columbia, however it is not a substitute for education, experience & the use of clinical judgment
October 2023

Management

- Early identification and diagnosis of malnutrition followed by nutritional intervention by a Registered Dietitian (RD) has the potential to reduce the prevalence of wounds, improve a person's quality of life, support wound healing, and reduce health care costs and hospital admission/readmission rates.^{2,5,6}
 - **Macronutrients:** When a wound is present, nutritional requirements are increased. Individual energy needs are based on the number and severity of the wound(s), body weight, degree of weight loss (if applicable), and other comorbidities.⁴ Adequate energy from carbohydrates and fat are needed to 'spare' protein, allowing protein to be used for wound healing and preserving skin integrity.²

Hydration status impacts wound healing as dehydration can reduce blood volume and circulation, resulting in reduced delivery of nutrients to the wound bed and elimination of wastes, thereby impairing wound healing and increasing risk of further skin breakdown. Protein and fluid requirements may be further increased with heavily exudative wounds and/or use of negative pressure wound therapy (NPWT).^{7,8}

Assessment of fluid status through a review of laboratory markers and/or clinical signs is recommended. Caution is advised when recommending protein and fluid needs to people with renal disorders. To enhance communication and collaboration, consider consulting the most responsible practitioner (MRP) to review recommendations and to ensure consistent messaging for the client.
 - **Micronutrients:** While all micronutrients are essential for health, there are several key vitamins and minerals associated with wound healing including vitamin A, vitamin C, and zinc.⁴ Vitamin D intake can also be low in the Canadian population and warrants attention, particularly for those living with diabetes.⁹⁻¹¹

As anemia can lead to delayed or non-healing wounds, intake of iron, vitamin B12, and folate should be assessed. When interpreting laboratory data, it is important to note that micronutrient levels and certain biomarkers are sensitive to the presence of inflammation (particularly if C-reactive protein (CRP) levels are greater than 20 mg/L).¹² For example, ferritin levels could be falsely elevated in the presence of inflammation while zinc, vitamin D, and vitamin A levels may be falsely decreased.

While correcting known deficiencies is essential, single vitamin or mineral supplementation above the DRIs has not shown benefit.⁴ If someone cannot meet the DRIs through a balanced diet, supplementation should be considered. Of note, vitamin or mineral assays are not available in all practice settings. When available, results may take several weeks to complete. Clinical judgment and other nutrition assessment data may prove more useful in the near-term when recommending vitamin and mineral supplementation.

Recent evidence supports use of ONS that include arginine, zinc, and antioxidants in adults when a pressure injury is present (Stage 2 or greater) as these have been shown to improve healing.^{13, 14} However, these arginine-enhanced or other ONS specifically formulated for wound healing are not currently available in Canada.
 - **Diabetes:** Optimal glycemic management for people living with diabetes is strongly recommended as hyperglycemia can impair wound healing. Ensure a balanced diet with adequate fluid intake and modify carbohydrate intake. Include lower glycemic carbohydrate choices, whenever possible, while optimizing the diet.¹⁵
 - **Larger Bodies:** People with larger bodies need special nutrition consideration as their risk for wounds may be increased and they may have a greater incidence of pressure injuries, venous ulcers, wound dehiscence and skin infections.^{2, 16}

In addition, malnutrition risk may be higher in those individuals who undertake long term efforts for weight loss or have unbalanced diets. Weight maintenance or gain, where indicated, is recommended during wound healing.

Bookmarks	Screening & Assessment Nutritional Diagnosis Interventions Monitoring/Evaluation Table 1: Validated Malnutrition Screening Tools Table 2: Nutrition Diagnosis Examples Table 3: Problem, Etiology, Signs and Symptoms (PES) Statement Examples Definitions References Document Creation/Review & Sub-Committee Health Authority Representatives Appendix A: British Columbia Burn Centres
Related Documents	Guideline for Nurses: Nutrition for Wound Prevention & Healing (under development) Learning Module: Skin Health & Wound Healing (under development)

Assessment and Diagnosis

Screening

1. Screen all clients with a wound, or at risk for a wound, for malnutrition. Choice of screening tools will vary depending on the population screened (see [Table 1](#)).
2. Subscales of the Braden Risk and Skin Assessment and the Pressure Injury Prevention Points (NPUAP) can also be helpful in delineating those at risk for wounds as a result of nutrition complications. These scales, however, do not specifically screen for malnutrition:
 - a. Braden Nutrition Subscale score 3 or less: high protein/high calorie diet indicated.
 - b. Braden Nutrition Subscale score 2 or less: RD involvement required.

