Hyperglycemia in the Hospital: Changing the Way We Think

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A cardiac nurse, Jeanne Zerr, asked a question more than 10 years ago that has helped shape our current knowledge about hyperglycemia in the hospital setting. She wanted to know if high blood glucose levels were associated with increased thoracic wound infections. In 1997, Zerr and her colleagues in Portland, Ore., published an article with the findings that “the incidence of deep wound infection in diabetic patients was reduced after implementation of a protocol to maintain mean blood glucose levels < 200 mg/dl in the immediate postoperative care.”1

Once the Portland group identified the role of oral agents is discussed, and extensive information on the immune system, mediators of inflammation, vascular response, and brain-cell response:

- It causes immunosuppression leading to infection.
- Acute hyperglycemia has been shown to increase viscosity, blood pressure, and natriuretic peptide levels.
- Hyperglycemia has numerous adverse effects on the cardiovascular system, including impairing preconditioning, a protective mechanism for cardiac insult. Infarct size increases in the presence of hyperglycemia.
- Hyperglycemia-induced platelet hyperactivity may explain the increased thrombotic events seen in hospitalized patients. The connection between acute hyperglycemia and vascular changes likely involve inflammatory changes.
- Acute hyperglycemia is associated with enhanced neuronal damage following induced brain ischemia.4

The recent technical review offers numerous outstanding and informative tables, including an evidence-based table associating blood glucose levels to clinical outcome (Table 1). Its Table 11 summarizes 11 evidence-based recommendations, including target blood glucose levels of < 110 mg/dl preprandially and < 180 mg/dl at peak postprandial, and the recommendation that intensive insulin therapy with intravenous insulin reduces mortality and morbidity among critically ill patients in surgical intensive care units. All 11 recommendations are shown here in Table 2.

The technical review also addresses the question, “How are target blood glucose levels best achieved in the hospital?” The role of oral agents is discussed, and extensive information on the use of insulin in diabetes and hyperglycemia is provided.
The review also advises the elimination of the use of “sliding scale” terminology. Hallelujah! The term “scheduled insulin” or “programmed insulin” is recommended to refer to the insulin needed to cover the daily basal and nutritional needs, i.e., glucose infusions. When discrete meals are added, then insulin doses should be written for “basal insulin,” “prandial insulin,” and “correctional insulin.”

The review also included information on special situations, including total parenteral nutrition, glucocorticoid therapy, and enteral feedings. The roles of self-management education, medical nutrition therapy, and bedside glucose monitoring are also addressed.

Implementing these extensive guidelines will require a change in the way we think. Until now, patients in the hospital have been expected to have hyperglycemia, with or without a diagnosis of diabetes, and that has been accepted. Today, data support the contention that glucose control and insulin administration does make a difference in the hospital setting. Elsewhere in this issue (p. 112), we have included an article by Diabetes Spectrum associate editor Geralyn Spollett, MSN, C-ANP, CDE, that focuses on clinical considerations for hospitalized patients and highlights the importance of changing the way we view hyperglycemia in the hospital.

Beyond just changing the way we think, however, we must also change the way we practice. Implementing the aggressive, but achievable, standards laid out in the technical review will require a multidisciplinary approach and effort.

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Beyond just changing the way we think, however, we must also change the way we practice. Implementing the aggressive, but achievable, standards laid out in the technical review will require a multidisciplinary approach and effort. Administrators
and third party payers will need to see the cost benefits that can accrue from shorter hospital stays and fewer complications when hyperglycemia is reduced. Physicians, nurses, and quality improvement coordinators will need to step up to make hyperglycemia management a priority for their own hospitals. Protocols for glucose management and staff education will be a necessity to improve the way hyperglycemia is treated. Additional clinical trials will be necessary to discern the best approaches for glucose management and to provide further evidence related to the importance of glucose control, the role of insulin therapy, and other influences on mortality and morbidity.

Changing the way we think (let alone the way we practice) can seem a daunting task. But I encourage you to take your cue from Jeanne Zerr and be an instigator in your own institution. Ask questions. Spread your knowledge throughout the hospital system. Develop and implement protocols. Share your findings with others.

References

Note of disclosure: Ms. Childs has received honoraria for speaking engagements from Novo Nordisk Pharmaceuticals and Aventis Pharmaceuticals, both manufacturers of insulin products for the treatment of hyperglycemia.