Standard of Practice: Care of the Neutropenic (ANC < 500) Patient

Essential Information
1. Neutropenia is defined as an ANC of <500 cells/mm³ or an ANC that is expected to decrease to <500 cells/mm³ during the next 48 hours.¹
2. Neutrophils account for approximately 60% of the body’s circulating white blood cells. They are the body’s first responders to infection by bacteria, viruses and other pathogens.
3. An absolute neutrophil count (ANC) < 1000 places a patient at increased susceptibility to infection. An ANC < 500 places a patient at considerable risk.²
4. Usually white blood cells nadir (reach their lowest point) 7-14 days after chemotherapy administration. If a patient has received numerous cycles of chemotherapy or has other co-morbid conditions, they may reach their nadir earlier.
5. The reduced quantity of neutrophils may limit the classic signs and symptoms of infection such as redness, pus, swelling and pain. Fever may be the only sign of infection!²³
6. Severely neutropenic patients who exhibit signs of infection and/or fever must have prompt (within < 60 minutes) intervention from a medical team. Blood cultures, urine cultures, chest radiograph are obtained and broad spectrum antibiotics are started immediately.²³
7. Colony-stimulating factors (G-CSF or GM-CSF) are recommended for all patients with cancer undergoing chemotherapy with >20% risk of febrile neutropenia (examples of risk factors include: age, prior extensive chemotherapy, bone marrow involved with disease, performance status, pre-treatment blood counts).⁵ However, the patient’s research protocol or clinical condition may prohibit use of colony-stimulating factors.
8. Not all neutropenia is caused by malignant disease or immune-suppressive therapy. Patients may experience neutropenia due to an underlying disease or treatment (Examples: Aplastic Anemia or medication related neutropenia).
9. Regular immunosuppressed diet order is available.

I. Assessment
A. The inpatient nurse will assess the following potential sites of infection every 8 hours or more frequently if clinically indicated; the outpatient nurse will assess the following potential sites of infection as clinically applicable with each patient encounter:
   1. Venous Access Devices: catheter entrance, exit and tunnel sites for skin breakdown, erythema, pain/ tenderness, discharge, swelling, or warmth.²
   2. Skin: skin for any breakdown, lesions, rashes or pain. Be especially alert to complaints of pain/ discomfort in areas of skin folds, including buttocks, axilla, perineum, genital area, and breasts.²⁴ Examine these areas as clinically indicated.
   3. GU: changes in urinary function including frequency, dysuria, hematuria; change in color/appearance/odor of urine.²
   4. GI: mouth and throat for redness, ulcers, white patches, soreness/tenderness, pain with eating/drinking, dryness or bleeding; bowel function for stool consistency, pain, frequency, color and amount of stool.²⁵
   5. Lungs: breath sounds and respiratory status for any changes in pattern, effort, dyspnea, cough, or sputum production (amount and color).²⁴⁵
   6. HEENT/Neurological: headaches, neck stiffness, mental status changes, focal neurological deficits, sinus pressure/congestion/drainage/pain, or orthostatic dizziness.²
B. Vital Signs:
1. Inpatients: Monitor blood pressure, temperature, pulse, and respiratory rate at least every four (4) hours or more frequently as clinically indicated. Review nursing orders in CRIS for vital sign parameters requiring Licensed Independent Practitioner (LIP) notification. Report changes in condition such as tachycardia, tachypnea, hypotension or temperature ≥ 38.0 Celsius.

2. Outpatients: monitor vital signs with each patient encounter. (Neutropenic outpatients will be instructed to monitor their temperature at home according to the patient education document Fever Guidelines, also available in Spanish).

3. End-of-Life - monitoring standards may be suspended with a medical order when the comfort of the patient overrides vital sign monitoring.

II. Nursing Interventions
   A. Monitor CBC/differential as ordered or as indicated by the specific research protocol, generally at least twice a week or every 3 days while on antibiotic therapy.
   B. Use strict aseptic technique when performing all invasive procedures and when manipulating any invasive tubing. Avoid IM injections that could lead to skin abscesses.
   C. Prevent rectal trauma by avoiding rectal temperatures, enemas, suppositories or digital exams. Discuss with LIP strategies to prevent constipation. Keep the perirectal area clean and dry. Reduce the risk of perianal trauma/infection by cleansing with sitz baths and applying skin barrier creams as needed. Minimize vaginal trauma by avoiding use of tampons or vaginal suppositories.

