

## NUTRITIONAL SUPPORTIVE CARE



Dr. Paul C. Rogers  
Pediatric Oncologist/Hematologist  
BC Children's Hospital

The prevalence of malnutrition (undernutrition) in children with malignancy ranges from 6-50% depending on diagnosis, stage, treatment and socioeconomic status. In developed countries, the degree of undernutrition is related to the pathological type of the malignancy and the degree of tumor involvement. It is most frequently seen in advanced solid tumors such as neuroblastoma, Wilms tumor, Rhabdomyosarcoma, and bony sarcomas, and is less often at presentation of leukemias or lymphomas. In developing countries, undernutrition is more frequently due to socioeconomic conditions with inadequate intake of calories and protein and is probably in excess of 50% of all children (protein calorie malnutrition-PCM; protein energy malnutrition-PEM). During therapy, undernutrition can be exacerbated due to the complex interactions between the host, tumor, treatment and psychological factors.

Nutritional status and relationship to overall survival and disease free outcome is controversial. There are reports that undernutrition correlates with decreased survival, especially in countries where overall undernutrition is prevalent. In developed countries, it does not always appear to be a significant prognostic factor. The study reported by Donaldson in 1981

does show significant correlation of poor nutritional status with decrease in overall survival, most notably in solid tumors. PEM does appear to be associated with impaired tolerance to chemotherapy and impaired immunity with increased risk of complications of therapy such as infection, marrow suppression and altered treatment schedules; conversely nutritional support does improve the feeling of well being and performance status while maintaining or improving immune competence. Pharmacokinetics of drugs are also affected by PEM with decreased clearance, altered distribution and metabolism of drugs. This has been well described for methotrexate.

Enhanced supportive care has played an important role in the overall improved prognosis for pediatric malignancies. However nutritional support has been inconsistently applied. A recent review by the Children's Oncology Group (COG) Nutrition committee reported a wide disparity in nutritional practice of assessment and intervention. This report showed that assessment of nutritional status does not occur on a consistent basis and when it does it is mostly based on weight change alone. Different indices are employed to indicate nutritional status, different guidelines used to categorize malnutrition, and when nutritional intervention appeared to be clinically indicated a variety of approaches were employed. This current status of nutritional practice is due to the dearth of well conducted nutritional trials in pediatric oncology for evidence based recommendations. There is a need for a consistent and rational nutritional approach to the supportive nutritional care of the pediatric oncology patient. Guidelines for assessment of nutritional status, categorization and algorithms for intervention are available and should be utilised. See Table 1. While the true impact of nutritional

intervention in children with cancer is uncertain, pediatricians accept, as fundamental, that appropriate nutrition is essential for growth, development and well being for children without disease. Thus adequate nutrition should be ensured in cancer patients while investigators conduct specific interventional trials to clarify what is the most practical and effective way to assess and nutritionally supplement patients.

**Table 1:**  
**Cancer Cachexia/Malnutrition**

### **Interactive Tumor & Host Related Effects**

- Socio-economic, inadequate supply of nutrients
- Anorexia
- Bowel obstruction
- Malabsorption
- Pain
- Metastatic disease
- Metabolic effects (Paraneoplastic)
- Altered metabolism of protein, fat & carbohydrate
- Increased Resting Energy Expenditure (REE)

### **Therapy Related Effects**

- Multimodal treatments (Chemotherapy, Radiation & Surgery)
- GI: nausea & vomiting, mucositis, impaired digestion, diarrhea, ileus, morphological changes to gut mucosa, decreased appetite
- Infection & antibiotics
- Other drugs
- Other organ toxicities

### **Psychological/CNS factors**

- Anorexia
- Food aversion
- Anticipatory vomiting
- Depression/Anxiety
- Body image
- Loss of control by the patient of his environment
- Parental influence and perceptions
- Changes in taste & smell

## Conclusions

Nutritional supportive care should be undertaken with the same diligence as one does for other supportive care issues such as those related to infections and blood product support. Interventions should be aimed at maintaining adequate intake that is required for growth, improving quality of life and possibly overall survival. Vigilance by the whole multidisciplinary team of the nutritional status of the patient is required. Assistance of those with expertise in nutrition should be sought with the same frequency as other consultants. The pandemic of obesity and its added morbidity necessitates long term nutritional and anthropometric surveillance.