Assessment

1. Perform Subjective Global Assessment (SGA)¹⁷ or Nutrition Focused Physical Exam (NFPE).^{18,19}
 2. Review bloodwork, as available:
 - a. Complete blood count (CBC).
 - b. Electrolyte panel, blood urea nitrogen (BUN), and creatinine.
 - c. Fasting blood glucose and hemoglobin A1C.
 - d. Vitamins/minerals such as vitamin D, zinc, and iron panel with or without ferritin, as available.
 - e. Monitor for signs and symptoms of dehydration (thirst, dizziness, dry lips and mouth, fainting, flushed skin, low blood pressure, tiredness, increased heart rate, irritability, headache, dark strong smelling urine, decreased urine output).
 - f. Note: albumin and prealbumin levels may not be reflective of protein stores and may be altered by inflammatory conditions.^{3, 20}
 3. Review weight history. Significant weight loss is defined by greater than 5% weight loss in one month, 7.5% in three months, or 10% in six months.
 4. Review the etiology of the wound, its stage or category, as applicable, and the number present.
 5. Review use of medications with nutritional implications, (e.g., adverse gastrointestinal (GI) effects, reduced appetite, or potential drug-nutrient interactions).
 6. Assess barriers to optimal nutrition, (e.g., pain, nausea, dysphagia, food insecurity, etc.). Consider functional limitations to optimal nutrition, (e.g., inability to eat or cook independently, dementia, etc.).
 7. Nutrition Requirements:
 - a. Energy: Recommend 30-35 kcal/kg to meet energy requirements and maintain/regain body weight.⁴
 - If BMI is greater than 30 use the:
 - Mifflin-St. Jeor equation as it may be more appropriate for predicting resting metabolic rate,²¹
- OR**

- Ideal body weight (IBW) to calculate energy needs
OR IBW = weight at BMI of 24.9.
 - Adjusted body weight to calculate energy needs.
 - Adjusted body weight for BMI more than 30 = IBW + 0.25 x (actual body weight – IBW).
 - Calculate energy requirements using indirect calorimetry if available.²⁰
 - b. **Protein:** Recommend 1.25-1.5 g/kg protein depending on the number and severity of wounds.⁴ Use clinical judgement when determining protein needs in renal disorders; collaborate with MRP when assessing needs. Use adjusted body weight when assessing protein requirements for individuals with BMI greater than 30.
 - Higher protein requirements may be seen with high output NPWT and larger wounds. Replace protein losses in exudate (1.5- 3.0 g/100 ml). Closely monitor nutrition status.^{7, 20}
 - c. **Hydration:** Recommend 30-35 ml/kg fluid or 1.0 ml/kcal to meet fluid needs.⁴ Fluid needs will be increased with heavily exuding wounds, use of NPWT, fever or GI losses, (e.g., diarrhea, vomiting). Caution is advised when recommending fluid requirements in renal, cardiac or hepatic disorders; collaborate with MRP when assessing needs.
 - d. **Micronutrients:** Correct known or suspected deficiencies. Refer to the DRI for specific nutrients.
 - Minerals:
 - Assess iron deficiency anemia by reviewing CBC, iron profile, and ferritin. Careful interpretation of the lab values is advised for clients with chronic inflammatory conditions, (e.g. kidney disease or congestive heart failure) or those with active infection/sepsis.
 - Assess zinc status if available. Zinc requirements may be increased with high GI losses.
 - Vitamins:
 - Assess vitamin C status if available. Vitamin C requirements may be increased with commercial tobacco use.²²
 - Assess vitamin D status if available. Consider vitamin D deficiency for those with intestinal malabsorption, diabetes, chronic kidney disease, osteoporosis, dark skin pigmentation, over 51 years of age, or institutionalized/hospitalized people.
 - Assess vitamin A status if available. Vitamin A needs may be increased with prolonged corticosteroid use.⁴
 - Assess vitamin B12 and/or folate level(s) if available. Screen for macrocytic anemia by reviewing CBC (elevated mean cell volume). Consider a potential for low B12 status for clients over 60 years of age, long-term adherence to a vegan/vegetarian diet, diagnosis of GI disorders, or prolonged use of some medications, (e.g., proton pump inhibitors, metformin, methotrexate).²³
8. Assess for optimal glycemic management for people living with diabetes to promote wound healing. For most people, the targets are as follows:²⁴
- a. Capillary blood glucose of 4.0-7.0 mmol/L preprandial and 5.0-10 mmol/L 2 hour postprandial (5.0-8.0 mmol/L if A1C not at target).
 - b. Hemoglobin A1C less than or equal to 7.0%.
 - c. Glycemic targets may need to be individualized with frailty, functional dependence, or those living with hypoglycemic unawareness or recurrent severe hypoglycemia. Refer to the client-specific targets as determined by the diabetes team and/or MRP.
9. Consider mental, spiritual, and emotional wellness factors that are influencing health and healing.
10. For many Indigenous, First Nations, Metis, Inuit peoples, food is considered medicine. Create space in the conversation to inquire about traditional food and/or traditional medicine use.

