Care of Patients With Neutropenia

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Neutropenia can be a significant problem in the oncology setting. Awareness of potential risks, management of neutropenia, and preventive measures guide nurses in providing comprehensive care that can make the difference between life and death.

Neutropenia is a reduction in the white blood cell (WBC) count (Camp-Sorrell, 2005; Cappozzo, 2004; Hawkins, 1997; Lynch, 2000).

- WBC function is to fight off infection.
- Five types comprise the count: neutrophils, lymphocytes, monocytes, eosinophils, and basophils (see Table 1).
- The five types are reported in percentages that add up to 100%.
- Neutrophils are the first line of defense in infection.
- Neutrophils digest bacterial organisms and debris.
- Neutrophils increase during infection or acute trauma.
- Neutrophils have a half-life of seven to eight hours in circulation.
- Bands, also called “stabs,” are the immature form of neutrophils.
- An increase in band level is called a left shift, which occurs with acute infection.

Neutropenia is caused by problems with neutrophil production, problems with neutrophil distribution, infection, treatment, or drugs (Lynch, 2000). Treatment-related causes include chemotherapy, radiation therapy, immunotherapy, and bone marrow transplant (National Comprehensive Cancer Network [NCCN] & American Cancer Society [ACS], 2002).

Despite the cause or treatment modality, patients with neutropenia are at increased risk for infection. The absolute neutrophil count (ANC) is an essential tool used in oncology to determine potential risk (Hawkins, 1997). ANC represents the number of mature WBCs in circulation using a simple, mathematical calculation. See Figure 1 to learn how to calculate the ANC. The ANC is categorized into grades, which reflect the risk for infection. See Table 2 for grading and levels of risk.

The occurrence of neutropenia can lead to life-threatening infections. To decrease the rate of chemotherapy-induced neutropenia, the chemotherapy dose may be reduced or delayed. Reductions or delays diminish the effectiveness of potentially curative treatment (Cappozzo, 2004; Nirenberg, 2003). Prevention of chemotherapy-induced neutropenia is one way to decrease the potential for dose reductions or delays and is achieved through the use of (Camp-Sorrell, 2005)

- Granulocyte-colony-stimulating factor
-Granulocyte macrophage-colony-stimulating factor.

The use of a colony-stimulating factor is recommended when (Camp-Sorrell, 2005)

- Patients have had a previous episode of febrile neutropenia.
- Chemotherapy is being administered in a dose-dense manner.
- A high risk of febrile neutropenia exists. Despite dose delays, reductions, or use of colony-stimulating factors, fever still may develop in the presence of neutropenia.

Table 1. Function of the White Blood Cell Components

<table>
<thead>
<tr>
<th>WHITE BLOOD CELL TYPE</th>
<th>FUNCTION</th>
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<tr>
<td>Neutrophils: also called polymorphonuclear cells (polys) or segmented neutrophils (segs)</td>
<td>Phagocytosis: digestion of bacterial organisms and debris</td>
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<td>Lymphocytes: Measurement reflects a combination of the T and B cells.</td>
<td>Combat acute viral infections and chronic bacterial infections</td>
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<tr>
<td>Monocytes: also called monos</td>
<td>Phagocytosis of bacteria; monocytes last longer in circulation than neutrophils.</td>
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<tr>
<td>Eosinophils: also called eos</td>
<td>Allergic reaction and parasitic infections</td>
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<tr>
<td>Basophils: also called mast cells or basos</td>
<td>Involved in inflammatory process and allergic reactions</td>
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Note. Based on information from Hawkins, 1997; Pagana & Pagana, 2002.

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This is called febrile neutropenia and is defined as one of the following (NCCN, 2005; “NCCN Makes Changes,” 2004).
- One-time temperature of 101°F or higher
- Temperature of 100.4°F or higher for more than one hour

If patients develop fever with neutropenia, the workup should include a history review and testing (NCCN, 2005).
- Review history for
  - Recent travel
  - Pet exposure
  - Infectious disease exposure
  - Timing of last chemotherapy treatment
  - Comorbid diseases
  - Current medications, including recent antibiotic use
  - Prior infections.

- Perform the following tests.
  - Blood cultures: Two sets should be taken from separate sites or the same site, such as a central venous catheter, if a sufficient volume of blood is removed with each sample. The recommended volume is 20–40 ml per sample (“NCCN Makes Changes,” 2004).
  - Complete blood count, electrolytes, and kidney and liver functions

This may include (Loerzel, 2005; NCCN, 2002)
- Fever or chills, which may be the only indication of infection
- Change in cough or new cough
- Sore throat or new mouth sore
- Burning or pain with urination
- Redness or swelling in any area
- Catheter site that is painful or sore
- Diarrhea
- Pain in abdomen or rectum
- Change in mental status.

Patients and caregivers should seek medical care if patients have (Loerzel, 2005; NCCN & ACS, 2002)
- Fever of 100.4°F for more than one hour or 101°F one time
- Any signs of infection.

If not properly managed, neutropenia in the oncology setting can have a devastating effect on quality of life. The development of an infection in the presence of neutropenia can be fatal in a matter of hours. Nursing makes an important impact on the outcome of care through interventions that help to prevent, monitor, and educate. These interventions may save the life of patients with neutropenia.

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References
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