**Table 2:**  
**Anthropometric, Biochemical and Body Mass Evaluations**

### **Anthropometric Measurements & Assessments**

- Weight
- Height/Length
- Head circumference (< 3 yrs)
- Weight for height/length
- Ideal Body Weight (IBW=patients actual Wt divided by the ideal Wt for Ht x 100)
- Body Mass Index (BMI=Wt in Kg divided by Ht in meters squared)
- Height and weight Z score
- Triceps skin fold (fat stores)
- Arm circumference (muscle stores)
- Waist circumference
- Height velocity
- Body Composition Assessment
  - ~ Isotope dilution methods
    - Fat-free mass, fat mass and % body fat
  - ~ Bioelectrical methods
    - TOBEC fat-free mass, fat mass and % body fat
  - ~ Absorptiometry methods
    - Dual photon absorptiometry (DPA) and dual-energy X-Ray absorptiometry (DEXA)
    - Measures 3 components of body: bone mass, lean body mass and fat mass

### **Biochemical Assessments**

- Complete blood count, hepatic biochemistry, renal & fluid biochemistry, sugar
  - ~ Albumin (half life 14-21 days)
  - ~ Transferrin (half life 8-9 days)
  - ~ Prealbumin (half life 2-3 days)
  - ~ Retinol Binding Protein (half life 12 hours)
- Fat status:
  - ~ Cholesterol
  - ~ Lipoproteins
- Trace elements: Zn, Cu, Se, Mg
- Vitamins: A, C, E, Thiamine, Riboflavin
- Global biochemical assessment of antioxidants



**Table 3: Patients at High Risk of Protein Energy Malnutrition (PEM)**

- Undernourished or cachectic at diagnosis
- Relapsed patients
- <2 months old
- <90% of ideal body weight
- Radiation to oropharynx/oesophagus or abdomen
- Chemotherapy treatment protocol with high occurrence of GI or appetite depressing side effects eg. Burkitt's, Osteogenic sarcoma, CNS
- Post surgical complications
- Stemcell transplant patients

**Table 4: Criteria for Intervention**

### **Anthropometric**

- >5% weight loss
- <10th %ile or >90th %ile weight-for-height
- <90% or >120% IBW-for-height
- <5th %ile or >85th %ile BMI-for-age
- <10th %ile height-for-age
- <10th %ile weight-for-age
- subcutaneous fat (triceps skinfolds) and muscle mass (upper midarm circumference) for signs of under/over weight
- Current percentile wt or ht fallen 2 %ile channels

