



Hematopoietic Stem Cell Transplantation in Children

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Definition:

Hematopoietic stem cell transplantation (HSCT) is a special form of therapy that involves taking cells that are normally found in the bone marrow (stem cells) from the donor and giving them back, by intravenous infusion, to the recipient, either the same person (autologous transplant) or to another person (allogeneic transplant) after their own bone marrow has been eliminated. Stem cells can be obtained from the bone marrow, peripheral blood, or cord blood after the baby is born. Therefore, the term HSCT is more preferably used than the term bone marrow transplantation (BMT). The three types of allogeneic donors are syngeneic, related, and unrelated. When the donor is an identical twin, donation is termed syngeneic. As the names imply, related allogeneic donors are relatives, and unrelated donors are identified through a donor registry or from a cord blood bank. The decision to use a certain type is dictated by the patient's disease, condition, and donor availability.

Indications:

HSCT is designed to establish marrow and immune function in patients with a variety of acquired and inherited malignant and nonmalignant disorders. These include hematological malignancies (eg. leukemia, lymphoma), nonmalignant bone marrow disorders (aplastic anemia), and genetic diseases associated with abnormal hematopoiesis and function (thalassemia, sickle cell anemia, and severe combined immunodeficiency). HSCT is also used in patients undergoing high-dose chemotherapy for the treatment of malignant diseases for which hematological toxicity

would otherwise limit drug administration (neuroblastoma, rhabdomyosarcoma, and brain tumors), and in patients with metabolic disorders to provide an enzyme source to correct the underlying defect (storage diseases).

Transplant Team:

The team consists of the BMT physician, nurse, social worker, dietician, physical therapist, spiritual care, and other team members including pharmacists, respiratory therapists, infectious disease specialist, dermatologist, gastroenterologist, radiation specialist, psychologist, and child life specialist.

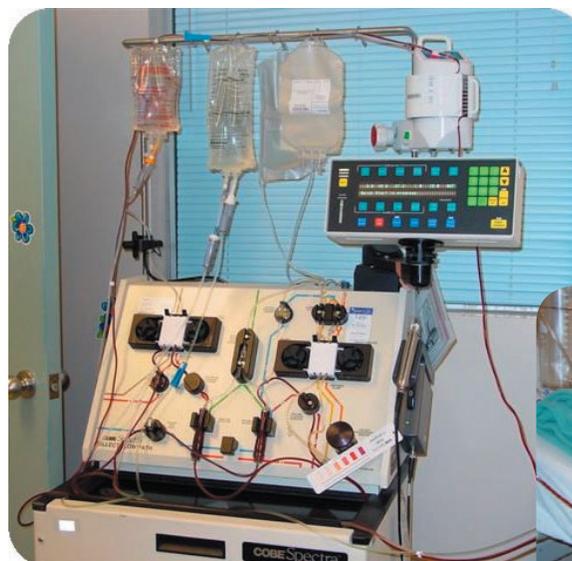
Donor Selection:

Once a disease process has been identified and transplant is considered, an appropriate donor must be identified. In a similar way to blood types, all patients have specific tissue types. Human leukocyte antigens (HLA) are proteins found in the

membranes of nearly every cell in the body with particularly high concentrations on the surface of white blood cells. HLA antigens are the major determinants used by the body's immune system for recognition and differentiation of self from non-self and therefore responsible for rejection of foreign tissue. The best possible match results in the least complications. For allogeneic transplants, patients and potential donors have their white blood cells tested for three antigens – HLA-A, -B and -DR. Each individual has two sets of these antigens, one set inherited from each parent. For this reason, it is much more likely for a sibling to match the patient than an unrelated individual and much more likely for persons of the same racial and ethnic backgrounds to match each other. In general, a patient has a 25% chance of having a sibling match. A 6-of-6 match refers to being matched at both sets of these three antigens (HLA-A, -B and -DR). If the donor and recipient are not a 6-of-6 match, they are said to be mismatched. This information helps the transplant physician determine the risks of non-engraftment and graft-versus-host disease (GVHD).

