

Febrile Neutropenia

What you need to know !



Presenter Disclosure

- **Faculty:** Gisele Sarbacher
- **Relationships with commercial interests:** NONE

Mitigating Potential Bias

- NONE

Learning Objectives

At the end of this workshop, participants will be able to:

- Define febrile neutropenia, understand its urgency, and identify populations at risk
- Utilize the new febrile neutropenia (FNE) resources in the identification and management of patients with FNE

What is Febrile Neutropenia?

Fever:

- A single oral temperature of 38.3°C (101°F), or greater than 38°C (100.4°F) lasting at least 1 hour, or greater than 38°C (100.4°F) documented at least twice over a 12 hour period.

Neutropenia:

- “Severe” neutropenia is defined by an absolute neutrophil count (ANC) $< 0.5 \times 10^9 / L$, or ANC $< 1.0 \times 10^9 / L$ and a predicted decline of the ANC to $< 0.5 \times 10^9 / L$ over the next 48 hours

(Neutropenia Protocol, 2017 CCMB Infection Prevention and Control Manual)

Who is at Risk?

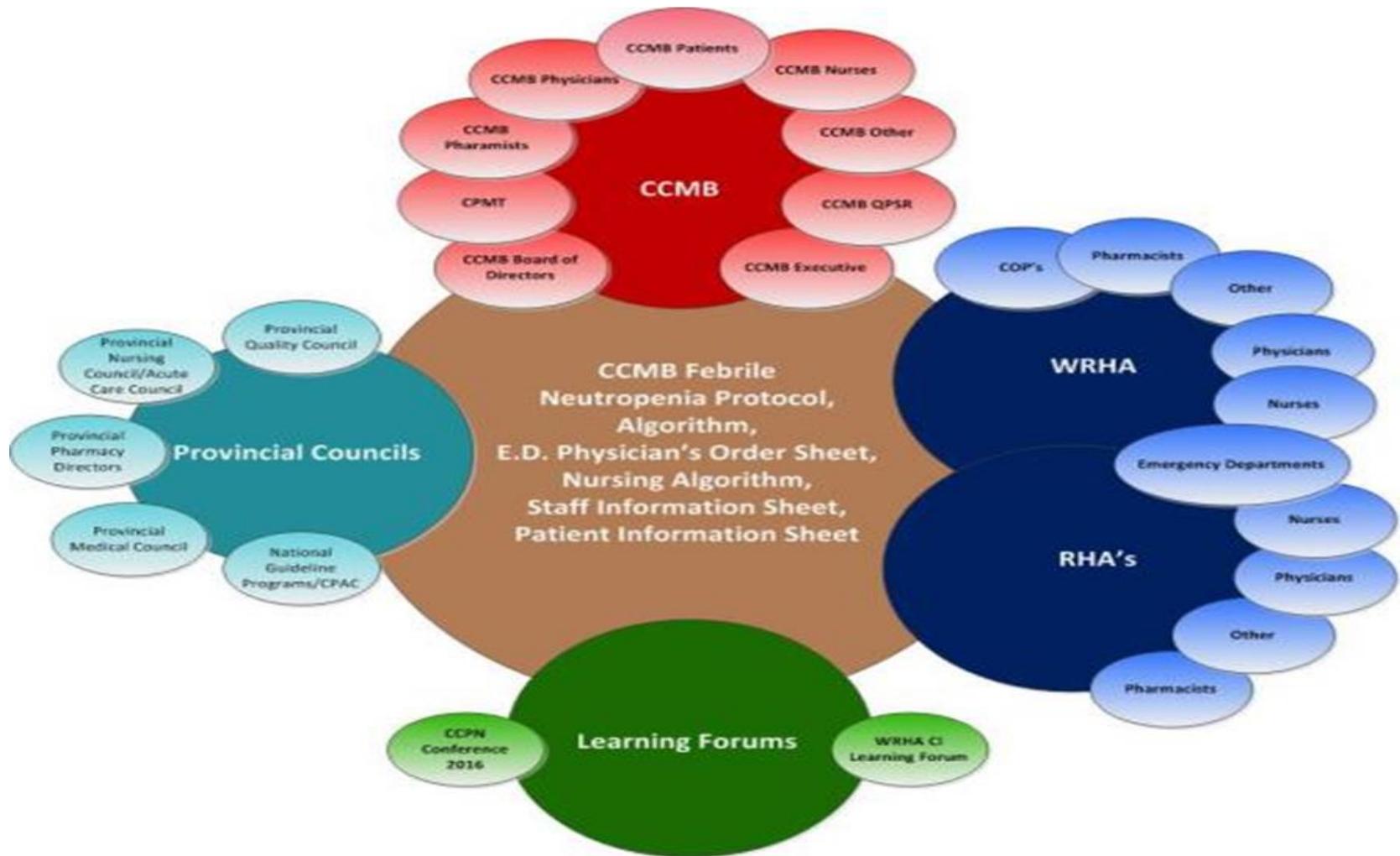
- Older age, female sex
- Poor nutritional status
- Pre-existing neutropenia
- Bone marrow failure secondary to:
 - Prior cytotoxic therapy
 - Prior radiation therapy
- Marrow invasion by cancer
- Open wounds, or active tissue infection
- Active co-morbid conditions
- Hematological malignancy
- Impaired immune function associated with an absolute lymphocyte count **< 0.5 x 10⁹/L**