Nutrition Diagnosis

Determine the most appropriate Nutrition Diagnosis(es) (see [Table 2](#)) and document using a Problem, Etiology, Signs and Symptom (PES) Statement (see [Table 3](#)).

Interventions

1. Determine the appropriate nutrition intervention and implement the nutrition care plan.
 - a. Recommend adequate energy intake to prevent weight loss, preserve lean body mass and support wound healing.
 - b. Recommend adequate protein intake.
 - c. Recommend adequate fluid intake.
 - d. Recommend adequate dietary sources of iron, zinc, vitamin C, vitamin D, vitamin A, vitamin B12 and folate.
 - Correct known or suspected micronutrient deficiencies.
 - Consider all sources of vitamin and minerals before recommending ONS, fortified foods/enhanced, single nutrient supplements, tube feeding formula, or parenteral multivitamin preparation.
 - Vitamin-mineral supplements may be suggested if a client is deficient, when nutrient needs cannot be met by diet alone or if diet is unbalanced. Use caution with micronutrient supplementation in clients with impaired renal clearance.
 - A general multivitamin-mineral supplement is recommended if intake is less than 50% usual food consumed.
 - Consider potential GI side effects of oral iron supplementation, (e.g., constipation, diarrhea).
 - Avoid concurrent oral calcium supplements or calcium-rich foods with oral iron or zinc supplementation.
 - Zinc supplementation above the upper limit may lead to increased risk of copper deficiency.
 - For those 51 year or older, Health Canada recommends a daily supplement containing 400 IU (10mcg) of vitamin D.
 - e. Examples of potential nutrition interventions include: high protein, high energy diet, nutrient dense diet, texture modified diet, nutrition support, vitamin/mineral supplements, ONS, protein supplements, feeding assistance, adaptive feeding aids.
2. Implement strategies to carry out nutrition interventions.
 - a. Energy:
 - Nutrients are best met through a 'food first' approach.
 - Liberalize diet restrictions, protect mealtimes, offer ONS.
 - Modify diet texture for chewing and swallowing difficulties.
 - Consider enteral nutrition support for those who cannot meet nutritional requirements orally. Parenteral nutrition should only be considered for clients with non-functional GI tract where feeding via oral and enteral routes is not possible. Initiation of enteral and parenteral support must be consistent with the client's goals, priorities, and resources.
 - b. Protein:
 - Provide protein-rich foods at each meal and snacks. Protein may be better utilized when it is spread throughout the day.
 - Modular protein supplements, (e.g., whey, soy, collagen) may be added to food or drinks.
 - c. Fluid:
 - Increase fluid intake by offering fluids at meals and snacks, including high moisture foods, and including ONS with or between meals.
 - d. Consider and address environmental and physical barriers to food intake.
 - Recommend adaptive aids for dining, (e.g., nosey cup, built up cutlery, etc.) to promote independence at mealtime.
 - Recommend eating with others during mealtimes to support socialization, which may benefit both food intake and mental health.
 - Optimize a client's eating environment by addressing factors that may agitate a client, (e.g., bright lights, noise, or stimulation).
 - e. Adapt nutrition recommendations according to cultural and personal preferences.
 - Acknowledge that food is more than nutrition and can represent culture, connection, relationship, and medicine.
3. Provide nutrition counseling and collaborative goal setting.