Donor and Recipient Testing:

Both the donor and recipient go through different preparations that include clinical and laboratory



Jesstin - 15 year old with Ewing's Sarcoma undergoing peripheral blood stem cell harvest for autologous transplantation



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Networks and a Cancer Control Strategy



Barbara Poole, M.P.A., B.Comm

Provincial Pediatric Oncology/Hematology Network Co-Chair

Barbara possesses a wealth of experience and expertise in planning and resource allocation for BC's health sector. In addition to her role as Network Co-Chair, she is the Provincial Process Leader for Surgical Oncology at BCCA. Having a stepson who is an adult survivor of childhood leukemia, Barbara has a special and unique contribution to the Pediatric Oncology/Hematology Network.

Paediatric Oncology could be viewed as a success story in health care. Over the past several decades advances in medicine have made it possible for more and more children to survive this terrible disease. However this means that more children are living with the after effects of either the disease and/or the effect of its treatment. So to truly have an impact on this disease on the lives of children, we must do more than what we have been doing.

At both the BC Children's Hospital and the BC Cancer Agency, we realize that we must change in the way cancer is managed! Such a change requires a change in the way we think about cancer and the way we manage the present cancer program. Cancer control is a mandate that aims to prevent cancer, cure cancer, and increase survival and quality of life for those who develop cancer by converting the knowledge gained through research, surveillance and outcome evaluation into strategies and actions.

This change requires us to become more than organizations that provide care – we must become “translational research” organizations. The translational research organizational model links the pathway

from discovery research to improved health outcomes, and vice-versa. It acknowledges that there are two distinct uptakes of information. The first is innovation and the second is the uptake of clinical research into practice and population application. The model is dependent on establishing and nurturing the “knowledge transfer” environments linking these separate domains.

Clearly, cancer control is too complex and broad a challenge for any single jurisdiction or organization to achieve by acting alone. A coordinated approach through a Network can improve access, integration, and continuity of programs and services in terms of cancer control. As a result, better prevention, detection, diagnosis, treatment, follow-up, and palliative care is possible. Networks facilitate the delivery of quality care on a population basis through the development of clinical practice guidelines and standards of practice, and the implementation of these things by:

- Offering continuing education/mentorships/preceptorships;
- Monitoring outcomes through data management and analysis;
- Conducting and translating research;
- Consulting and liaising with stakeholders.

Networks also provide an opportunity for feedback on initiatives and existing services, and the implementation of delivery of

evidence-based oncology practice. This feedback has led to significant clinical guidelines upgrades and expansion of web-based services and resources for care providers working in communities. Well-developed networks can provide a resource to communities to meet many existing needs.

Put more simply, networks translate knowledge into action.

Networks are different from the usual organizational structures. There are two key features of a network that set it apart from other systems -- its interconnectivity and its informal nature. It is for this reason that Networks can be more responsive. Networks are a useful structure for provincial health strategies, which involve autonomous organizations and self-regulating professions.

What makes a network successful?

Well, first and foremost a network has to focus on topics that are important to its members. The members need to share core values. The network is built upon the personal relationships of its members. Also important is the structure of the network - it needs to have an active and passionate core group and be led by someone who is a respected opinion leader. Lastly there are supports to networks that help let the network continue to grow. These include ensuring members have the time and support to be involved, supporting communications between members, and providing forums for dialogue.

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evaluations to determine health status and screen for blood borne pathogens. The harvest (collection) of donor stem cells is usually performed by multiple bone marrow aspirations from the iliac crest under a general anesthetic in the operating room. A volume of approximately 15 ml/kg is usually removed. Some donors will require a blood transfusion following their donation while the majority will only require iron supplementation. Some donors/patients (especially autologous transplants) will have their stem cells harvested from the peripheral blood. Chemotherapy and/or growth factors (G-CSF) are administered prior to harvesting to mobilize their stem cells

into the peripheral blood. The patient's stem cells are then collected via a cell separator, cryopreserved, and thawed at the time of reinfusion.