Why the Urgency?

- ❑ Patients with cytotoxic therapy-induced severe neutropenia are a risk for potentially life-threatening invasive bacterial infections
- ❑ Delayed and/or inappropriate treatment of neutropenic fever syndrome is associated with increased morbidity and mortality
- ❑ Timely intervention may be life-saving
- ❑ Timeline of **ONE HOUR** for assessment and initial anti-bacterial therapy is critical



Resources Developed through Collaborative Efforts



STAFF INFORMATION – NEUTROPENIC FEVER SYNDROME

Definitions

Systemic infection in neutropenic patients is potentially life-threatening. Therefore, a neutropenic fever or sepsis syndrome is considered a time-dependent condition in which early recognition of the cancer patient's potential to have neutropenic sepsis is critical to successful management.¹

FEVER – Single oral temperature (T) greater than 38.3°C (101°F), OR greater than 38°C (100.4°F), lasting at least one hour, OR greater than or equal to 38°C (100.4°F), documented at least twice over a 12-hour period

SEVERE NEUTROPENIA – Absolute Neutrophil Count (ANC) less than 0.5 x 10⁹/L
OR ANC less than 1.0 x 10⁹/L with a predicted decline of the ANC to less than 0.5 x 10⁹/L over the next 48 hours

RISK FACTORS

- Pre-existing neutropenia
- History of a neutropenic fever syndrome
- Bone marrow failure secondary to:
 - o Prior cytotoxic chemotherapy
 - o Prior radiation therapy
- Open wounds or active tissue infection
- Impaired immune function associated with an absolute lymphocyte count (ALC) less than 0.5 x 10⁹/L

Cancer patients with neutropenic sepsis syndromes may present with body temperatures of less than 38°C.

Patients presenting with hyperthermia (body temperature less than 36°C) have a higher likelihood of bacteremic events.

Telephone Triage

ASK:

- Name of chemotherapy drugs the patient has been prescribed. Treatment schedule patient is on; particularly ask the date of the first dose of the current cycle of chemo-radiotherapy in order to identify the treatment day
- Date of last CBC
- Current medications, including antimicrobial therapy
- Adverse drug reaction history, ALLERGIES
- If patient has taken acetaminophen/Tylenol*
- Presence of fever, chills (fever may not be present if patient is taking corticosteroids or acetaminophen)
- If patient is receiving hematopoietic growth factors (e.g. Neupogen®, filgrastim)

If severe symptoms and/or change in mental status:

Decide whether to direct patient to Emergency Department (E.D.) or to manage patient at Cancer Centre

Medical assessment is required within 15 minutes of presentation to facility

Notify as appropriate: Physician (Oncologist, Hematologist, FPO); Non-Physician Provider (Clinical Assistant, Physician Assistant); Nurse Practitioner; E.D. Staff

Assessment and Workup

Look for subtle changes in respiration, mucous membranes, urinary tract symptoms and nervous system:

Assessment

- Full vital signs (temperature, pulse, respiration, blood pressure, O₂ saturation)
- Focal pain referable to:
 - o eyes (e.g. conjunctivitis, periorbital cellulitis)
 - o ears (e.g. otitis externa or media)
 - o nose (e.g. sinusitis)
 - o mouth (e.g. stomatitis and oral ulcers)
 - o throat (e.g. oral mucositis, gingivitis, pharyngitis, parapharyngeal space infection)
- Symptoms that may suggest a lower respiratory focus:
 - o rapid or deep breathing (e.g. dyspnea)
 - o chest pain (e.g. pleuritic inflammation)
 - o cough or wheezing
- Focal abdominal pain and diarrhea may suggest an Intra-abdominal sepsis syndrome
- Presence of central venous access device (CVAD), or peripheral venous catheter
- Focal skin or soft tissue swelling, tenderness, and erythema, especially anatomically related to a CVAD may suggest a cellulitis or CVL-related infection