III. Patient Education
   A. Reinforce neutropenic guidelines using the patient education document “Understanding Your Complete Blood Count.”
   B. Patients, staff and visitors must adhere strictly to guidelines regarding hand hygiene (How to Wash Your Hands). Encourage patient and family to use alcohol-based gel for hand hygiene.
   C. Instruct patient regarding meticulous and frequent oral hygiene, including the use of a soft/ultra soft toothbrush, mouth rinses with alcohol-free mouthwash at minimum in morning, after each meal and bedtime. Flossing is not recommended for a platelet count equal or less than 50,000 and/or an ANC equal or less than 500. Refer to Oral Care Standard of Practice as needed.
   D. Preserve skin integrity by instructing the patient to maintain good personal hygiene. Patients should shower daily as tolerated using a mild, fragrance-free soap and apply fragrance-free lotion to prevent dry/cracking skin. Electric razors should be used to prevent breaks in the skin.
   E. Patients should avoid contact with individuals of all ages with signs/symptoms of a suspected transmissible illness. Patients should avoid aerosolized bursts of organisms, construction sites and crowds of people where transmissible respiratory pathogens (Aspergillus, RSV, Influenza, and Para-Influenza) are potentially present. When any exposures are likely, a mask is recommended.
   F. Contact with persons who have recently received any live vaccines (usually Sabin oral polio, Chicken pox/Varicella and nasal flu mist) should be avoided. Patients should check with their NIH health provider before receiving any vaccines or immunizations.
   G. Instruct patient to avoid handling potted plants, sniffing fresh flowers and contact with stagnant water (humidifiers, water pitchers, water in a vase). Fresh flowers and potted plants are not permitted in patient rooms of neutropenic patients, but may be displayed at the nurses’ station.
Flowers should be discarded when they show any signs of wilting.\textsuperscript{4, 5} Outpatients should be reminded to avoid gardening or handling cat litter/pet excrement.\textsuperscript{4, 5}

H. Provide nutritional counseling with patient and family in collaboration with the Clinical Center (CC) Nutrition Department and the “\textit{Don't Let Your Food Make You Sick}” patient education document.\textsuperscript{4}

I. Discuss sexual activity guidelines with LIP and counsel patients as to safe sexual practices as it relates to the neutropenic state.

J. Provide opportunity for patient and family to ask questions and sufficient discussion to meet learning needs.

IV. Documentation

Document assessments and interventions in CRIS as follows:

A. Assessment parameters (VAD, skin, GU, GI, lungs, HEENT and neurological) every 8 hours, (for outpatients with each patient encounter), or with any change in clinical presentation.