Transplantation process:

For the recipient, this is generally divided into the following 5 phases:

- 1) conditioning
- 2) stem cell infusion
- 3) neutropenic phase
- 4) engraftment phase
- 5) post engraftment period

Conditioning typically begins 7-10 days prior to stem cell infusion. The purpose is to deliver chemotherapy and/or radiation to eliminate malignancy, prevent rejection of new stem cells, and create space for the new cells. The most common conditioning regimens include cyclophosphamide and busulfan ± total body irradiation. A number of other combinations are also used and commonly include drugs, such as etoposide, melphalan, and others. In addition, anti-T cell agents, such as antithymocyte globulin (ATG), may be added to the regimen in certain cases to prevent rejection of the graft. Patients undergoing allogeneic transplant also receive cyclosporine and methotrexate

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Jesstin's cryopreserved stem cells are thawed, prepared and reinfused.

(or other immunosuppressive therapies) for GVHD prophylaxis. Patients generally tolerate conditioning well.

Stem cell infusion is performed by infusing the harvested stem cells through a central venous catheter, much like a blood transfusion. Before infusion, the patient is premedicated with acetaminophen, diphenhydramine, and hydrocortisone to prevent reaction. Anaphylaxis, volume overload, and transient GVHD are the major potential complications. In addition, stem cell products that have been cryopreserved (autologous) contain dimethyl sulfoxide (DMSO) as a preservative and potentially can cause renal failure, in addition to the unpleasant smell and taste.

Neutropenic phase: This starts following stem cell infusion and lasts until the infused stem cells start multiplying which may be up to 4 weeks; during this time the patient essentially has no effective immune system. Acute toxicities from the conditioning therapies occur during this period and include mucositis (inflammation and breakdown of mucous membranes causing pain, anorexia, poor nutrition, and increased risk of infection), infections (catheter related, gram negative sepsis, fungal infections, and viral infections especially respiratory viruses, and herpes simplex virus), and increased transfusion requirement. Intensive supportive care is the mainstay of successful passage through this phase.

Engraftment (post neutropenic) phase: During this period the greatest challenges are management of GVHD and prevention of infections (especially CMV). In HSCT, the immune system is part of the transplanted organ; therefore, the new immune system can attack the entire body. When this occurs, it is termed GVHD. This generally involves the skin, gastrointestinal tract, and the liver causing rash, diarrhea, and

hyperbilirubinemia, respectively, in its acute form. This can continue as a mild localized disease to an extensive multisystem disease in its chronic form. The good side of GVHD is the graft versus leukemia (GVL) effect that

also may be present. In addition, patients may develop an entity called

hepatic veno-occlusive disease (sinusoidal obstruction syndrome) that is characterized by hepatomegaly, jaundice, fluid retention, and platelet transfusion refractoriness. It develops in 5-20% of patients and is related to the intensity of the preparative regimen. The diagnosis is made on clinical grounds. The prognosis is related to the degree of liver and kidney dysfunction. The treatment is supportive with careful management of fluid overload.

Post engraftment period: This period lasts for months to years and is characterized by poor T-cell immunity, slow immune reconstitution, and management of acute and/or chronic GVHD. Patients who received total body irradiation often have significant splenic dysfunction. Therefore, the risk of infection from encapsulated organisms is increased and any fever should be considered as a sign of infection and treated empirically until proven otherwise. In addition, varicella zoster virus (VZV) infection traditionally may develop in 40-50% within the first year of transplant. Because there is a high risk of dissemination (30-50%) and potential risk of death among transplantation recipients, prompt institution of intravenous antiviral therapy is recommended if VZV reactivation or primary infection occurs. All patients should receive pneumocystis carinii pneumonia (PCP) prophylaxis until evidence of immune reconstitution develops. The peak incidence of nonbacterial, nonfungal interstitial pneumonia (diffuse infiltrates with hypoxia) is 40-80 days post-transplant. The most common causes of interstitial

pneumonia are CMV, PCP (in patients not receiving prophylaxis), and "idiopathic" pneumonias. Prompt hospitalization and investigation is required.