Use MASCC Risk Index Score

Work up

- Before antibiotic administration: blood cultures from at least two (2) separate anatomical sites (note that a multilumen CVAD represents a single site)
- CBC and leukocyte differential to establish the state and degree of neutropenia
- Chemistry including serum electrolytes (sodium, potassium, chloride, and total CO₂); serum glucose, urea, creatinine, lactate
- INR, prothrombin time, AST, ALT, LDH, GGT, ALP, total bilirubin
- Venous blood gases
- Consider:
 - o Chest x-ray posterior-anterior and lateral views
 - o ECG
 - o CSF sample
 - o Mid-stream urine for microbiological culture and for urinalysis
 - o Stool sample [i.e. if diarrhea is present] for Clostridium difficile toxin testing, or where appropriate enteric pathogens (Giardia spp., Shigella spp., E. coli O157, and Campylobacter spp.)
 - o Pocl of skin/soft tissue inflammation (e.g. wound swab)

Decision Making

- Prescription of oral versus intravenous antibiotics
- Need for hospitalization vs. the safety of outpatient management
- Need for reverse isolation, respiratory precautions, or enteric precautions

Algorithm

Neutropenic Fever – Initial Assessment, Workup and Treatment, Adults with Cancer – Ambulatory Setting (SEE OVER)

References

1. Smith, P., Coyle, N., Kettle, R., et al. 2018. Guidelines for the management of oncology/hematology adult patients (>18) with neutropenic sepsis. Northern Inland Cancer Network. Retrieved from <https://www.ccmmb.ca/>

CCMB Department of Nursing May 13, 2017



NURSING ALGORITHM - NEUTROPENIC FEVER

INITIAL ASSESSMENT, WORKUP AND TREATMENT
ADULTS WITH CANCER – AMBULATORY SETTING

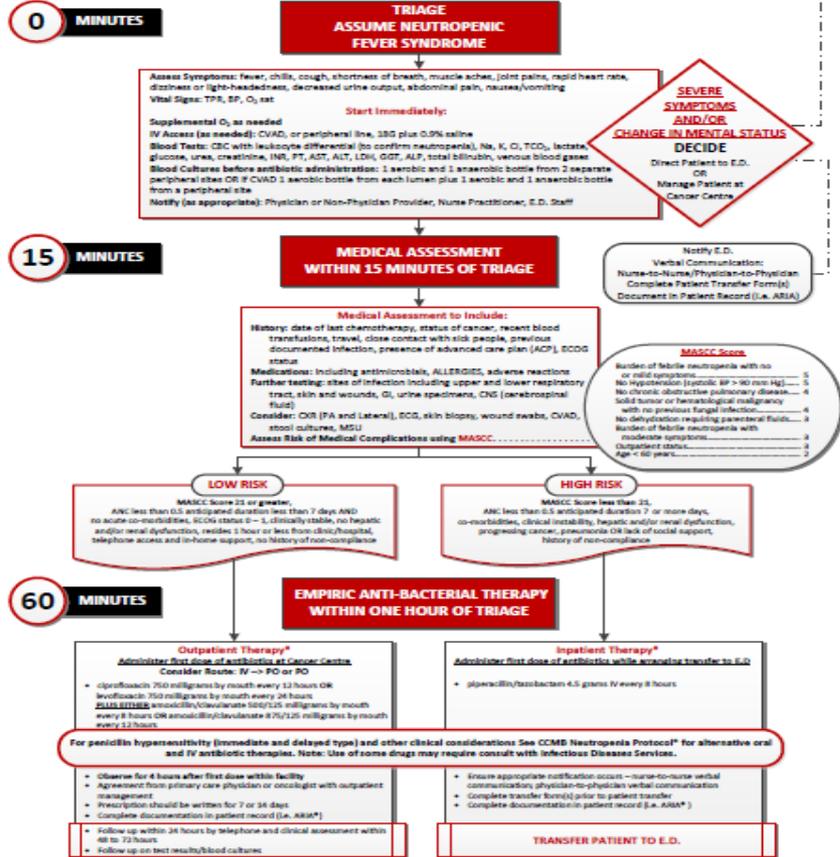
ANTIBIOTICS WITHIN ONE HOUR

PATIENT PRESENTS

OR

PATIENT PHONES

... with a single oral temperature 38.3°C or higher, or greater than 38°C lasting at least one hour, or greater than 38°C documented at least twice over a 12 hour period; or feels "unwell"; and has had cytotoxic chemotherapy within the past 6 weeks.
Patients with neutropenic sepsis may present with temperature less than 38°C