### **Nutrient intake**

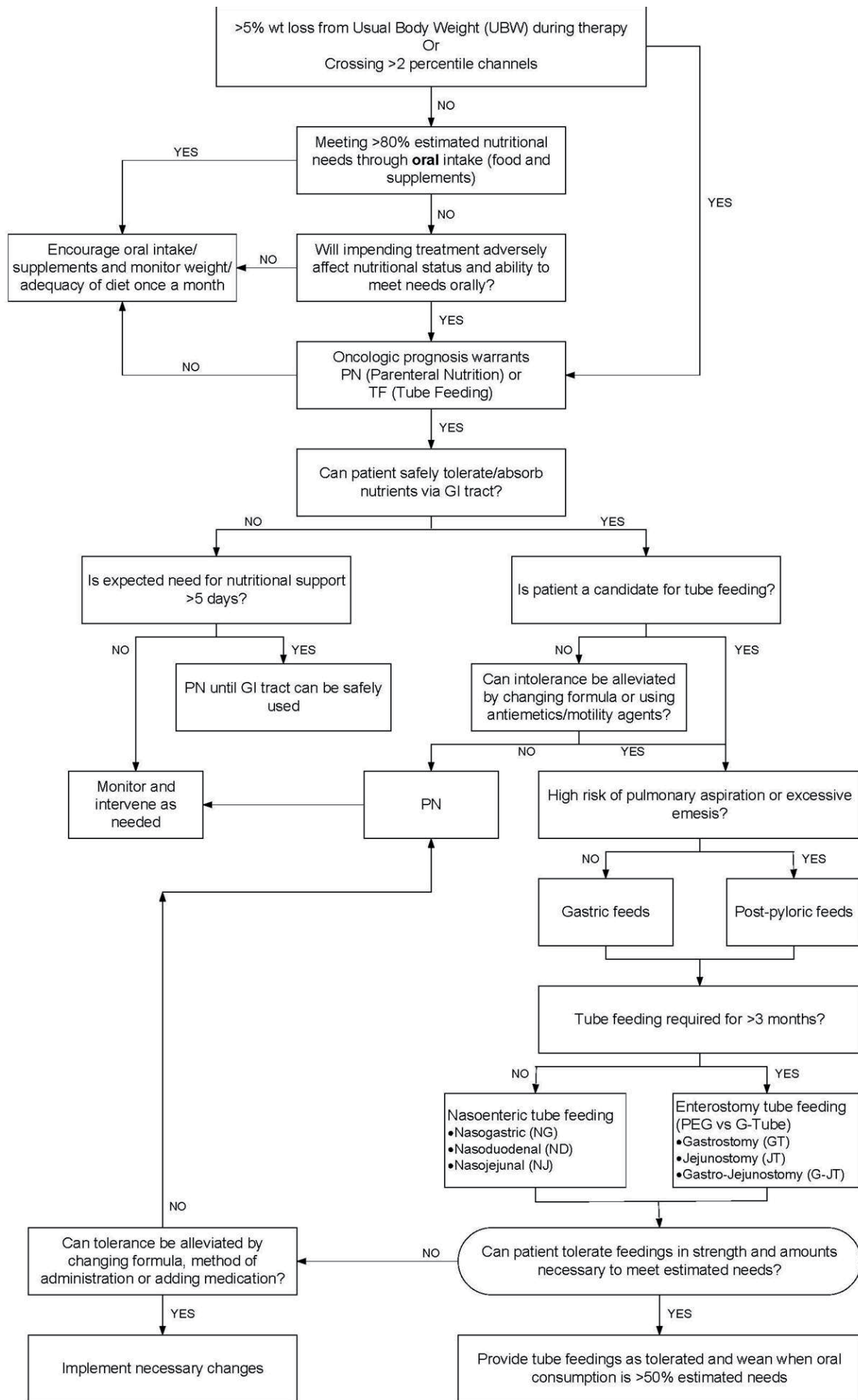
- <80% of estimated needs of calories and protein

*Supportive Care of Children with Cancer. Current Therapy and Guidelines*  
*From the Children's Oncology Group, 3rd ed., 2004.*

### **References:**

- Donaldson SS, Wesley MN, Dewys WD, Suskind RM, Jaffe N. and Van Eys J (1981). A study of the nutritional status of pediatric-cancer patients. *Amer. J. Dis. Child*, 135, 1107-1112.
- Ladas EJ, Sacks N, Brophy P, Rogers PC (2006). Standards of Nutritional Care in Pediatric Oncology: Results from a Nationwide Survey on the Standards of Practice in Pediatric Oncology. *Pediatric Blood & Cancer*, 46(3), 339-344.
- Ladas EJ, Sacks N, Meacham I, Henry D, Enriques L, Lowry G, Hawkes R, Dadd G, Rogers PC (2005). A multidisciplinary Review of Nutrition Considerations in Pediatric Oncology Population: A Perspective From Children's Oncology Group. *Nutrition in Clinical Practice*, 20, 377-393
- Ringwald-Smith K, Cartwright C, Mosby TT (2006). Medical Nutrition Therapy in Pediatric Oncology. In L Elliott, LL Molseed, PD McCallum, B Grant (Editors). *The Clinical Guide to Oncology Nutrition (Second Edition)* (Chapter 11, pp 110-125). American Dietetic Association.
- Sacks N, Ringwald-Smith K, Hale G (2004). Nutritional Support. In: Altman A, Editor. *Supportive Care of Children with Cancer* (pp 243-261). Baltimore: The Johns Hopkins University Press.
- Sala A, Pencharz P, Barr RD (2004). Children, Cancer, and Nutrition – A Dynamic Triangle in Review. *Cancer*, 100, 677-687.

