

Standardized Insulin Orders Reduce Hypoglycemia

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DALLAS — Implementation of standardized subcutaneous insulin order sets and an insulin management algorithm across nearly all services in a 400-bed hospital resulted in significantly improved glycemic control, Dr. Gregory A. Maynard reported at the annual meeting of the Society of Hospital Medicine.

"That shouldn't be too surprising. But maybe what is surprising is that it also reduces hypoglycemia, if done well," said Dr. Maynard, chief of the division of hospital medicine at the University of California, San Diego, Medical Center.

The study was the first hospitalwide validation of recommendations that were laid out in an earlier American Diabetes Association report (*Diabetes Care* 2004;27:553-91).

"These results are generalizable. They allow you to couch this type of project in



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DR. CLEMENT

terms of a safety issue, not just a quality issue," he said.

Poor glycemic control is pervasive among diabetic inpatients. Study findings indicate that 35%-40% of inpatients with known diabetes or new hyperglycemia have a mean blood glucose level higher than 200 mg/dL throughout their hospital stay. This poor glycemic control is strongly associated with increased mortality, higher infection rates, and greater length of stay. Physician knowledge and practice patterns regarding inpatient diabetes management are highly variable.

For all of these reasons, the ADA and the American Association of Clinical Endocrinologists have recommended that hospitals implement standardized subcutaneous order sets and insulin management algorithms. And that message is being heard: In a recent national survey of 700 clinical endocrinologists, three-quarters indicated that their hospital is in the process of trying to improve glucose management, according to Dr. Maynard.

He presented a study of the effect of these interventions on inpatient glycemic control and hypoglycemia at his institution. The interventions, developed by a multispecialty task force, were implemented on all services except critical care and obstetrics. The study population consisted of more than 11,000 adult inpatients who underwent 53,466 patient-days of point-of-care blood glucose monitoring.

The first major intervention, introduced in November 2003, was the standardized subcutaneous insulin order set. It encouraged the use of basal, nutritional, and correction-dose insulin in lieu of the traditional sliding-scale insulin.

"Sliding-scale insulin regimens general-

ly lead to a roller coaster effect, with increased hyperglycemia and increased hypoglycemia," Dr. Maynard said.

Glargine was selected as the preferred basal insulin and lispro as the correctional insulin. "It's less important which [you choose] than that you make a choice and standardize the process in your medical center. You limit the choices to get people more used to using a standardized regimen," he explained.

The second key intervention was a one-

page insulin management algorithm introduced in May 2005. It provided guidance on calculating insulin dosage and monitoring glucose, and specified preferred regimens for inpatients in various nutritional situations.

Before the interventions, on a month-by-month basis, 70%-75% of patients requiring insulin were on a sliding-scale only regimen. Today, across all services, that's down to about 20%, meaning that 80% of patients have some basal insulin on board.

The percentage of patients with a mean blood glucose of 180 mg/dL or less on hospital days 1-14 rose significantly from 63% at baseline to 68% after introduction of standardized insulin orders to 73% post algorithm. The percentage of hospital days when all patients' blood glucose values were 60-180 mg/dL rose similarly.

Moreover, the percentage of monitored hospital days when patients had hypoglycemia or severe hypoglycemia declined by about 30% (see box), to the surprise of

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References: 1. Food and Drug Administration, Center for Drug Evaluation and Research. Approval package for: application number NDA 21-928: statistical review(s). Food and Drug Administration Web site. Available at: http://www.fda.gov/cder/foi/nda/2006/021928_s000_Chantix_StatR.pdf. Accessed August 25, 2006. 2. Data on file. Pfizer Inc. Post hoc analysis of data from final study reports. 3. Gonzales D, Rennard SI, Nides M, et al, for the Varenicline Phase 3 Study Group. Varenicline, an $\alpha_4\beta_2$ nicotinic acetylcholine receptor partial agonist, vs sustained-release bupropion and placebo for smoking cessation: a randomized controlled trial. *JAMA*. 2006;296:47-55. 4. Jorenby DE, Hays JT, Rigotti NA, et al, for the Varenicline Phase 3 Study Group. Efficacy of varenicline, an $\alpha_4\beta_2$ nicotinic acetylcholine receptor partial agonist, vs placebo or sustained-release bupropion for smoking cessation: a randomized controlled trial. *JAMA*. 2006;296:56-63. 5. CHANTIX [package insert]. New York, NY: Pfizer Inc; May 2007.

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the many physicians and surgeons who had relied on sliding-scale regimens in an effort to prevent hypoglycemia.

"People are scared to death of hypoglycemia. If you're going to introduce an order set, you have to monitor hypoglycemia rates with some passion because the anecdotal reports will increase," Dr. Maynard said.

All of these improvements were achieved without the use of any special teams. The hospital didn't even have a diabetes educator at the time of the unfunded project.

Dr. Stephen Clement, lead author of the ADA guidelines, said that in speaking to hospital groups around the country, he's found that the biggest obstacle to implementing measures to improve inpatient glycemic control comes from surgeons worried about hypoglycemia.

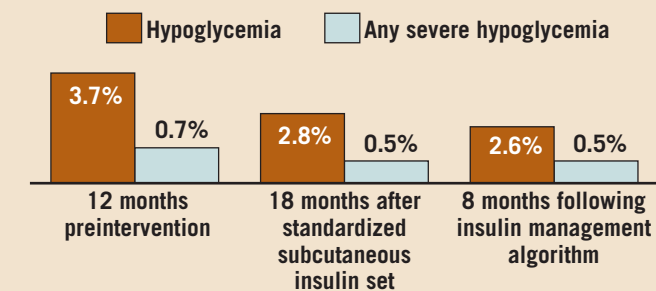
"Part of it is that hypoglycemia is so graphic. We've all seen a patient have a hypoglycemic seizure, but we don't see what's happening to platelet function and neutrophils when the blood sugars are 300," said Dr. Clement, acting chief of endocrinology at Georgetown Uni-

versity Hospital, Washington.

He was pleased about the San Diego group's strong discouragement of sliding-scale regimens. "Forget the sliding scale. Take that little pearl you learned in medical school and throw it in the garbage can," he advised.

For detailed information on how to implement protocols for improved care of hyperglycemic inpatients, Dr. Maynard suggested visiting the Glycemic Control Resource Room at the Society of Hospital Medicine Web site (www.hospitalmedicine.org). ■

Monitored Patient-Days With Hypoglycemia



Note: Based on a study of 11,057 patients who underwent 53,466 patient-days of point-of-care glucose monitoring.
Source: Dr. Maynard

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