GLU-09 Review - May 18, 2026

Review Measure Specification by selecting this link

Feedback from Measure Reviewer(s)

Dr. Patrick Henson, Vanderbilt University

Review of new literature (Published 2023)
The PROGRAM investigators evaluated whether insulin-dosing reminders improved postoperative hyperglycemia compared with glucose-check reminders alone. The intervention did not significantly reduce hyperglycemia, a finding that may instead reinforce the importance of the core MPOG GLU metrics emphasizing timely glucose assessment OR insulin treatment[1] **A study of 37 abdominal surgery patients demonstrated that closed-loop insulin administration is likely preferable to usual care with glucose checks in maintaining blood glucose in the range of 5.6-10.0 mmol/L (100-180 mg/dL). This reinforces the current model where BG 180 mg/dL is considered the upper limit/treatment threshold[2]. In similar fashion, a study of 54 cardiac surgical patients demonstrated no difference in "time in range" of blood glucose 100-180 mg/dL when using continuous glucose monitoring versus usual checks[3]** **STOIC-D randomized Surgical inpatients with known diabetes or new hyperglycemia ≥200 mg/dL to early electronic specialist-led diabetes care vs standard care and demonstrated a lower patient-day mean glucose and lower healthcare-associated infection risk. This is more a study of the perioperative optimization pathway than intraoperative care, however, and extends beyond day of surgery. The principle remains relevant. The upper limit of 200 mg/dL in non-diabetic patients is not consistent with GLU-9, 10, 11[4]** **An observational study of perioperative patients without diabetes reported a nearly 35% incidence of perioperative hyperglycemia. Multiple prior studies have demonstrated that non-diabetic patients who develop perioperative hyperglycemia experience higher rates of complications compared with normoglycemic non-diabetic patients, and in some cases, even higher complication rates than patients with diabetes[5].** **A study of cardiac surgical patients demonstrated the use of A1C for screening followed by POC BG and correction to BG <180 mg/dL was ultimately associated with reduced risk of perioperative infection[6]. A small study of neurosurgical patients demonstrated that structured blood glucose monitoring and insulin correction to maintain BG <180 mg/dL was associated with reduced infection rate in patients with and without a history of diabetes[7].**

Synthesis of current literature reports on the risks associated with hyperglycemia in diabetic and non-diabetic populations, and recommends controlling blood glucose <180 mg/dL in the perioperative period in both groups, regardless of diabetic status[8], the Endocrine Society recommends insulin to maintain BG <180 mg/dL in hospitalized diabetic patients, including those having surgery[9], and a review of clinical practice guidelines reports consistency with blood glucose maintenance below an upper limit of 180 mg/dL in hospitalized patients, as well as a recommended re-assessment period of between 30-120 minutes for hyperglycemic patients[10] .

The American Diabetes Association Practice Advisory recommends maintaining blood glucose in non-critically ill hospitalized patients with diabetes at between 100-180 mg/dL and extends this to the perioperative period as well[11]. These all support the current upper limit for recheck and treatment used in the GLU measures.

1. Zapf, M. *et al.* PeRiOperative Glucose PRAgMatic (PROGRAM): a randomized trial of standardized insulin management in surgical patients. *Anesthesiology* (2025) doi:10.1097/aln.0000000000005577.

2. Krutkyte, G. *et al.* Perioperative Fully Closed-loop Versus Usual Care Glucose Management in Adults Undergoing Major Abdominal Surgery. *Ann. Surg.* 281, 732–740 (2025).

3. Moon, S.-J. *et al.* Use of an insulin titration protocol based on continuous glucose monitoring in postoperative cardiac surgery patients with type 2 diabetes and prediabetes: a randomized controlled trial. *Cardiovasc. Diabetol.* 24, 210 (2025).

4. Barmanray, R. D. *et al.* The Specialist Treatment of Inpatients: Caring for Diabetes in Surgery (STOIC-D Surgery) Trial: A Randomized Controlled Trial of Early Intervention With an Electronic Specialist-Led Model of Diabetes Care. *Diabetes Care* 47, 948–955 (2024).

5. Dejen, E. T. *et al.* Postoperative hyperglycemia among adult non-diabetic surgical patients at University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia. *BMC Anesthesiol.* 24, 217 (2024).