Table 5: Algorithm for Nutritional Intervention in the Pediatric Oncology Patient



# EDUCATION DAYS

## PEDIATRIC ONCOLOGY/HEMATOLOGY EDUCATIONAL DAY

Friday, October 30, 2009

BC Children's Hospital, Chan Centre for Family Health Education, Vancouver, BC

The Provincial Pediatric Oncology/Hematology Network, in conjunction with the Division of Pediatric Oncology/Hematology/BMT, BC Children's Hospital, is committed to providing ongoing educational and discussion opportunities to support physicians and health care providers in the care of the child with cancer and hematological disorders.

This educational day has been developed to reflect the needs of community pediatricians, family physicians, and multidisciplinary health care professionals in their management of children with cancer and hematological disorders.



### PROGRAM:

- 0830 Advances in the Management of Brain Tumours
- 0930 *Break*
- 1000 Oncologic Emergencies
- 1045 Pain & Symptom Management in the Palliative Setting
- 1130 Management of Thrombosis
- 1215 *Lunch*
- 1330 Work-Up and Management of Bleeding in Children
- 1415 Diagnosis and Treatment of Fungal Infections in the Immunosuppressed Child
- 1500 Long Term Outcomes and Surveillance Guidelines for Survivors of Childhood Cancers
- 1545 *Break*
- 1600 Discussion Groups:
  - ~Pediatricians and Family Practice
  - ~Nurses and Allied Health  
(Practice Updates and Coordination of Care)
- 1700 *Wine and Cheese Reception*

### REGISTRATION:

Online: [www.ubccpd.ca](http://www.ubccpd.ca)  
Phone: (604) 875-5101  
Fax: (604) 875-5078  
Email: [cme.cpd.info@ubc.ca](mailto:cme.cpd.info@ubc.ca)  
Mail: UBC CPD  
855 West 10th Avenue  
Vancouver, BC V5Z 1L7

Fees:	Before Oct 26	On-site
Physicians	\$175	\$199
Nurses & Allied Health	\$119	\$139
Residents & Students	\$79	\$89

## WELCOME BACK: FACILITATING THE RETURN TO SCHOOL FOR CHILDREN WITH CANCER

Friday, October 23, 2009

Eric Hamber Secondary School, Vancouver, BC

### GOAL:

To educate school personnel on the cognitive and late effects of childhood cancer treatment and to improve the transition of childhood cancer survivors from clinic to classroom

For: Elementary and Secondary School Teachers, Intermediate and Advanced Level Nurses, Social Workers, Parents of children with a history of any type of cancer

### LEARNING OBJECTIVES:

- Discuss the treatment of childhood cancers and the side effects of survivorship
- Recognize the physical, cognitive, and emotional challenges that childhood cancer survivors face
- Develop strategies to help meet students' short- and long-term educational needs
- Access resources that support schools and the families of childhood cancer survivors



### FOR MORE INFORMATION, CONTACT:

Sharon Paulse, Patient Services Manager  
The Leukemia & Lymphoma Society of Canada  
310 - 1682 West 7th Avenue, Vancouver, BC  
Phone: 604-733-2873 Fax: 604-733-2848  
Toll Free: 1-866-547-5433  
Email: [sharon.paulse@LLS.org](mailto:sharon.paulse@LLS.org)  
Website: [www.LLS.org/wes](http://www.LLS.org/wes)

# CHANGES...AT BCCH

## NURSE CLINICIANS

The Oncology/Hematology BMT Program at BC Children's Hospital (BCCH) has recently implemented Oncology Nurse Clinician positions in our program to help facilitate and streamline communication with our community partners. The Nurse Clinicians:

- act as a clinical resource for nurses at BCCH as well as to community care providers around the province in the care of pediatric oncology patients
- function as the team leader of the interdisciplinary care team, consulting and collaborating with team members to ensure consistent and integrated family-centered care within BCCH and between BCCH and provincial partners and community agencies