4. Coordinate nutrition care across the continuum to support individuals and family to access supports and resources as needed. Consider:
 - Community RD, outpatient RD, or other nutrition support upon discharge, (e.g., Registered Dietitian Services through HealthLink BC). (<https://www.healthlinkbc.ca/health-services/healthlink-bc-811-services/dietitian-services> or call 811).
 - Meal-based programs, grocery delivery, or cooking services.
 - Financial subsidies and assistance:
 - Assess eligibility for the Monthly Nutrition Supplement (<https://www2.gov.bc.ca/gov/content/governments/policies-for-government/bcea-policy-and-procedure-manual/health-supplements-and-programs/monthly-nutritional-supplement>) or
 - Short Term Nutrition Supplement (<https://www2.gov.bc.ca/gov/content/governments/policies-for-government/bcea-policy-and-procedure-manual/health-supplements-and-programs/nutritional-supplements>).
 - Adult day programs, respite care, or home support agencies.
 - Community organizations, First Nations Friendship Centers, or other wellness services, as appropriate. For First Nations individuals living on a reserve, coordinate care with the nursing team in communities (home care nurse/community health nurse) for continuity of nutritional care.
 - Refer to other care providers as needed, (e.g., home care nursing, wound care, social worker, occupational therapist (positioning/equipment), speech-language pathologist (dysphagia/communications), dental care, mental health care providers, elders, or spiritual assistance).
 - Refer to diabetes education clinic/team if optimal glycemic management is indicated.

Nutrition Monitoring/Evaluation

1. Rescreen for malnutrition at each encounter or readmission.
2. Ensure nutrition care plan is co-created with the client and/or care provider and reflects their preferences, goals, priorities, and resources.
3. Monitor intake (energy, protein, fluids, micronutrients), weight, available laboratory data, and wound healing
4. Review micronutrient supplement use regularly due to possibility of over-supplementation or toxicity.¹²
5. Review and adjust nutrition care plan (requirements, glycemic management, and supplementation) as needed. Enhanced monitoring is especially important for slow to heal wounds.
6. Refer to other care providers as needed, (e.g., home care nursing, wound care, social worker, (financial), occupational therapist (positioning/equipment), speech language pathologist (dysphagia/communication), dental care, mental health care providers, elders, or spiritual assistance).
7. Refer to diabetes education clinic/team if optimal glycemic management is indicated.
8. Follow client until wound is healed and/or they are well nourished and no longer at nutrition risk. Once the wound is closed, nutrition requirements return to baseline for most clients. As the remodeling phase of wound healing can take up to 12 months or longer, optimal nutrition remains an important part of client care for the duration of healing.
9. Provide nutrition education as needed.

Client Education & Resources

- Consider a High Protein, High Energy Diet order for inpatients/residents. Refer to your Health Authority Diet Writing Guidelines
- First Nations Health Authority. (n.d.). Traditional foods fact sheets. Available at: https://www.fnha.ca/Documents/Traditional_Food_Fact_Sheets.pdf
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Tables

Table 1: Validated Malnutrition Screening Tools	
Screening Tool	Population
Canadian Nutrition Screening Tool (CNST) (2014).	Identifies adult patients in acute care at risk of malnutrition. Link: Canadian Nutrition Screening Tool (CNST)
Mini Nutrition Assessment SF (MNA®) (2009)	Identifies adults 65 year or older living in long term care or community dwelling who are malnourished or at risk for malnutrition. The Mini Nutrition Assessment (MNA®) screening tool has been validated for patients with or at risk for pressure injuries. Link: Mini Nutrition Assessment SF (MNA®)
Malnutrition Universal Screening Tool (n.d.)	Identifies adults who are underweight and at risk of malnutrition (acute, long term care or community). Link: Malnutrition Universal Screening Tool (MUST)
Malnutrition Screening Tool (1999)	Identifies adult patients in acute or ambulatory care who are at risk of malnutrition. Link: Malnutrition Screening Tool (MST)
Short Nutritional Assessment Questionnaire (SNAQ) (2012)	Identifies adults who are underweight and at risk of malnutrition: SNAQ: for hospitalized – acute care. SNAQ ^{RC} : for the elderly in care homes or long-term care. SNAQ ⁶⁵⁺ : for patients in the community who are aged 65 and over. Link: Short Nutritional Assessment Questionnaire (SNAQ)

Adapted from: Posthauer, ME et al. Adv Skin Wound Care 2013 26(3): 128-40.