References:
1. Pevsner D, Sabatelli M, et al. Antimicrobial prescribing and antibiotic management of fever and neutropenia in children for malignancy. American Society of Clinical Oncology Clinical Practice Guidelines. (2016) 34(12): 2046-60.
2. Pevsner D, Ross F, Saperstein D, et al. Clinical Practice Guidelines for the use of Intravenous Antibiotics in Neutropenic Patients with Cancer. 2016. Update by the Infectious Disease Society of America. (2016) 54(12): 2046-60.
3. MASCC Patient Information. <https://www.mascc.org/>

CCMB Department of Nursing May 13, 2017



Patient Information Sheet—Neutropenia (low white blood cell count)

What is Neutropenia?

Neutropenia occurs when a certain type of white blood cell—called neutrophils—are low. These white blood cells, which are made in your bone marrow, are important to fight infection and keep you healthy. When the number of neutrophils in the blood becomes low, your body might find it harder to fight infection.

This information sheet will help you to know what to do if you feel unwell, with or without a fever.

How will I know if I have Neutropenia?

Most people who have neutropenia do not know it. They do not have any symptoms and do not feel sick. Having a blood test is the only way to confirm if you have neutropenia.

There are signs that should alert you to possible infection:

- Fever** - A fever is a body temperature above 38°C or 100.4°F. It is most accurate to take your temperature with a digital thermometer.
- Any of the following symptoms with or without a fever -
 - Chills/shaking
 - New cough
 - Shortness of breath
 - Sore throat
 - Mouth sores
 - Abdominal (belly) pain
 - Diarrhea, nausea, vomiting
 - Having to pass small amounts of urine often
 - Burning feeling when you pass urine
 - Urine that is strong-smelling or cloudy (not clear) or red or pink in color
 - Flu-like symptoms such as body aches and feeling tired
 - Pain, redness or swelling on skin, especially around an IV or PICC line or around wounds
 - Green or yellow drainage from a cut or wound

What causes Neutropenia?

Many things can cause neutropenia but the most common causes are:

Chemotherapy - Chemotherapy can affect the bone marrow and slow down how many white blood cells are being made. This can cause neutropenia.

Radiation Therapy - Large bones like the breast bone or hip bones have more bone marrow in them. Radiation to these bones can affect the bone marrow and slow down how many white blood cells are being made. This can cause neutropenia. If you are having chemotherapy and radiation together, this may increase the risk of neutropenia.

Cancer or Blood Disorders - Some types of cancer or blood disorders cause low white cells without having any treatment.

How might having Neutropenia affect my treatment?

Your Cancer Team may decide to delay your treatment or lower the dose to keep you as healthy as possible during treatment. The decision will be based on YOUR treatment plan and YOUR health.

Neutropenia with symptoms or fever can be life threatening. Get medical help right away!

How do I help prevent infection?

- DO** wash your hands
 - Always before eating and after going to the bathroom
 - After contact with pets
 - Carry hand sanitizer with you in case you don't have access to soap and water
- DO** bathe or shower daily and change clothes daily
- DO** try to prevent scrapes, scratches or injury to skin. This includes mouth, penis, vagina and anus
- DO** check with your Cancer Team
 - Before having any immunizations
 - Before having dental work or teeth cleaning. Let your dentist know that you are having cancer treatment
 - About sexual activity when you are neutropenic
 - About avoiding large crowds



- DON'T** go near anyone who has a cold, flu, diarrhea or other contagious illnesses (e.g. chicken pox, shingles)
- DON'T** take Tylenol[®] regularly unless your oncologist or hematologist has said this is OK. Tylenol[®] will mask a fever.

What should I do if my temperature is greater than 38°C/100.4°F or if I become unwell?

If you feel **very unwell**, go to your nearest emergency department.

