Tight glucose control for critically ill patients gained credence several years ago after a landmark study showed tight control for ICU patients reduced the incidence of infections and mortality.

Now the pendulum is swinging back, as newer reports show managing blood glucose levels too tightly places patients at risk for hypoglycemia and other potentially harmful effects.

Physicians’ concerns about hypoglycemia have been a barrier to implementing tight glucose control protocols during surgery. Close management of glucose levels is also time consuming and labor intensive.

What impact are the new findings having on intraoperative blood glucose management? And how does the new research affect the glucose control measure used by the Surgical Care Improvement Project (SCIP) (sidebar)?

**SCIP takes moderate stance**

SCIP has steered a moderate course. Dale Bratzler, DO, MPH, president and CEO of the Oklahoma Foundation for Medical Quality, which manages SCIP, has clarified that the new studies, particularly the NICE-SUGAR report of ICU patients published in *The New England Journal of Medicine* in March 2009, are not relevant to the SCIP measure. The SCIP measure is more liberal than the NICE-SUGAR control group, which had a target of 180 mg/dL or less for ICU patients.

“I have no doubt that hospitals around the country have gone beyond the requirements of the SCIP performance measure because all the sentiment for quite a while was that tight blood sugar control is the thing to do,” Dr Bratzler told *OR Manager*. “But it was never required with respect to the performance measure. We just try to avoid the extremes. Everyone agrees that the extremes of hyperglycemia are detrimental.”

**What is “tight” glucose control?**

Much of the controversy about glucose control stems from use of the word “tight,” says Leif Saager, MD, assistant professor of anesthesiology at the Cleveland Clinic.

“The SCIP measure of 200 mg/dL or less is not tight glucose control; it is a more moderate glucose control. It means just watch your glucose and make sure it is within reason,” notes Dr Saager, one of a group of researchers at the Clinic that is studying intraoperative glucose control.

Tight glucose control gained momentum in 2001 after publication of a randomized trial led by Greet Van den Berghe, MD, PhD, which found tight glucose control in the surgical ICU reduced mortality by almost half and reduced serious complications such as bloodstream infections. After that
report, tight glucose control became synonymous with 80 mg/dL to 110 mg/dL.

Because the SCIP measure was based on this study, there was some confusion. Even though the SCIP measure calls for moderate glucose control, many hospitals strove to keep levels within the tight range in the Van den Berghe study.

The NICE-SUGAR study had a much different finding. Comparing a tight glucose-control group (81 mg/dL to 108 mg/dL) with a moderate glucose control group (180 mg/dL or less), the researchers found no differences—except the tight-control group had a much higher rate of hypoglycemia.

The NICE-SUGAR findings don’t mean glucose control is not important. “But what we have defined as tight control might be harmful because of the hypoglycemia,” Dr Saager explains.

**Recommendations change**

Professional organizations have since changed their positions. A 2009 consensus statement by the American Association of Clinical Endocrinologists and American Diabetes Association recommends maintaining glucose levels between 140 mg/dL and 180 mg/dL for critically ill inpatients, noting that targets of less than 110 mg/dL are not recommended (sidebar).

An earlier 2006 consensus conference had recommended reducing blood glucose readings for hospitalized adults to less than 110 mg/dL.

**Making adjustments**

In view of the new studies, St Luke’s Health System, Kansas City, Missouri, is adjusting its glucose control protocols for cardiovascular surgery patients. The previous protocol was based on the Portland Protocol developed by Anthony Furnary, MD, lead author of another landmark study from 1999.

“Previous studies showed tight control had a positive impact on length of stay, mortality, and infection. Newer studies seem to be swinging the pendulum the other way, saying while glucose control is good, tight control is not,” says Rose Garcia, RN, BSN, CCRN, TNCC, cardiovascular ICU nurse.

The cardiovascular ICU has changed its target from a range of 80 mg/dL to 110 mg/dL to a range of 120 mg/dL to 150 mg/dL. The current preoperative protocol for cardiovascular surgery patients is 200 mg/dL for both diabetic and nondiabetic patients.

Intraoperatively, the anesthesiologist checks blood glucose every 30 minutes as well as before, during, and after cardiopulmonary bypass, keeping the level at 200 mg/dL.

**Intraoperative data lacking**

The landmark studies on glucose control focused on ICU patients. There is no data to support tight glucose control intraoperatively. Moreover, tight glucose control is time-consuming, labor intensive, and more expensive, says Dr Saager.

“The overall benefit of glucose control even in the ICU remains unclear, and whether it is beneficial during surgery is completely unknown,” says Daniel I. Sessler, MD, professor and chairman of the Department of Outcomes Research at the Cleveland Clinic.

For the Clinic’s glucose studies, an investigator must be in the OR for the
entire procedure. Blood glucose measurements are taken every 5 to 10 minutes to keep blood glucose levels at 80 mg/dL to 110 mg/dL in study cases. “It is not something you can tell anesthesiologists to do in addition to everything else they do,” Dr Sessler says. Yet without a dedicated person to monitor blood glucose, he says, “there is the risk of hypoglycemia and worse outcomes.”

If future studies demonstrate a benefit to tight glucose control, Dr Saager says emerging technology might eventually help with glucose monitoring. After the Van den Berghe study was published, companies started developing systems and software that would monitor glucose levels, calculate insulin dosing, and give needed insulin to the patient, but the technology has not come to market.

“We still need more data,” says Dr Saager. In contrast to the amount of evidence supporting the SCIP measure to keep patients warm during surgery, for glucose control, he says, “We see there is much more work to be done.”

—Judith M. Mathias, RN, MA

More about SCIP is at www.qualitynet.org

References


SCIP quality measure: Postop glucose control

SCIP-Infection-4

Description: Cardiac surgery patients with controlled 6 am blood glucose (≤ 200 mg/dL) on postoperative day 1 and postoperative day 2 with the anesthesia end date being postoperative day zero.

Numerator statement: Surgery patients with controlled 6 am blood glu-
cose (≤ 200 mg/dL) on postoperative day 1 and postoperative day 2.

**Denominator statement:** Cardiac surgery patients with no evidence of prior infection.


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**Glucose control consensus statement**

The 2009 American Association of Clinical Endocrinologists and American Diabetes Association Consensus Statement on Inpatient Glycemic Control includes these recommendations for treatment of hyperglycemia in critically ill patients:

- Initiate insulin therapy for treatment of persistent hyperglycemia, starting at a threshold of no higher than 180 mg/dL.
- Once insulin therapy has been started, a glucose range of 140 mg/dL to 180 mg/dL is recommended for the majority of critically ill patients.
- Although strong evidence is lacking, somewhat lower glucose targets may be appropriate in selected patients; however, targets of less than 110 mg/dL are not recommended.