### Karen Craigie, RN

Karen has been a nurse since 1978 and as a pediatric oncology nurse for 10 years  
Works with: Drs. Jeff Davis, David Dix, John Wu  
Clinic hours: Mon-Fri, 8:00 am - 4:00 pm  
Phone: 604-875-2345 local 5639  
Email: [kcraigie@cw.bc.ca](mailto:kcraigie@cw.bc.ca)



### Diane Distefano, RN

Diane has been a nurse for 25 years and as a pediatric oncology nurse for 23 years. Besides her role as a nurse clinician, she is part of the Apheresis Program  
Works with: Drs. Paul Rogers, Kirk Schultz, Evan Shereck, Fellows  
Clinic hours: Mon-Fri, 8:30 am - 4:30 pm  
Phone: 604-875-2345 local 7097  
Email: [ddistefano@cw.bc.ca](mailto:ddistefano@cw.bc.ca)



### Naomi Evans, BN

Naomi has been a nurse since 2000 and a pediatric oncology nurse for about 7 years. She has recently joined the clinic as the neuro-oncology nurse clinician looking after all children with neuro-oncology diagnoses  
Works with: Drs. Chris Fryer, Juliette Hukin, Rod Rassekh  
Clinic hours: Mon-Fri, 8:30 am - 4:30 pm  
Phone: 604-875-2345 local 6017  
Email: [nevans@cw.bc.ca](mailto:nevans@cw.bc.ca)



### Suzanne Horn, RN

Suzanne has been a nurse for 19 years and as a pediatric oncology nurse for the past 18 years.  
Works with: Drs. Sheila Pritchard, Caron Strahlendorf  
Clinic hours: Mon-Fri, 10:00 am - 6:00 pm  
Phone: 604-875-2345 local 4822  
Email: [shorn@cw.bc.ca](mailto:shorn@cw.bc.ca)



### April Phillips, RN

April has been a nurse for 16 years and as a pediatric oncology nurse for 14 years.  
Works with: Drs. Mason Bond, Rod Rassekh  
Clinic hours: Mon-Fri, 8:00 am - 4:00 pm  
Phone: 604-875-2345 local 7754  
Email: [aphillips2@cw.bc.ca](mailto:aphillips2@cw.bc.ca)

## DISCHARGE PLANNING NURSE

In addition to our Nurse Clinicians, the Discharge Planning Nurse is a valuable resource for our community partners. The Discharge Planning Nurse:

- participates in the assessment of discharge needs prior to discharge
- communicates with the health care team at BCCH and those in the community regarding discharge plans



### Cecilia Lau, RN BSN

Cecilia has been a nurse since 2001. She has worked as a staff nurse for 6 years and a primary nurse for the oncology fellows for 2½ years. Since July 2009, she has been working as the Discharge Planning nurse in the Oncology inpatient units  
Office hours: Mon-Fri 8:30 am - 4:30 pm  
Phone: 604-875-2345 local 7626  
Email: [clau4@cw.bc.ca](mailto:clau4@cw.bc.ca)

*Nurse Clinicians and the Discharge Planning Nurse can be reached through hospital paging (604-875-2161).*

## NETWORK COORDINATOR

Our Network has also undergone changes. With Grace Chan moving on to be the Program Manager of the Oncology/Hematology/BMT Program at BCCH, Paulina Chen has joined our team as the new Network Coordinator.



### Paulina Chen, RN BSN

Paulina has been a nurse for over 25 years. Her experiences include staff nurse, primary nurse, nursing instructor for BC Institute of Technology (BCIT) and University of British Columbia (UBC), Clinical Coordinator for Camp Goodtimes and Discharge Planning nurse. She now takes on the role as the coordinator for the Provincial Pediatric Oncology Hematology Network (BC POHN)  
Office hours: Tues, Wed and alternating Thurs 8:30 am - 4:30 pm  
Phone: 604-875-2345 local 7435  
Email: [ppchen@cw.bc.ca](mailto:ppchen@cw.bc.ca)