Immunizations:

The prevention of infectious complications plays an important role in improving long-term outcome. Re-immunization for HSCT recipients may prevent the development of preventable diseases. See accompanying article on immunization recommendations.

Important follow-up issues:

Medications (steroid/cyclosporine):

Patients are usually discharged from hospital on GVHD prophylaxis or therapy. Some of these have specific complications that need to be monitored. Hypertension, hypomagnesemia, insulin-dependent diabetes mellitus, hyperkalemia, photosensitivity, renal impairment, and poor bone mineralization are some examples.

Blood products: If transfusions are required in the first 12 months following transplant, these blood products should be irradiated to prevent GVHD in these immunocompromised hosts. Patients previously supported by CMV seronegative blood products should continue CMV negative transfusions.

Activities of daily living: Return to school varies but most children are back to school within a year following transplant. The patient should be encouraged to exercise.

Appetite starts to improve as salivary function, smell, and taste recover after chemoradiotherapy.

Anorexia may persist in patients receiving cyclosporine or tacrolimus (an anti-GVHD drug).

Contact with household pets (but not feces) is allowed if good hand washing follows the handling of pets. Contact with exotic pets, ducklings, chicks, and stray cats should be avoided.

Swimming in public or private pools, hot tubs, etc., should be discouraged until there is evidence of immune reconstitution. Patients should avoid the use of pesticides, solvents, fertilizers, or other potential myelosuppressive agents. The patient should use sun blocking creams (SPF 30 or greater) when outdoors to reduce the possibility of precipitating cutaneous GVHD. A

Jesstin received an autologous transplant on February 18, 2005. He engrafted well and is now discharged from the hospital. One of his least favorite moments in transplant was smelling the stem cell reinfusion which he describes as "rotten oysters". His word of wisdom to others who are to go through transplant is to be patient with the recovery process and to celebrate each small step of improvement.

comprehensive guide to going home after transplant is reviewed with and given to patients and families prior to discharge. This guide will be accessible shortly on our website (www.kidscancer.bc.ca).

Long-term complications (see Table 1): During follow-up visits special attention should be given to complications that relate to chemoradiotherapy (growth, development, pubertal stage, pulmonary, neurologic, and psychologic abnormalities), GVHD (skin, oral, ocular, lung, and gut), immunosuppression (infection), and underlying disease (relapse). In addition, the small risk of secondary malignancy should be kept in mind.

The development of new oral pain or dryness may alert to the development of chronic GVHD. Cataracts may develop 1-6 years after total body irradiation. The use of chronic steroid therapy may contribute to the development of cataracts. In patients with chronic GVHD, a Sjogren's-like syndrome with ocular sicca (dryness) may develop.

Growth, thyroid, and gonadal dysfunction may develop. Children require careful long-term follow-up and most will require hormone supplement for development of secondary sexual characteristics.

Restrictive pulmonary abnormalities appear to peak at one year post-transplant. However, clinical restrictive lung disease is infrequent. Among patients with extensive chronic GVHD, 5-10% will develop severe obstructive airway disease that resembles obliterative bronchiolitis.

Leukoencephalopathy may rarely develop in patients who receive intrathecal methotrexate and cranial irradiation. Some children, especially those who received cranial irradiation, may exhibit learning difficulties (especially in mathematics and abstract thinking).

Evidence suggests these abnormalities begin to appear 24-42 months post-transplant. Recognition of the problem, referral for psychological testing and special educational instructions should be considered for these children.

Patients develop a variety of coping mechanisms to deal with intensive medical care and life-threatening illnesses. Drug therapy with prednisone may increase emotional lability or provoke frank psychosis. Cyclosporine may cause tremors, and contribute to seizure development, as well as muscle cramping, lethargy and persistent nausea.