Bring all the medications you are taking with you.

Tell the Emergency Department staff:

- the name of your cancer or blood disorder
- the type of treatment you are on—it is helpful to know the name of any cancer drug
- the first day of your most recent treatment (chemotherapy and/or radiation therapy)

Get the right medical help as soon as possible

If you have questions or concerns:

Monday to Friday 8:00 a.m. - 4:00 p.m.

Call your Cancer Team at:



OR CALL
Urgent Cancer Care
204-787-8900

After Hours or Weekends

All CCMB patients may call Paging:

- Health Sciences Centre 204-787-2071
- St. Boniface Hospital 204-237-2053

Ask for the On Call Service:

- Medical Oncology
- Hematology
- Radiation Oncology
- Gynecology Oncology
- Surgical Oncology
- Leukemia/Bone Marrow Transplant

TALK WITH
YOUR
CANCER TEAM
ABOUT
PREVENTING
INFECTION!

Pre-printed Order Sets

Institution or RHA LOGO

PHYSICIAN'S ORDER SHEET

FEBRILE NEUTROPENIA ORDERS

Unwell Cancer Patients (with or without a fever) who have received systemic anti-cancer therapy in previous 6 weeks, with anticipated absolute neutrophil count < 0.5 x 10⁹/L, and suspected infection

Administration of initial empirical antibacterial therapy within 60 minutes of suspicion of a neutropenic fever (sepsis) syndrome

DATE RECORD NO.

PATIENT

DOB

PROV HC#

DOCTOR

CLINIC/UNIT

LOC#

DRAFT

<p>These orders are to be used as a guideline and do not replace sound clinical judgment and professional practice standards. Patient allergy and contraindications must be considered when completing these orders. <input type="checkbox"/> Standard orders. If not in agreement with an order, cross out and initial. <input type="checkbox"/> Requires a check (✓) for activation.</p>		<p>DATE: _____ TIME: _____</p> <p>Patient's Height: _____</p> <p>Patient's Weight: _____</p>
<p>Drug Allergies →</p>	<p>ORDER TRANSCRIBED AND ACTIVATED</p>	<p>TEST DONE</p>
<p>R MEDICATION ORDERS TO BE INITIATED OR DISCONTINUED</p> <p>DATE: _____ TIME: _____</p> <p>Initial Therapy</p> <p><input type="checkbox"/> Normal Saline intravenously _____ mL bolus over _____ hours</p> <p><input type="checkbox"/> Normal Saline intravenously _____ mL/hr</p> <p><input type="checkbox"/> Oxygen _____ L/min nasal prongs</p> <p>High-Risk Patients (MASCC less than 21, and/or other criteria – Features p.2)</p> <p><input type="checkbox"/> Piperacillin/tazobactam 4.5 grams intravenously every 8 hours – first dose within 60 minutes after arrival</p> <p>If Methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) risk factors, (colonization, skin/soft tissue infection) consider adding:</p> <p><input type="checkbox"/> Vancomycin _____ milligrams (15 mg/kg/dose) intravenously every 12 hours</p> <p>If Vancomycin-resistant <i>Enterococcus</i> (VRE) colonization consider adding:</p> <p><input type="checkbox"/> Linezolid 600 milligrams intravenously every 12 hours</p> <p>If suspected Extended spectrum Beta Lactamase (ESBL) – producing gram-negative bacillary infection:</p> <p><input type="checkbox"/> Meropenem 1 gram intravenously every 8 hours – first dose within 60 minutes after arrival</p> <p>If severe sepsis/septic shock consider adding:</p> <p><input type="checkbox"/> Gentamicin or <input type="checkbox"/> Tobramycin _____ milligrams (7 mg/kg) intravenously daily, dose adjusted for serum creatinine and trough levels</p> <p>Piperacillin/tazobactam, meropenem, linezolid are restricted drugs. Ongoing prescription requires mandatory consultation with Infectious Diseases Services.</p> <p>Low-Risk Patients (MASCC 21 or greater)</p> <p><input type="checkbox"/> Ciprofloxacin 750 milligrams orally every 12 hours plus Amoxicillin/clavulanate 875/125 milligrams orally every 12 hours</p>	<p>U TEST DONE</p>	<p>GENERAL ORDERS PAGE 1 OF 2</p> <p><input type="checkbox"/> CBC, electrolytes, glucose, urea, creatinine</p> <p><input type="checkbox"/> Venous blood gases</p> <p><input type="checkbox"/> Lactate</p> <p><input type="checkbox"/> INR, Prothrombin Time</p> <p><input type="checkbox"/> AST, ALT, LDH, GGT, ALP, Total Bilirubin</p> <p><input type="checkbox"/> Blood Culture – before antibiotic administration from ≥ 1 peripheral sites and all parenteral lines as follows:</p> <ul style="list-style-type: none"> One each: aerobic and anaerobic blood culture bottle from a peripheral site, and One aerobic blood culture bottle from each lumen of a multi-lumen central venous catheter (CVC) Where there is no CVC, obtain blood cultures from ≥ 2 peripheral sites <p><input type="checkbox"/> Urinalysis and urine culture</p> <p><input type="checkbox"/> Chest radiograph</p> <p><input type="checkbox"/> Electrocardiogram</p> <p>Other: _____</p> <p><input type="checkbox"/> Vital signs every 30 minutes</p> <p><input type="checkbox"/> Document height and weight</p> <p><input type="checkbox"/> Complete risk stratification (see p.2)</p> <p><input type="checkbox"/> If "Severe sepsis / Septic shock syndrome" – add Sepsis Order Set</p> <p><input type="checkbox"/> Consult MICU, if severe sepsis / septic shock</p> <p><input type="checkbox"/> Consult Medicine</p> <p><input type="checkbox"/> Consult Medical Oncology, Radiation Oncology, Adult Hematology, or Leukemia / Bone Marrow Transplant Service (circle desired service)</p> <p><input type="checkbox"/> Consult Infectious Diseases Services</p> <p>Low-Risk Patients</p> <p>Following work-up and initial empirical antibacterial therapy:</p> <p><input type="checkbox"/> Observe for 4 hours with stable vital signs</p> <p><input type="checkbox"/> Phone oncology on call to make aware of discharge (see p.2)</p> <p><input type="checkbox"/> Ensure follow-up within 48 hours</p>
<p>PHYSICIAN'S SIGNATURE: _____ MD</p> <p>PRINTED NAME: _____</p>	<p>PHYSICIAN'S SIGNATURE: _____ MD</p> <p>PRINTED NAME: _____</p>	<p>TRANSCRIBED: _____ REVIEWER: _____</p> <p><input type="checkbox"/> FAXED DATE: _____ TIME: _____ INITIALS: _____</p>