Return Undeliverable Canadian Addresses to  
BC Children's Hospital  
Provincial Pediatric Oncology/Hematology Network  
Attn: Paulina Chen, Network Coordinator  
Room A119, 4480 Oak Street  
Vancouver, BC V6H 3V4

## CHANGES...IN THE COMMUNITY

### NORTHERN HEALTH PAEDIATRIC REGIONAL CLINIC

The Paediatric Regional Clinic is in full operation at the Prince George Regional Hospital! The clinic is located adjacent to the paediatric inpatient ward at PGRH. Included in the clinic space are 8 clinical assessment rooms, an on-site dietician, nursing unit clerk, seven pediatricians and one "soon to be" nurse navigator. The clinic is prepared to provide excellent care to regional paediatric patients and families in Northern BC with a superb staff and resources.



Currently the Paediatric Regional Clinic is host to 16 clinics that run clinics weekly, monthly, or quarterly. The types of clinics that serve paediatric patients at the Paediatric Regional Clinic include: oncology, cardiology, endocrinology, genetics, diabetes, asthma, neurology, nephrology, cystic fibrosis, rheumatology, autism, ADHD, follow-ups, shakedown and speech therapy with plans of expanding clinic offerings. For more information about the clinic please phone 250-565-5825.



### VICTORIA GENERAL HOSPITAL, VANCOUVER ISLAND PATIENT FAMILY LIAISON IN PEDIATRIC ONCOLOGY

My name is Susan Kerr, and as of March 2009 I have taken on the role of Patient Family Liaison in Pediatric Oncology at Victoria General Hospital on Vancouver Island. My position and the opportunities that it presented were something that I envisioned for the oncology families for quite some time.

Supporting my son Jacob through Neuroblastoma treatment in 2005 led my family and me on a journey like no other we had ever been on. My husband and I never imagined the impact this diagnosis would have on not only our immediate family, but our extended families as well.

Vancouver Island was always home to us between treatments and after, but there was a horrible sense of isolation that added to the uncertainties of

supporting a child through cancer treatment. The connections and support my family had at BC Children's Hospital and at Ronald McDonald House seemed to slip away as we made our way back home to Victoria. It was during Jacob's treatment that I realized Island families desperately needed options.

Part of my job is to provide families with information, support and networking options, and I maintain regular contact with Dan Mornar, Parent/Patient Advocate at BC Children's Hospital. I meet with the oncology team at Victoria General Hospital on a weekly basis as well. The first month I had 4 families on my contact list, and at this point in time, six months later, I have 17. It is my hope that this list continues to grow.

### The Provincial Pediatric Oncology/Hematology Network

The Network is an interdisciplinary organization whose goal is to ensure appropriate diagnosis, management, follow-up, and end-of-life care for pediatric patients with malignancies and blood disorders.

The Network supports community hospitals and practitioners, and develops partnerships with other health care facilities to enable seamless and integrated care for patients and families on treatment and off treatment.

It will further develop and enhance the research programs of basic, translational, and clinical research to better childhood cancer control and improve outcomes for these patients and their families.

### For More Information

To learn more about the Provincial Pediatric Oncology/Hematology Network, or to submit articles or stories to this newsletter, please contact:

Paulina Chen  
Network Coordinator  
604-875-2345 ext 7435  
ppchen@cw.bc.ca

Dr. Chris Fryer  
Network Clinical Consultant  
604-875-2345 ext 6884  
cfryer@cw.bc.ca

### Steering Committee Chairs

Dr. Paul Rogers  
604-875-2345 ext 7839  
progers@cw.bc.ca

Barbara Poole  
604-675-8000 ext 7999  
bpoole@bccancer.bc.ca

Childhood cancer affects the entire family, and providing an avenue of support on Vancouver Island is an invaluable opportunity for improved health and wellness for everyone.

I am so grateful to be in this position and look forward to the upcoming months filled with events, family meetings, and building on our networks of support.



Susan Kerr, Patient Family Liaison  
Pediatric Oncology  
Victoria General Hospital  
Phone: 250-888-5862  
Email: susanlkerr@shaw.ca