Rejection, relapse, and secondary malignancies: Late rejection more than one year post transplant has been very unusual (less than 5%). The risk of relapse is greatest in patients who have persistent disease at the time of transplant. For hematological malignancies most relapses occur within 1-2 years following transplant and few relapses have been observed beyond 3 years. The risk of developing a second malignancy (e.g. breast cancer, thyroid cancer, skin cancer, leukemia, or sarcomas) is greater than that

expected in the general population. The risk may be related to chemoradiotherapy exposure, an underlying genetic predisposition to cancer, or interactions among these factors.

In summary, many children are surviving HSCT and require long-term follow-up care. Long-term survivors are at risk for many complications that relate to the underlying disease for which transplantation is performed, as well as prior therapy, conditioning therapy, immunosuppression, and GVHD. Specific screening and prevention measures can lessen the risk of these complications.



Dr. Jastaniah is currently doing research work on immune responses in ALL and complications related to bone marrow transplants and hemoglobinopathy patients.

Table 1: Screening Considerations for Complications in Long-Term HSCT Survivors

Complication	Health Measures for the Physician	Health Behaviors for the Patient
Immunodeficiency	Immunize at 12 months with DT/Td, IPV, HepB, Hib, pneumococcal vaccine, and influenza Immunize at 2 years with MMR (if not contraindicated) PCP prophylaxis	Avoid eating raw meats, contact to animals, and exposure to construction sites.
Chronic GVHD	Monitor for GVHD (referral) Physiotherapy to prevent contractures Artificial tears (keratoconjunctivitis)	Use sunscreen
Secondary malignancies	Screen for skin, oropharyngeal, and pulmonary neoplasia Mammogram (patients >25 y) Gynecologic exam (Pap smear)	Avoid smoking Minimize sun exposure Perform breast and skin self-examination
Endocrinopathies/ Osteopenia	Monitor TSH, T4, growth velocity, secondary sexual characteristics, FSH, LH, and testosterone Recommend bisphosphonates, exercise, and calcium Consider hormone replacement	
Pulmonary	Pulmonary function test (including diffusion capacity)	Avoid smoking
Cardiac	ECC with exercise stress	Avoid heavy weight lifting
Renal	Serum creatinine, Blood pressure	
Dental	Dental assessment (caries)	Regular teeth brushing
Ocular	Ophthalmologic examination and Schirmer test	
Hearing	Audiometry	
Avascular necrosis	Consider hip replacement	
Learning impairment	Psychological testing, including cognitive testing and IQ testing	

Immunization in Oncology and Hematology Patients and Families

Current Recommendations

General Guidelines

- Updated guidelines for immunization schedules can be found at the BC Centre for Disease Control. Please visit the website for details of the following:
<http://www.bccdc.org/content.php?item=193>
- 2.0 Schedule A: Basic Immunization
- 3.0 Schedule B: Children 1 year but <7 years
- 4.0 Schedule C: Children 7 years to 18 years
- 8.0 Vaccines recommended for high risk clients
- 9.0 Adult/Child HSCT recipients: list of free vaccines
- 11.0 Worksheet for child HSCT recipients
- Documentation: It is very important to keep an accurate immunization record of the patient and all household members.
- Patients not receiving chemotherapy can be assumed to be normal and receive regular scheduled immunization.

Immunosuppressed Patients

Definition:

- Oncology patients receiving chemotherapy should be regarded as immunosuppressed during and for 3 months post chemotherapy.
- Allogeneic BMT patients not on immunosuppressive therapy should still be regarded as immunosuppressed for 2 years post transplant.

Guidelines:

- Live attenuated vaccines must be avoided, i.e. oral polio, BCG, MMR (Measles, Mumps, Rubella), Varicella.
- Killed vaccines may be given as per schedule to immunosuppressed children without extra risk but may not be effective. Killed vaccines can be given provided the Absolute Neutrophil Count (ANC) and Absolute Lymphocyte Count (ALC) are $>1.0 \times 10^9/L$.
- Influenza vaccine should be given on an annual basis to children >6 months of age when $ALC >1.0 \times 10^9/L$.