6. Mattina, A. *et al.* Impact of systematic diabetes screening on peri-operative infections in patients undergoing cardiac surgery. *Sci. Rep.* 14, 14182 (2024).

7. Kulikov, A., Krovko, Y., Zagidullin, T. & Bilotta, F. Implementation of perioperative blood glucose monitoring and insulin infusion protocol can decrease postoperative infection rate in diabetic patients undergoing elective craniotomy: An observational study. *J. Clin. Neurosci.* 124, 137–141 (2024).

8. Shuford, R. & Miller-Ocuin, J. L. Hyperglycemia in the Perioperative Period. *Clin Colon Rect Surg* 36, 198–200 (2023).

9. Korytkowski, M. T. *et al.* Management of Hyperglycemia in Hospitalized Adult Patients in Non-Critical Care Settings: An Endocrine Society Clinical Practice Guideline. *J Clin Endocrinol Metabolism* 107, dgac278- (2022).

10. Wilson, L. M. *et al.* Management of Diabetes and Hyperglycemia in the Hospital: A Systematic Review of Clinical Practice Guidelines. *Diabetes Care* 48, 655–664 (2025).

11. Committee, A. D. A. P. P. *et al.* 16. Diabetes Care in the Hospital: Standards of Care in Diabetes—2025. *Diabetes Care* 48, S321–S334 (2024).

Appropriateness of rationale

Glucose management in the perioperative patient remains an important concern for surgeons and anesthesiologists. Severe perioperative hyperglycemia has been associated with increased complications across a wide range of surgical procedures and patient populations. Diabetes mellitus itself confers increased perioperative risk, and hyperglycemia further magnifies that risk in patients with diabetes. However, perioperative hyperglycemia in patients without a known diagnosis of diabetes may be an even stronger predictor of adverse outcomes. Monitoring and maintaining blood glucose within an appropriate target range has been associated with reductions in complications such as surgical site infection, mortality, and prolonged hospital length of stay.

The optimal perioperative glucose target remains an area of ongoing debate. Although glucose variability has been recognized as an independent risk factor for complications in critically ill and hospitalized patients, maintaining blood glucose within a moderate target range has been associated with improved outcomes while minimizing the significant risks associated with hypoglycemia. Current national standards and societal recommendations generally support a perioperative glucose target between 100 and 180 mg/dL for hospitalized patients undergoing elective surgical procedures.

Much of the available evidence has focused on intraoperative glycemic control. However, poor preoperative glycemic control, particularly elevated day-of-surgery glucose values, as well as postoperative hyperglycemia, have also been strongly associated with increased rates of complications, including surgical site infection and mortality.

A blood glucose target of 140-180 mg/dL in hospitalized patients has been demonstrated to be safe, and maintaining blood glucose below 180 mg/dL has been associated with reduced complications related to surgery and critical illness. The current measures (GLU-09, GLU-10, and GLU-11) establish 180 mg/dL as the threshold for monitoring and initiation of treatment, consistent with current evidence, national standards, and societal recommendations.

The best available evidence supports maintaining blood glucose below 180 mg/dL, with a general target range of 100-180 mg/dL in hospitalized and perioperative patients. The three measures in this review do not establish a lower threshold for treatment, as they are intended to focus on appropriate monitoring, timely reassessment, and insulin treatment for blood glucose values exceeding 180 mg/dL rather than mandate a specific treatment strategy below that threshold.

Notable evidence since the last review (in 2023) reinforce this standard.

Evaluation of inclusion/ exclusion criteria

- Age < 12 years

Reported as "adult metric". I would be in favor of adjusting the age range to mirror GLU-11 (exclude <18 years), renaming the metric description from "Percentage of adult patients with…" to "Percentage of adult and adolescent patients with…"

- **ASA 5 & 6 including Organ Procurement (CPT: 01990)**

While this is not explicitly stated, it seems as though these measures are meant to prioritize management in non-emergent cases. However, a case could be made that ASA 5 include severely and critically ill patients. Is there justification for exclusion?

- **Cases with measure duration (Preop Start to PACU End) ≤ 30 minutes**

Short duration cases (those under 30 minutes) are appropriately excluded, as the practical nature of glucose monitoring coupled with shorter and presumably lower stress surgical cases

- **Cesarean Delivery Cases (determined by Obstetric Anesthesia Type value codes: 1, 2, 7)**
- **Labor Epidurals (determined by Obstetric Anesthesia Type value codes: 3 & 6 including obstetric non-operative procedures - CPT: 01958)**

Appropriate, as some risks of treating hyperglycemic obstetric patients extend to the fetus, and evidence is limited on the maternal benefits.

