

Febrile neutropenia, a serious complication of cytotoxic chemotherapy, is an oncologic emergency associated with high rates of morbidity and mortality. Fever is often the only clinical sign of an underlying infection in neutropenic patients with cancer. Prompt treatment with empiric broad-spectrum antibiotics is crucial to ensuring best outcomes for patients; practice guidelines recommend antibiotic administration within one hour of fever onset. A quality improvement initiative to improve time to antibiotic administration among patients with febrile neutropenia presenting to a community hospital emergency department is described in this article.

AT A GLANCE

- Neutropenia is a dose-limiting toxicity of chemotherapy administration that predisposes patients with cancer to serious infection.
- Failure to meet the one-hour guideline to administration of antibiotics can lead to increased morbidity, mortality, and hospital length of stay.
- Identification of key areas for improvement using evidence-based strategies can improve adherence to guideline-based practice in the treatment of febrile neutropenia.

KEYWORDS

febrile neutropenia; time to antibiotic administration; emergency department

DIGITAL OBJECT

IDENTIFIER

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Febrile Neutropenia

Decreasing time to antibiotic administration in a community hospital emergency department

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Neutropenia is a dose-limiting toxicity of chemotherapy administration that predisposes patients diagnosed with cancer to serious infections. It is defined as an absolute neutrophil count (ANC) of less than $1 \times 10^9/L$ or an ANC expected to fall below that level in combination with a fever (Flowers et al., 2013). Fever with neutropenia is a common complication of cytotoxic chemotherapy, occurring in 10%–15% of patients with solid tumors and more than 80% of patients with hematologic malignancies after receiving two or more neutropenia-inducing chemotherapy cycles (Freifeld et al., 2011; Klemencic & Perkins, 2019).

Neutropenic fever is defined as a single oral temperature of $38.3^\circ C$ ($101^\circ F$) or higher or a temperature of $38^\circ C$ ($100.4^\circ F$) or higher sustained for more than one hour (Taplitz et al., 2018). Fever is often the only clinical sign of an underlying infection in neutropenic patients with cancer (Rosa & Goldani, 2014). If febrile neutropenia is the result of infection, it is the most potentially lethal complication of chemotherapy administration (Bodey et al., 1966).

Febrile neutropenia is associated with high rates of morbidity and mortality (Keng et al., 2015) and is considered to be an oncologic emergency requiring prompt management to ensure the best outcomes for patients. Mortality rates range from 4% to 10%, depending on patient characteristics, type of malignancy, comorbidities,

and infectious complications (Kuderer et al., 2006), and have been reported as high as 58% in patients with multiple comorbidities. A delay in time to antibiotic administration is associated with a decrease in survival and a reported increase in mortality of 7.6% for each hour of delay (Koenig et al., 2019); for example, a four-hour delay could result in a 30.4% higher risk of death.

Febrile Neutropenia Guidelines

Empiric broad-spectrum antibiotics are the standard of care for patients with febrile neutropenia. At the author's institution, Duke Cancer Center Raleigh in North Carolina, empiric monotherapy with cefepime (fourth-generation cephalosporin) is used in the treatment of gram-negative organisms. According to American Society of Clinical Oncology clinical practice guidelines for the treatment of febrile neutropenia, antibiotics should be administered within one hour of emergency department presentation in patients with febrile neutropenia (Flowers et al., 2013). A one-hour time from triage to antibiotic administration for patients with febrile neutropenia is also recommended by the international guideline panel of the Surviving Sepsis Campaign (Flowers et al., 2013). The Society of Critical Care Medicine and European Society of Intensive Care Medicine's (2019) Hour-1 bundle guides practice toward early assessment and actions within the first hour, including measuring lactate levels, obtaining