- Acute lymphoblastic leukemia patients:
It is best to wait until they reach the maintenance phase of chemotherapy and give scheduled immunization prior to steroid pulse.
- Passive Immunization for exposed patients:
 - Hepatitis A Immunoglobulin 0.02 mL/kg IM (max dose 2 mL)
 - Hepatitis B HBIG 0.06 mL/kg IM (max dose 5 mL) in previously unvaccinated patients
 - Measles Immunoglobulin 0.5 mL/kg IM (max dose 15 mL); give within 6 days of exposure regardless of previous immunization status
 - Varicella VZIG 1 vial/10 kg IM (max 5 vials); give within 48 hours of exposure in susceptible individuals

- High Risk Hematology Patients:
Refer to Section II 8.0 of BC Centre for Disease Control Guidelines
- Splenectomy or Sickle cell patients (Hb SS, SC, Sb-thal)

One month before splenectomy or when diagnosed (on top of all the regular immunizations):

- ~Prenar*, Pneumovax-23 (then q5 years), Menjugate-C (*No Prenar if patient is fully immunized with the most current immunization schedule containing Prenar)
- ~Hepatitis B vaccine (if patient likely to need blood products)
- ~Influenza vaccine (annually) for sickle cell patients only

- Hemophilia patients

In addition to regular immunizations, give Hepatitis A and Hepatitis B vaccines subcutaneously in the first year of life.

- b-Thalassemia Major

In addition to regular immunizations, give Hepatitis A and Hepatitis B vaccines before starting transfusions.

Household Members of Immunosuppressed Individuals

- Oral polio vaccine is the only live attenuated vaccine which should NOT be given to household members of an immunosuppressed child as the virus is shed for up to 12 weeks post immunization.
- Immediate family (parents and siblings) and household members should receive all currently recommended vaccines to reduce the risk of exposure of the immunosuppressed patient. These include:
 - ~Varicella vaccine for anyone with a negative history of varicella zoster virus (VZV) infection
 - ~Influenza vaccine on an annual basis
 - ~Meningococcal C conjugate vaccine
 - ~Pneumococcal conjugate vaccine

Post Treatment Patients

- For all patients except allogeneic transplants, active immunization should be continued. Many patients will have diminished titres. We recommend evaluating the immunity status six months after completing all chemotherapy. Measure antibody titres for polio, tetanus, measles, mumps, rubella, HSV, VZV, Hepatitis B. Boosters including live vaccines to be given depending on immune status.
- Allogeneic BMT patients should still be regarded as immunosuppressed for two years post transplant. A complete re-immunization with exception of no live viruses should be started according to Section 11.0 of BC Centre for Disease Control. Live vaccines should not be given until two years post treatment.

For more information:

Sung L. et al, Practical Vaccination Guidelines for Children with Cancer. *Pediatr Child Health* 2001;6;379-383.

Network Activities

Electronic Roadmaps

The pilot project for the use of electronic roadmaps on ALL patients is now underway at BCCH, Victoria, Prince George and Surrey.

Regional Meetings

An education and meeting day was held at Kelowna General Hospital on October 15, 2004. It was well attended by pediatricians, nurses, and health care providers from Kelowna, Vernon, Penticton and Nelson.

An education session on pediatric oncology palliative care is planned for May 17, 2005 at Prince George Regional Hospital.

Contact us if you wish to have continuing education related to pediatric oncology/hematology held in your region.

Website

The website www.kidscancer.bc.ca is being modified and revised. It will have a new look with updated information in June 2005. We appreciate feedback on the website as we continue to develop it.