AUTHORIZED BY:

DATE: REVIEW PENDING
CPGI Updated: May 11, 2017

Institution or RHA LOGO

PHYSICIAN'S ORDER SHEET

FEBRILE NEUTROPENIA ORDERS

Unwell Cancer Patients (with or without a fever) who have received systemic anti-cancer therapy in previous 6 weeks, with anticipated absolute neutrophil count < 0.5 x 10⁹/L, and suspected infection

Administration of initial empirical antibacterial therapy within 60 minutes of suspicion of a neutropenic fever (sepsis) syndrome

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<p>These orders are to be used as a guideline and do not replace sound clinical judgment and professional practice standards. Patient allergy and contraindications must be considered when completing these orders. <input type="checkbox"/> Standard orders. If not in agreement with an order, cross out and initial. <input type="checkbox"/> Requires a check (✓) for activation.</p>		<p>DATE: _____ TIME: _____</p> <p>Patient's Height: _____</p> <p>Patient's Weight: _____</p>
<p>Drug Allergies →</p>	<p>ORDER TRANSCRIBED AND ACTIVATED</p>	<p>TEST DONE</p>
<p>R MEDICATION ORDERS TO BE INITIATED OR DISCONTINUED</p> <p>DATE: _____ TIME: _____</p> <p>Penicillin Allergy Substitutions</p> <p>1. Immediate-type (less than 1 hour onset) or accelerated-type (less than 72 hours onset) reactions:</p> <p>i) High-risk patients</p> <p><input type="checkbox"/> Meropenem 1 gram intravenously every 8 hours (preferred)</p> <p>OR</p> <p><input type="checkbox"/> Ciprofloxacin 400 milligrams intravenously every 12 hours (only if a fluoroquinolone was not used as prophylaxis) plus Vancomycin _____ milligrams (15 mg/kg/dose) intravenously every 12 hours</p> <p>ii) Low-risk patients</p> <p><input type="checkbox"/> Ciprofloxacin 750 milligrams orally every 12 hours (only if a fluoroquinolone was not used as prophylaxis) plus Clindamycin 600 milligrams orally every 8 hours (preferred)</p> <p>OR</p> <p><input type="checkbox"/> Moxifloxacin 400 milligrams orally every 24 hours</p> <p>OR</p> <p><input type="checkbox"/> Levofloxacin 750 milligrams orally every 24 hours</p> <p>2. Delayed-type (greater than 72 hours onset) reactions:</p> <p>i) High-risk patients</p> <p><input type="checkbox"/> Meropenem 1 gram intravenously every 8 hours (Preferred)</p> <p>OR</p> <p><input type="checkbox"/> Ceftazidime 2 grams intravenously every 8 hours plus Vancomycin _____ milligrams (15 mg/kg/dose) intravenously every 12 hours</p> <p>ii) Low-risk patients</p> <p><input type="checkbox"/> Ciprofloxacin 750 milligrams orally every 12 hours plus Clindamycin 600 milligrams orally every 8 hours (preferred)</p> <p>OR</p> <p><input type="checkbox"/> Moxifloxacin 400 milligrams orally every 24 hours</p> <p>OR</p> <p><input type="checkbox"/> Levofloxacin 750 milligrams orally every 24 hours</p>	<p>U TEST DONE</p>	<p>GENERAL ORDERS PAGE 2 OF 2</p> <p>High-Risk Features for medical complications requiring admission (MASCC less than 21)</p> <ul style="list-style-type: none"> Profound neutropenia ANC less than 100/mm³ following cytotoxic chemotherapy Anticipated severe neutropenia greater than 7 days Hypotension (SBP < 90 mmHg, or MAP < 70 mmHg) Estimated CrCl < 30 mL/min, elevated serum creatinine Transaminases (AST/ALT) > 5x upper limit of normal Uncontrolled or progressive cancer Oral or GI mucositis that interferes with oral intake New onset abdominal pain, nausea/vomiting, diarrhea New onset pulmonary infiltrates or hypoxemia New onset of neurologic or mental status changes Indwelling central venous access tunnel site infection <p>Low-Risk Features for medical complications (MASCC 21 or greater)</p> <ul style="list-style-type: none"> Outpatient status at time of fever onset Absence of high-risk features Anticipated duration of severe neutropenia less than 7 days <p>MASCC Score (maximum score = 26)</p> <p>Burden of illness: no or mild symptoms 5</p> <p>Systolic BP greater than 90 5</p> <p>No Chronic Obstructive Pulmonary Disease (COPD) 4</p> <p>Solid tumor diagnosis or no previous invasive fungal infection 4</p> <p>No dehydration 3</p> <p>Outpatient at onset of fever 3</p> <p>Burden of illness: moderate symptoms 3</p> <p>Age less than 60 2</p> <p>Total: _____</p> <p>Guideline for CancerCare Manitoba Consult:</p> <ol style="list-style-type: none"> Patient with a solid tissue malignancy – Medical Oncology, Radiation Oncology Lymphoma patient – Adult Hematology Patient with acute leukemia or hematopoietic stem cell transplant (HSCT) – Leukemia/Bone Marrow Transplant Service
<p>PHYSICIAN'S SIGNATURE: _____ MD</p> <p>PRINTED NAME: _____</p>	<p>PHYSICIAN'S SIGNATURE: _____ MD</p> <p>PRINTED NAME: _____</p>	<p>TRANSCRIBED: _____ REVIEWER: _____</p> <p><input type="checkbox"/> FAXED DATE: _____ TIME: _____ INITIALS: _____</p>

AUTHORIZED BY:

DATE: REVIEW PENDING
CPGI Updated: May 11, 2017

Neutropenia Protocol – Identification and Management of Neutropenic Fever Syndrome

		
INFECTION PREVENTION AND CONTROL POLICIES, PROCEDURES, GUIDELINES AND PROTOCOLS		
PROTOCOL TITLE: Neutropenia Protocol – Identification and Management of Neutropenic Fever Syndromes		
SECTION: Infection Control Services	PROTOCOL NO.: 12.500	APPROVED BY THE PRESIDENT AND CEO, CCMB <i>Original signed by Dr. S. Navaratnam</i>
DATE: February 6, 2012 Latest Review: May 8, 2017	PAGE: 1 of 22	

