Acute Bone Pain

An analysis of symptom management interventions after administration of granulocyte–colony-stimulating factors for myelosuppression

Elizabeth Joy Mclean, MSN, RN, OCN®

BACKGROUND: The administration of granulocyte–colony-stimulating factors (G-CSFs) has proven to be essential in increasing the body's immune system following treatment with chemotherapy; however, many patients have reported varying levels of acute bone pain after receiving G-CSFs.

OBJECTIVES: The purpose of this study was to assess the use of pharmacologic and nonpharmacologic interventions to manage acute bone pain following G-CSF administration.

METHODS: A descriptive, cross-sectional survey was administered to hospitalized patients who received G-CSFs during a four-month period to evaluate the perceived effectiveness of interventions in reducing pain.

FINDINGS: The findings of this study suggest that patients employ pharmacologic and nonpharmacologic interventions for pain management, but results are inconsistent and often inadequate. Nonpharmacologic interventions received higher scores for consistency and perceived effectiveness.

KEYWORDS
pain management; acute bone pain; granulocyte–colony-stimulating factors

DIGITAL OBJECT IDENTIFIER
10.1188/20.CJON.165-169

MYELOSUPPRESSION IS A COMMON SIDE EFFECT following chemotherapy administration because healthy cells and rapidly dividing cells in bone marrow tissue are often destroyed in addition to cancer cells. Chemotherapy drugs can also prevent the marrow from developing new blood cells, resulting in bone marrow suppression, which can lead to thrombocytopenia, anemia, and neutropenia. Of these conditions, neutropenia is particularly concerning because white blood cells are responsible for immune system function, and low white blood cell counts put patients at greater risk for infection, fever, and sepsis. Bone marrow suppression can prove detrimental to patients' overall health and ability to adhere to their medication regimen. For patients with cancer receiving chemotherapy, adherence to their prescribed medication regimen is essential for optimal health outcomes (Kirshner et al., 2012, 2018; Mullen, 2014; Pinto et al., 2007; Xu et al., 2015).

Granulocyte–colony-stimulating factors (G-CSFs) can be injected following the completion of treatment with chemotherapy to stimulate white blood cell production in patients with cancer. However, G-CSFs have been reported to cause many patients to experience varying degrees of acute bone pain following administration (Bondarenko et al., 2016; Kirshner et al., 2007, 2012). The cause of such bone pain is multifactorial because of the release of histamine and inflammation of bone marrow (Romeo et al., 2015). As bone marrow swells, nerves are affected by the changing immune function and stimulation of bone cells; the body releases histamine in reaction to this swelling (Romeo et al., 2015). In addition, G-CSFs stimulate the bone marrow to proliferate and expand, secrete cytokines, and potentiate pain (Lambertini et al., 2014). The resulting acute bone pain often presents in areas where marrow concentrates, such as the back, sternum, rib cage, and hips, but it can also be noted in joints and muscles (Mullen, 2014). For some patients, acute bone pain can be severe enough to warrant dose reductions and gaps in the treatment regimen, putting the patient at an increased risk for less than optimal oncologic outcomes, infections, and hospitalizations (Kirshner et al., 2018). Patients have previously reported pain ranging from mild to severe, with some patients reporting such severe pain that they considered refusing additional treatment with G-CSFs (Kirshner et al., 2018). According to Kirshner et al. (2007), refusing treatment with G-CSFs can interfere with the recommended dosing of chemotherapy, thereby decreasing the patient's response to treatment and potentially lowering the patient's long-term survival rate. To treat acute bone pain, healthcare providers may prescribe narcotics or recommend over-the-counter (OTC) medications, such as nonsteroidal anti-inflammatory drugs (NSAIDs) and