Controlling Malglycemia in Patients Undergoing Treatment for Cancer

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Patients with or without preexisting diabetes undergoing treatment for cancer may be at risk for malglycemic events. Malglycemia, particularly hyperglycemia and diabetes in patients with cancer, may lead to adverse outcomes. Prevention, prompt recognition, and early intervention to regulate malglycemia can optimize the effects of cancer treatment, minimize the harmful consequences, and improve quality of life for patients with cancer. The development of evidence-based standards of care and protocols are needed to guide clinical practice when caring for patients with cancer.

At a Glance
- Malglycemia has been associated with increased risk for adverse patient outcomes.
- Multiple known and unknown factors contribute to the onset of malglycemia.
- Formal guidelines or protocols are needed to best manage malglycemia in patients receiving cancer treatment.

Context should be carefully considered when planning disease management and treatment (Bayliss et al., 2014). Typically, members of the healthcare team are focused on isolated disease management strategies, often failing to consider other pathophysiological processes that can diminish the effectiveness of those very treatments. Educating members of the healthcare team regarding the deleterious effects of malglycemia (hyperglycemia, hypoglycemia, and/or glycemic variability) (Hammer et al., 2009) is imperative for the comprehensive care of patients with cancer. Understanding the pathophysiology and subsequent ramifications of malglycemia can result in preemptive assessment, early identification, intervention, and opportunities to educate the patient.

The development of evidence-based standards of care and protocols for the treatment of malglycemia are needed to guide clinical practice when caring for patients with cancer. These best practices can be integrated into patients’ individualized treatment plans, thereby mitigating the untoward effects of malglycemia.

Background

 Patients with established diabetes (American Diabetes Association, 2015) are at increased risk for developing certain types of cancers, such as liver, pancreatic, endometrial, colorectal, breast, and bladder cancers (Giovannucci et al., 2010) (see Figure 1). In addition, patients with or without preexisting diabetes undergoing treatment for cancer may be at risk for malglycemic events because of numerous factors, including steroids (Mazali, Lalli, Alves-Filho, & Mazzali, 2008) and certain chemotherapeutic agents (e.g., docetaxel [Taxotere®], everolimus [Afinitor®], temsirolimus [Torisel®], androgen deprivation therapy) (Hershey et al., 2014). In addition, higher body mass index (Roumen, Blaak, & Korpeleijn, 2009), nutritional imbalances (Butler, Btaiche, & Alaniz, 2005), nutritional support, stress (Butler et al., 2005), physical inactivity (Katz, 2007), and age (Campisi & d’Adda di Fagagna, 2007) are potential contributors. Studies in patients who underwent treatment for hematologic malignancies (Storey & Von Ah, 2012) and, in particular, those who received autologous or allogeneic hematopoietic cell transplantations (Derr, Hsiao, & Saudek, 2008; Fuji et al., 2007; Hammer et al., 2009; Olausson, Hammer,
& Brady, 2014) have shown associations between malglycemia and increased risks for adverse events, such as infection, toxicity, morbidity, and mortality.

Unknown Contributors

Although these patient and clinical factors are likely contributors to malglycemia, how to integrate these factors into comprehensive management guidelines is not fully understood. Underlying genetic and epigenetic factors likely contribute to an individual’s risk as well. In addition, the biophysiologic mechanisms between malglycemia and adverse events in patients undergoing treatment for cancer are not thoroughly understood, but they seem to involve immune function that is altered through an inflammatory response to hyperglycemic-induced oxidative stress (Yu, Jhun, & Yoon, 2011). In response to hyperglycemic-induced oxidative stress (Yu, Jhun, & Yoon, 2011). In addition, the optimal therapeutic range for blood glucose is unknown, as are the best protocols for controlling glucose in patients with cancer.

Current Guidelines

No formal established guidelines or protocols are available regarding how to best manage malglycemia in patients undergoing cancer treatment. Oyer, Shah, and Bettenhausen (2006) offered an overview of approaches to the management of steroid-induced diabetes in patients with cancer, which ranged from the use of oral agents to insulin. Metformin (Glucophage®, Glumetza®, Glucophage XR®) has gained popularity for use in patients with cancer and diabetes, in part because of its reported protective effect (Simon & Balkau, 2010). An article by Brady, Grimes, Armstrong, and LoBiondo-Wood (2014) noted that the glycemic management of inpatients receiving steroids consisted primarily of insulin therapy. Jacob and Chowdhury (2015) suggested a variety of approaches to the management of diabetes, ranging from correction doses of insulin (if patient is not eating) to multiple-dose insulin therapy. Basal-bolus insulin therapy has been recommended for use in patients receiving high-dose steroids (Brady, Thosani, et al., 2014; Gosmanov, Goorha, Stelts, Peng, & Umpierrrez, 2013). Although many are aware that hyperglycemia and diabetes in patients with cancer may lead to adverse outcomes, a lack of consensus exists, and wide variations in treatment algorithms are reportedly being used, indicating the need for the development of evidence-based standards of care.

Implications for Nursing and Conclusion

Prevention and early intervention is important because malglycemia, particularly hyperglycemia, has been shown to affect diagnostic imaging studies (Rabkin, Israel, & Keidar, 2010), alter response to treatment (Biernacka et al., 2013; Zeng et al., 2010), and influence progression of cancer (Duan et al., 2014; Ryu, Park, & Scherer, 2014). In addition, reviews of studies examining the impact of malglycemia have noted less than desirable health outcomes for patients who experience malglycemia (Olausson et al., 2014; Storey & Von Ah, 2015). Malglycemia can be monitored using blood glucose meters or continuous glucose monitors, both of which require patient engagement to understand trends and patterns. Prevention, prompt recognition, and early intervention to regulate malglycemia can optimize the effects of cancer treatment, minimize the harmful consequences, and improve quality of life for patients with cancer.

References

Derr, R.L., Hsiao, V.C., & Saudek, C.D. (2008). Antecedent hyperglycemia is associated with an increased risk of neutropenic infections during bone marrow

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