- **Glucose measurements > 180mg/dL within 90 minutes before measure end (see 'Other Measure Build Details' for more information)**

Appropriate to maintain the timing of the measure.

- Outpatient cases with Anesthesia Duration <4 hours long

Separate measure in development for ambulatory cases. I think it is valuable to capture shorter outpatient cases (i.e. those 2-4 hours) as we are seeing many cases shifting to ambulatory including colorectal, urologic, spine, and many of these cases have enhanced recovery pathways which include glucose monitoring as part of the protocol.

Evaluation of definition of success or flagged cases

- **Administration of insulin within 90 minutes (either IV or sub Q routes) or**
- **Recheck of glucose level within 90 minutes**

The criteria for success is appropriately conservative. I would expect recheck or treatment to be within 60 minutes, ideally, but a small amount of latitude to measure and chart either seems reasonable/

Other feedback

How do we handle preop blood glucose values when they occur well before standard preop admission?

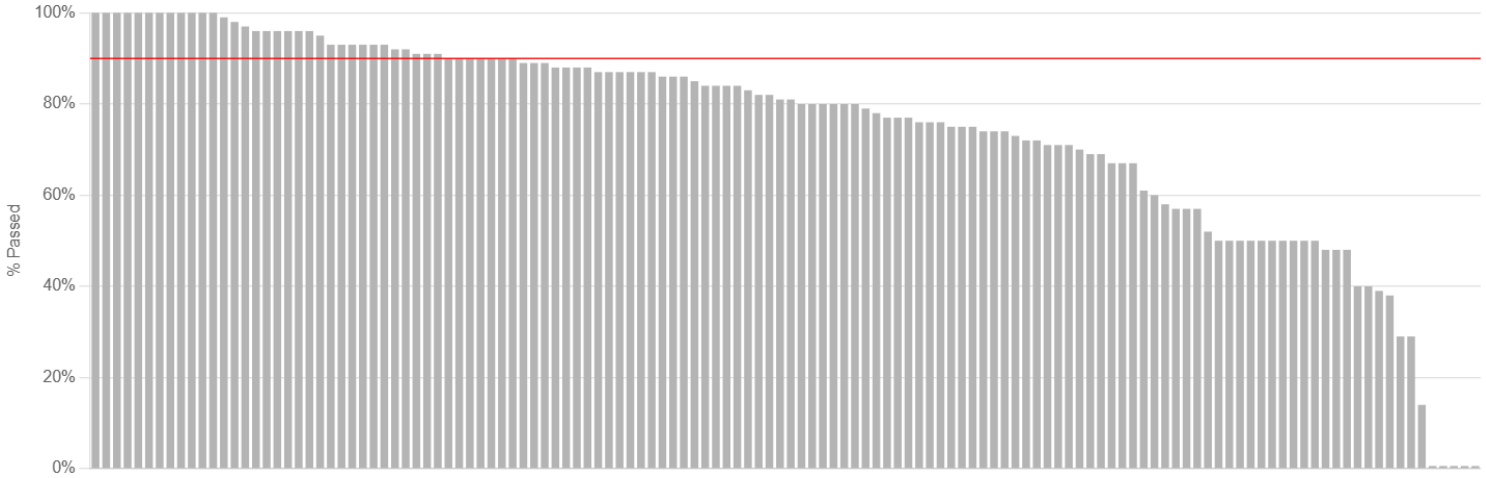
Consider including ASA 5?

Adjust wording or exclude adolescents? (12-18)

Dr. Henson's Recommendation for GLU-09

	Dr. Henson	QI Committee
Keep as is: no changes at all	☐	☑
Modify: changes to measure specifications (see below)	☑	☐
Retire: eliminate entirely from dashboard and emails	☐	☐

MPOG Coordinating Center Comments


100%
80%
60%
40%
20%
0%
% Passed


MPOG
MULTICENTER PERIOPERATIVE
OUTCOMES GROUP


MPOG
MULTICENTER PERIOPERATIVE
OUTCOMES GROUP