Long Term Follow-Up

We recognize that there is an urgent need to establish a program to follow-up the approximately 3,000 survivors of childhood cancer in BC. A proposal for a Surveillance Program for Adult Survivors of Childhood Cancer has been made to the PHSA. The proposed program will be based at BC Children's Hospital with satellite clinics in Victoria, Prince George, Kelowna and Surrey, involving a health care team comprising of pediatric oncologists, pediatricians, family practice oncologists, nurses, and other specialties.

Palliative and Psychosocial Care

Plans are underway to establish working groups to assess and coordinate palliative and end of life care as well as psychosocial care for pediatric oncology patients around the province.

For more information relating to the Network and its activities, please contact Grace Chan, Network Coordinator, gchan@cw.bc.ca

Mark Your Calendars

Balding for Dollars (www.baldingfordollars.com)

April 16, 2005, 11:00 am - 4:00 pm

Chan Family Health Education Centre & Research Institute

For more information, contact Kelly May at (604) 240-4337 or Dan Mornar at (604) 721-0529 or (604) 875-2345 ext. 6477 or email dmornar@cw.bc.ca



APON - Association of Pediatric Oncology Nurses - Local Chapter (www.apon.org)

May 19, 2005, 6:00 pm

BC Children's Hospital Ambulatory Care Building, Room KO-155

For more information contact Kerri O'Reilly at (604) 875-2345 ext 7693

Childrun - 20th Anniversary Celebration (www.childrun.com)

June 5, 2005

North-east parking lot of BC Children's Hospital

For more information, contact the BCCH Foundation office at (604) 875-2444



SIOP / ICCCP (www.siop.nl/siop2005 and www.icccpo.org)

September 21-24, 2005

Vancouver Convention and Exhibition Centre, Vancouver, BC

International Confederation of Childhood Cancer Parent Organizations (ICCCPO)

in conjunction with the 37th Congress of the International Society of Pediatric Oncology (SIOP)

2005 Theme: Pediatric Oncology

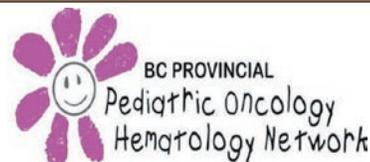
BC Cancer Agency, Annual Cancer Conference