1.0 BACKGROUND:

- 1.1 Patients with cytotoxic therapy-induced severe neutropenia and mucositis are at risk for potentially life-threatening invasive bacterial infections.^{1,2}
- 1.2 Risk factors for developing a neutropenic fever syndrome include older age, female sex, marrow invasion by cancer, reduced granulopoiesis, poor nutritional status, integumental damage, hematological malignancy, and active co-morbid conditions.^{3,4}
- 1.3 Delayed and/or inappropriate treatment of neutropenic fever syndromes is associated with increased morbidity and mortality.⁵
- 1.4 Successful management of neutropenic fever syndromes in cancer patients is time-sensitive.⁶ Timely intervention may be life-saving.⁷
- 1.5 Rapid triage to recognize and prioritize neutropenic sepsis syndromes for emergent initial empirical anti-bacterial therapy is critical to successful outcome of such events.⁸

2.0 PURPOSE:

- 2.1 To provide healthcare providers at CancerCare Manitoba (CCMB), the Winnipeg Regional Health Authority (WRHA), and the provincial regional health authorities with standardized guidelines for the rapid triage, assessment, and initial management of new onset of suspected sepsis syndromes in cancer patients with fever and neutropenia.
- 2.2 To provide nursing and medical staff with a **timeline of one hour (60 minutes)** for the provision of triage, "sepsis syndrome" assessment, and initial empirical anti-bacterial treatment services for suspected neutropenic sepsis syndromes in accordance with the time-dependent CTAS Level II (**Emergent**) standard. This framework should allow the clinician to make an initial clinical assessment and therapeutic plan based upon the patient history, vital signs, and clinical examination in the absence of laboratory test results or diagnostic imaging.
- 2.3 To provide healthcare providers with a guideline for the management of new onset neutropenic sepsis syndromes over the subsequent 72 to 120 hours from the administration of initial empirical anti-bacterial therapy.
- 2.4 To provide differential guidelines for the identification and initial management of

Key Messages

- **Time to Medical Assessment**
 - If a patient receiving chemotherapy presents with a fever, medical assessment is required within **15 minutes** of presentation to facility.

- **Assume Febrile Neutropenia**
 - Don't Wait for Blood Work Results
 - Begin Assessment & Interventions – Follow the Neutropenic Nursing Algorithm
 - Administer first dose of anti-bacterial therapy within 60 minutes

References

7.0 REFERENCES:

1. Bow EJ, Wingard JR, Bowden RA: Infectious complications in patients receiving cytotoxic therapy for acute leukemia: History, background and approaches to management, *Management of Infection in Oncology Patients*. London, Martin Dunitz, 2003, pp 71-104
2. Bow EJ: Infection in neutropenic patients with cancer. *Crit Care Clin* 29:411-41, 2013
3. Bow EJ: The Diagnostic Approach to the Febrile Neutropenic Patient: Clinical Considerations, in Maschmeyer G, Rolston, K.V.I. (ed): *Infections in Hematology*. Berlin, Heidelberg, Springer-Verlag, 2015, pp 91-111
4. Bow EJ: Approach to Infection in Patients Receiving Cytotoxic Chemotherapy for Malignancy, in Hall JB, Schmidt GA, Kress JP (eds): *Principles of Critical Care* (ed 4th). New York, McGraw-Hill, 2015, pp 600-625
5. Okera M, Chan S, Dornede U, et al: A prospective study of chemotherapy-induced febrile neutropenia in the South West London Cancer Network. Interpretation of study results in light of NCAG/NCEPOD findings. *Br J Cancer* 104:407-12, 2011
6. Richardson S, Pallot D, Hughes T, et al: Improving management of neutropenic sepsis in the emergency department. *Br J Haematol* 144:617-8, 2009
7. Gaieski DF, Mikkelsen ME, Band RA, et al: Impact of time to antibiotics on survival in patients with severe sepsis or septic shock in whom early goal-directed therapy was initiated in the emergency department. *Crit Care Med* 38:1045-53, 2010
8. Flowers CR, Seidenfeld J, Bow EJ, et al: Antimicrobial prophylaxis and outpatient management of fever and neutropenia in adults treated for malignancy: american society of clinical oncology clinical practice guideline. *J Clin Oncol* 31:794-810, 2013
9. Freifeld AG, Bow EJ, Sepkowitz KA, et al: Clinical practice guideline for the use of antimicrobial agents in neutropenic patients with cancer: 2010 update by the infectious diseases society of america. *Clin Infect Dis* 52:e56-93, 2011