B. Vital sign parameters every 4 hours or more often if clinically indicated.

C. All interventions and the patient/families response.

D. All patient/family education and validation of learning as well as any follow up needed.

E. Any telephone contacts with patient/family related to neutropenic status.

V. References


VI. Contributing Standard of Practice

Nursing and Patient Care Services: Standard of Practice, Oral Care

Approved:
## SOP: Care of the Neutropenic Patient

### Table of Evidence

<table>
<thead>
<tr>
<th>Citation</th>
<th>Level/Type of Evidence</th>
<th>Strengths and Limitations (Quality of the Evidence)</th>
<th>Analysis and Synthesis of the Evidence</th>
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</thead>
</table>
**Limitations:** All panel members are from institutions in the United States or Canada; Some recommendations may not be as applicable outside of North America, in areas where differences in available antibiotics, in the predominant pathogens, and/or in health care–associated economic conditions exist. Earlier detection of invasive fungal infections has led to debate regarding optimal use of empirical or preemptive antifungal therapy, for which algorithms are still evolving. | • The guidelines for the use of antimicrobial agents in neutropenic patients with cancer were updated by the Infectious Disease Society of America, based on systematic review of the literature and the consensus of a North American panel of experts.  
• Reviews the clinical features associated with infection in the neutropenic host and outlines the assessments and evaluation that should be performed in neutropenic patients to promote earliest detection and prompt broad spectrum treatment of infection  
• In-depth synthesis of the evidence supporting initial and long-term, risk-adapted antimicrobial therapy, antibiotic prophylaxis and antiviral therapy for neutropenic patients with cancer based on an algorithm of low vs. high risk for infection based on intensity of neutropenia  
• Recommend laboratory parameters (CBC with diff) be monitored every three days during intensive antibiotic therapy. |
| Hughes, W., Armstrong, D., Bodey, G. et al (2002). 2002 Guidelines for the Use of Antimicrobial Agents in Neutropenic Patients with Cancer, Clinical Infectious Diseases, 34, 730-751. | Systematic review | **Strengths:** Guidelines developed based on evidence where that was available, and by the consensus of a national panel of experts, in areas where evidence was lacking. Evidence was graded based on the United States Public Health |
Service Grading System for ranking recommendations in clinical guidelines, and the team used an explicit search strategy, thorough analysis and synthesis of the evidence.

**Limitations:** The guidelines were published in 2002, and an update is scheduled for publication in late 2008.

**Strengths:** Systematic review with explicit search strategy, and thorough analysis and synthesis of evidence.

**Limitations:** While the conclusions may be applied across a variety of neutropenic populations, the evidence reviewed emphasizes chemotherapy-induced neutropenia in patients with cancer

**Strengths:** Reviews fundamental knowledge derived from research concerning neutrophil physiology, the prevalence and determinants of neutropenia in patients with cancer, and the consequences of chemotherapy-induced neutropenia (CIN).

**Limitations:** While the conclusions may be applied across a variety of neutropenic populations, the evidence reviewed emphasizes chemotherapy-induced neutropenia in patients with cancer

**Strengths:** Systematic review of literature from 1995 -2005

The tentative conclusions or implications for practice that can be drawn from this systematic review include:

- Prevention of infection for people with CIN includes recommendations for good hand hygiene, environmental protection and avoiding exposure to individuals with infections.
- A number of widely practiced interventions for the prevention of infection in patients with cancer and CIN, such as low-bacterial diets and inpatient isolation procedures, lack strong empirical evidence.
- Strong evidence is available for several nursing interventions such as oral care and bathing.

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<td>• Antifungal prophylaxis in patients with cancer undergoing chemotherapy</td>
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<td>• Antifungal prophylaxis for severely neutropenic afebrile patients</td>
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- CSFs for all patients with cancer undergoing chemotherapy with a greater than 20% risk of febrile neutropenia
- Influence vaccination annually for all patients with cancer
- Pneumococcal vaccination
- TMP-SMZ to prevent PCP in all patients considered at risk
- Antifungal prophylaxis in patients with cancer undergoing chemotherapy
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- Environmental interventions to limit infection transmission in patients receiving oxygen and respiratory care, and to prevent nosocomial infection via uniforms and hospital mattresses
- HEPA filtered masks and HEPA filters in patients with prolonged neutropenia
- Guidelines about avoiding plants and plant neutropenic afebrile patients
- Antibacterial prophylaxis and herpes viral prophylaxis for selected populations
- Precluding visitors with symptoms of respiratory infections
- Environmental interventions are recommended for specific clinical situations

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- Environmental interventions to limit infection transmission in patients receiving oxygen and respiratory care, and to prevent nosocomial infection via uniforms and hospital mattresses
- HEPA filtered masks and HEPA filters in patients with prolonged neutropenia
- Guidelines about avoiding plants and plant material
- Recommendations for the handling of ice for cold beverage preparation
- Environmental guidelines concerning contact with pets and their litter
- Recommendations to limit exposure to potentially infectious agents during ongoing construction

- The guidelines also identify interventions where **effectiveness is not established or is unlikely**, and those interventions that are **not recommended for practice**.

- More detail can be found about the Putting Evidence into Practice (PEP) reference card in appendix A and also at www.ons.org/outcomes/volume1/prevention.shtl

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<tbody>
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<tr>
<td>Evidence Based Practice Facilitators:</td>
<td>Amy Callahan</td>
</tr>
<tr>
<td>Primary Stakeholder:</td>
<td>Nicole Ritzau</td>
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