November 3-5, 2005

Westin Bayshore, Vancouver, BC

2005 Theme: Cancer and the Family

Pediatric Oncology day is Saturday, November 5, 2005



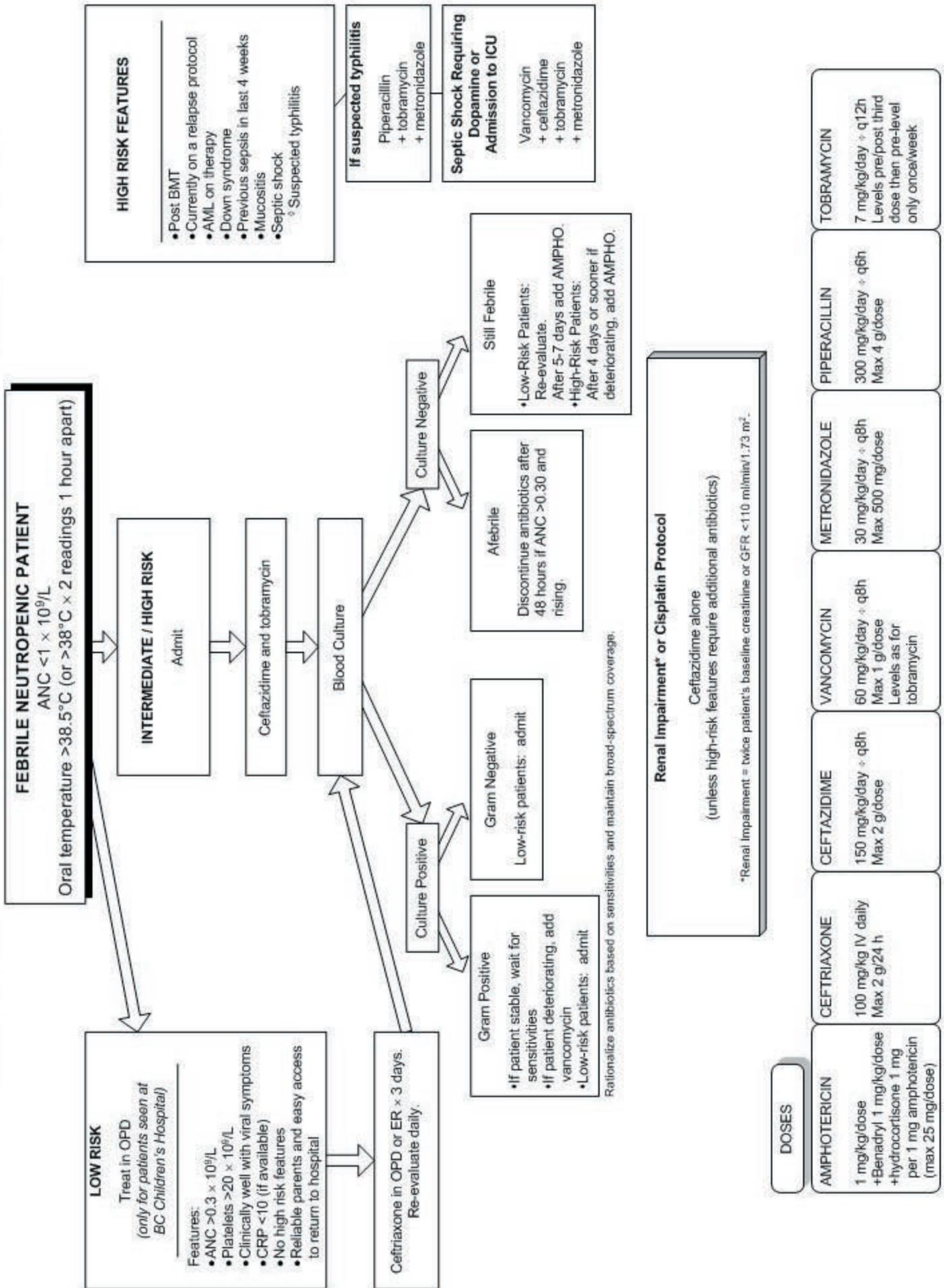
Hemophilia 2006 (www.wfh.org)

27th International Congress of the World Federation of Hemophilia
May 21-25, 2006

Vancouver Convention and Exhibition Centre, Vancouver, BC
For more information, email hemophilia2006@wfh.org

EMPIRIC ANTIBIOTIC PROTOCOL FOR FEVER AND NEUTROPENIA

These are only guidelines and full clinical evaluation is required for all febrile patients.



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

Publications Mail Agreement No. 41074013

Web Sites to Visit

www.cure4kids.org

Established by St. Jude Children's Research Hospital and dedicated to medical education for physicians, nurses, scientists, and health care workers. Pediatric Oncology online seminars and courses are free.

www.curesearch.org

An excellent web site resource on care of the child with cancer for both health care professionals and patients/families. This site is a collaboration between the Children's Oncology Group and the National Childhood Cancer Foundation.

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:

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Teen Adventures - Spirit Quest 2005

Tofino Adventure
April 28, 2005 - May 1, 2005
Four day surfing, kite flying and beach combing adventure
Chesterman Beach House
Tofino, BC

Kayaking Adventure
August 6-9, 2005
Four day Yakkity Yak adventure in the Gulf Islands

Whitewater Rafting Adventure
August 27-30, 2005
Four day whitewater adventure on the Thompson and Fraser Rivers with Kumsheen Raft Adventures

Tall Ship Adventure
May 26 - 29, 2005
Four day tall ship adventure in the Gulf Islands

Horseback Adventure
July 8 - 11, 2005
Four day horseback trip and Giddyup Adventure in the Cariboo at Wells Gray Guest Ranch

For more information about Teen Adventures, please contact Dan Mornar at dmornar@cw.bc.ca or (604) 875-2345 ext 6477