The Impact of Hyperglycemia on Hematopoietic Cell Transplantation Outcomes: An Integrative Review

Jill M. Olausson, RN, MSN, CDE, Marilyn J. Hammer, PhD, DC, RN, and Veronica Brady, MSN, FNP-BC, BC-ADM, CDE

Since Van den Berghe et al. (2001) published the results of their groundbreaking study showing that tight glycemic control in the critical care setting significantly improved patient outcomes, researchers have attempted to understand the relationship between hyperglycemia and patient outcomes in a variety of clinical settings. Hyperglycemia, defined by the American Diabetes Association ([ADA], 2013) as a fasting blood glucose (BG) level of 126 mg/dl or greater or a random glucose of 200 mg/dl or greater, is experienced by a large majority of patients during the acute treatment phase of hematopoietic cell transplantation (HCT) (Hammer et al., 2009; Rentschler, 2010), and has, therefore, been studied in this patient population. This review synthesizes the results of these studies.

Hematopoietic Cell Transplantation and Hyperglycemia

HCT is a potentially curative treatment for a variety of malignant and nonmalignant hematologic disorders not resolved through first-line therapies. Although HCT has a high rate of success, it also is associated with a high rate of morbidity and mortality during the acute post-transplantation phase related to infection, organ toxicity, and other complications such as acute and chronic graft-versus-host disease (GVHD) (Appelbaum, Forman, Negrin, & Blume, 2009). Many of the contributors to these adverse outcomes are nonmodifiable. Research is showing, however, that one modifiable factor may be hyperglycemia. Therefore, understanding the scope of the influence of hyperglycemia is essential for optimizing outcomes.

Research completed in a variety of patient populations has shown that hyperglycemia is associated with adverse outcomes in the hospitalized patient and is described in a consensus report by the American Association of Clinical Endocrinologists and the ADA (Moghissi et al., 2009). Hyperglycemia can increase oxidative stress, leading to impaired immune function, decreased healing time, prolonged blood coagulation time, and cause endothelial dysfunction (Hammer &