Use of Buffered Lidocaine in Bone Marrow Biopsies: A Randomized, Controlled Trial

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Patients with cancer require numerous invasive procedures throughout their disease process, including bone marrow biopsies, lumbar punctures, and aspiration of fluid from organ cavities. The procedures generally cause discomfort. One of the biggest concerns for healthcare providers is keeping patients comfortable. Lessening the pain that patients experience during invasive procedures is one way to improve patient comfort.

Purpose/Objectives: To determine whether a difference exists in perceived pain during preprocedure anesthetic injection for bone marrow biopsy between buffered and unbuffered lidocaine, to determine whether pain levels change over time, and to investigate relationships between perceived pain scores and other variables.

Design: A double-blind, randomized, experimental, crossover design.

Setting: A large hospital in the midwestern region of the United States.

Sample: 48 patients undergoing bone marrow biopsy.

Methods: The patients served as their own controls for the bilateral procedure. A 100 mm visual analog scale measured pain. A demographic questionnaire gathered the between-subjects exploratory variables.

Main Research Variables: Perceived pain scores and type of lidocaine anesthetic solution (buffered versus unbuffered).

Findings: Participants reported significantly lower pain scores on the side anesthetized with buffered lidocaine compared with the side anesthetized with unbuffered lidocaine. Higher pain scores were reported on the treatment side for participants who had received more than two surgical procedures. Patients who were members of a minority group had higher mean pain scores than Caucasians on the control side.

Conclusions: Buffered lidocaine is superior to unbuffered lidocaine as an anesthetic for bone marrow biopsy procedures.

Implications for Nursing: Advanced practice nurses perform a significant number of bone marrow biopsies and aim to improve patient comfort during invasive procedures. Use of unbuffered lidocaine should be questioned.

Background

Of the 1.3 million newly diagnosed cancer cases per year, about 8% are hematologic malignancies; this translates to more than 114,460 new cases per year (Leukemia & Lymphoma Society, 2008). Patients diagnosed with hematologic malignancies require bone marrow biopsy procedures at the time of diagnosis, and many patients require several during the treatment process. Patients should experience as little discomfort with bone marrow biopsy procedures as possible (Hyun, Stevenson, & Hanau, 1994).

Bone marrow biopsies are invasive procedures that cause a considerable amount of discomfort and often pain. Because pain is a subjective symptom and because healthcare professionals aim to deliver patient-centered care, anything that helps to reduce patients' perceptions of pain is beneficial. Patients with cancer may encounter more peripheral pain than patients with other diagnoses because of physical changes from the disease itself or from side effects of chemotherapy (Matutes, 2007; Wood & Phillips, 2003). The chemotherapy that patients receive makes their skin, tissue, and bones more sensitive to any type of manipulation. This, in turn, adds to the pain that patients experience (Kannarkat, Lasher, & Schiff, 2007; Polomano & Bennett, 2001). To decrease the amount of discomfort and pain that patients experience, and to promote smooth procedures, local anesthesia is used for bone marrow extraction. The local anesthetic used most often is lidocaine (Hyun et al., 1994).

Lidocaine, as injected, causes a painful burning sensation that continues with injection into the bone marrow. The pain associated with lidocaine can be partially correlated to the actual acidity of the available solution (Milner, Guard, & Allen., 2000; Richtsmeier & Hatcher, 1995; Ririe, Walker, James, & Butterworth, 2000; Xia, Chen, Tibbits, Reilley, & McSweeney, 2002). Lidocaine is an amino amide that can cause precipitation if left in its