Table 2: Nutrition Diagnosis Examples

Inadequate oral intake (NI-2.1)
Inadequate fluid intake (NI-3.1)
Increased nutrient needs (Specify the nutrient(s), e.g., energy and/or protein) (NI-5.1)
Malnutrition (NI-5.2)
Inadequate protein-energy intake (NI-5.3)
Inadequate protein intake (NI-5.7.1)
Inadequate vitamin intake (specify) (NI-5.9.1)
Inadequate mineral intake (specify) (NI-5.10.1)
Unintended weight loss (NC-3.2)
Acute disease or injury related malnutrition (undernutrition) (NC-4.1.3)
Food- and nutrition-related knowledge deficit (or accepted synonym), limited food and nutrition related knowledge (NB-1.1)

Table 3: Problem, Etiology, Signs and Symptom (PES) Statement Examples

Inadequate protein intake related to inability to meet elevated protein requirements secondary to a Stage 3 pressure injury as evidenced by client's estimated protein needs (150 grams) and an average dietary intake of 100 gram of protein/day.
Food and nutrition-related knowledge deficit related to previous lack of education around nutrition for wound healing as evidenced by recent dietary intake and request for more information.
Inadequate oral intake related to decreased appetite and ability to meet macro- and micronutrient needs as evidenced by a 5% weight loss in 1 month and non-healing diabetic foot wound.
Increased protein and hydration requirements related to Stage 4 pressure injury treated with NPWT as evidenced by 300 mL exudate accumulating in 24 hours, and prolonged wound healing time.
Malnutrition related to dysphagia (texture-modified diet) as evidenced by client eating less than 50% of minced & moist foods (IDDSI L5) with mildly thick (IDDSI L2) fluids due to client's report that food is unappealing.
Predicted inadequate vitamin intake (vitamin C) related to reduced intake of fruits/vegetables and increased vitamin C needs with commercial tobacco use, as evidenced by bleeding gums and impaired wound healing.
Inadequate mineral intake (zinc) related to malnutrition/inadequate oral intake as evidenced by serum zinc 0.4 mcg/mL, weight loss of 20% in 6 months, and client report of low intake of zinc-rich foods, (e.g., meats, eggs, legumes, etc.).

Table 3 cont.: Problem, Etiology, Signs and Symptom (PES) Statement Examples

Unintended weight loss related to increased difficulty purchasing food and preparing meals due to mobility impairment with foot ulcer as evidenced by weight loss of 5% of body weight in the last 6 weeks.
Inadequate oral intake related to limited access to sufficient, appropriate, safe food as evidenced by recent dietary intake.
Acute disease or injury related malnutrition (coccyx wound) related to poor appetite and cognitive changes/reduced ability to prepare foods as evidenced by moderate loss of subcutaneous fat, moderate muscle loss, and total weight loss of 20% of body weight over 12 months.

Definitions

Client: Generic term used to describe a person accessing care regardless of care setting; patient in the hospital, client in community; resident in long-term care.

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Document Creation/Review

This guideline is based on the best evidence-based information available at the time it was published and avoids opinion-based statements, where possible. It was developed by the BC Provincial Registered Dietitian Wound Sub-Committee of the Provincial Interprofessional Skin & Wound Committee and has undergone provincial partner review.

Created By	British Columbia Provincial Registered Dietitian Wound Sub-Committee with collaboration with Registered Dietitians from across all Health Authorities.
Publication Date	October 2023
Revision Date(s)	
Review Date(s)	

Sub-Committee Health Authorities Representatives		
First Nations Health Authority <ul style="list-style-type: none"> • Tessie Harris RD Fraser Health Authority <ul style="list-style-type: none"> • Hannah Mazure • Alison Schmidbauer RD Island Health <ul style="list-style-type: none"> • Erica Messing RD • Christy Remington RD 	Interior Health Authority <ul style="list-style-type: none"> • Liam Pierce RD, CDSC Northern Health Authority <ul style="list-style-type: none"> • Judy April MAdEd, RD • Tanis Mihalynuk PhD, RD Vancouver Coastal Health <ul style="list-style-type: none"> • Esther Huang • Ellen Mackay MSc RD CDE - Chair • Mignon Radhakrishnan MEd, RD • Swati Scott RD, IBCLC, CDE • Anna Slivinski RD 	Providence Health Care <ul style="list-style-type: none"> • Yoon Heo RD, CNSC Yukon <ul style="list-style-type: none"> • Cynthia Chubbs RD, BScN PHSA BCCA <ul style="list-style-type: none"> • Melanie Newman RD With support from: Shannon Handfield, RN BSN NSWOC Provincial Professional Practice Stream Lead – Wound Ostomy Continence

Appendix A: BC Provincial Burn Centres – Adult

Vancouver Health Sciences Centre
 BC Professional Firefighters Burns, Trauma and High Acuity Unit
 Phone: 604-875-4111 Extension: 540

Victoria Royal Jubilee Hospital
 7 South – Complex Wound Care Unit
 Phone: 250-519-5300 Extension: 17900