

NQF-ENDORSED VOLUNTARY CONSENSUS STANDARDS FOR HOSPITAL CARE

Measure Information Form

Measure Set: Surgical Care Improvement Project (SCIP)

Set Measure ID #: SCIP-Inf-4

Performance Measure Name: Cardiac Surgery Patients With Controlled Postoperative Blood Glucose

Description: Cardiac surgery patients with controlled postoperative blood glucose (less than or equal to 180 mg/dL) in the timeframe of 18 to 24 hours after *Anesthesia End Time*.

Rationale: Hyperglycemia has been associated with increased in-hospital morbidity and mortality for multiple medical and surgical conditions. In a study by Zerr, et al (1997), the risk of infection was significantly higher for patients undergoing coronary artery bypass graft (CABG) if blood glucose levels were elevated. Studies have shown there is an independent rise in the risk of surgical infection with blood glucose levels > 180 mg/dL (Van den Berghe, 2001). Latham, et al (2001), found that hyperglycemia in the immediate postoperative phase increases the risk of infection in both diabetic and nondiabetic patients and the higher the level of hyperglycemia, the higher the potential for infection in both patient populations. A study conducted in Leuven, Belgium (Van den Berghe, 2001), demonstrated that intensive insulin therapy not only reduced overall in-hospital mortality but also decreased blood stream infections, acute renal failure, red cell transfusions, ventilator support, and intensive care. Hyperglycemia is a risk factor that, once identified, could minimize adverse outcomes for cardiac surgical patients. Guidelines highlight the need for perioperative (particularly intraoperative and postoperative) glucose control in cardiac surgery patients. The Society of Thoracic Surgeons Workforce guidelines (Lazar, 2009) recommended cardiac surgery patients, with and without diabetes, maintain serum glucose of < 180 mg/dL. It is acknowledged that controlling the blood glucose in the immediate time period after surgery may be challenging (due to changing medications, use of inotropes, etc.), however, cardiac care teams should be able to reasonably control the blood sugar to levels of 180 mg/dL or less within the 18 – 24 hour post-operative time frame.

Type of Measure: Process

Improvement Noted As: An increase in the percentage.

Numerator Statement: Cardiac surgery patients with controlled postoperative blood glucose (less than or equal to 180 mg/dL) in the timeframe of 18 to 24 hours after *Anesthesia End Time*.

Included Populations: Not applicable

Excluded Populations: None

Data Elements:

Glucose

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

Included Populations:

- An *ICD-9-CM Principal Procedure Code* of selected surgeries (as defined in Appendix A, Table 5.10 for ICD-9-CM codes)

AND

- An *ICD-9-CM Principal Procedure Code* of selected surgeries (as defined in Appendix A, Table 5.11 for ICD-9-CM codes)

Excluded Populations:

- Patients less than 18 years of age
- Patients who have a length of stay greater than 120 days
- Patients who had a principal diagnosis suggestive of preoperative infectious disease (as defined in Appendix A, Table 5.09 for ICD-9-CM codes)
- Burn and transplant patients (as defined in Appendix A, Tables 5.14 and 5.15 for ICD-9-CM codes)
- Patients enrolled in clinical trials
- Patients whose ICD-9-CM principal procedure occurred prior to the date of admission
- Patients with physician/advanced practice nurse/physician assistant (physician/APN/PA) documented infection prior to surgical procedure of interest
- Patients who undergo CPR or surgery, discharge, expire, or leave Against Medical Advice (AMA) prior to 24 hours after *Anesthesia End Time*.

Data Elements:

- *Anesthesia Start Date*
- *Admission Date*
- *Birthdate*
- *Clinical Trial*
- *Discharge Date*
- *ICD-9-CM Principal Diagnosis Code*
- *ICD-9-CM Principal Procedure Code*
- *Infection Prior to Anesthesia*

Risk Adjustment: No

Data Collection Approach: Retrospective data sources for required data elements include administrative data and medical record documents. Some hospitals may prefer

to gather data concurrently by identifying patients in the population of interest. This approach provides opportunities for improvement at the point of care/service. However, complete documentation includes the principal or other ICD-9-CM diagnosis and procedure codes, which require retrospective data entry.

Data Accuracy: Variation may exist in the assignment of ICD-9-CM codes; therefore, coding practices may require evaluation to ensure consistency.

Measure Analysis Suggestions: It is important that blood glucose levels be maintained and documented throughout the entire postoperative period. In the course of quality improvement efforts, hospitals may find it useful to drill down to the response for the data element *Glucose*. Further insight may be gained by examining the consistency and values of blood glucose diagnostics and documentation within the organization.

Sampling: Yes, please refer to the measure set sampling requirements and for additional information see the Population and Sampling Specifications Section.

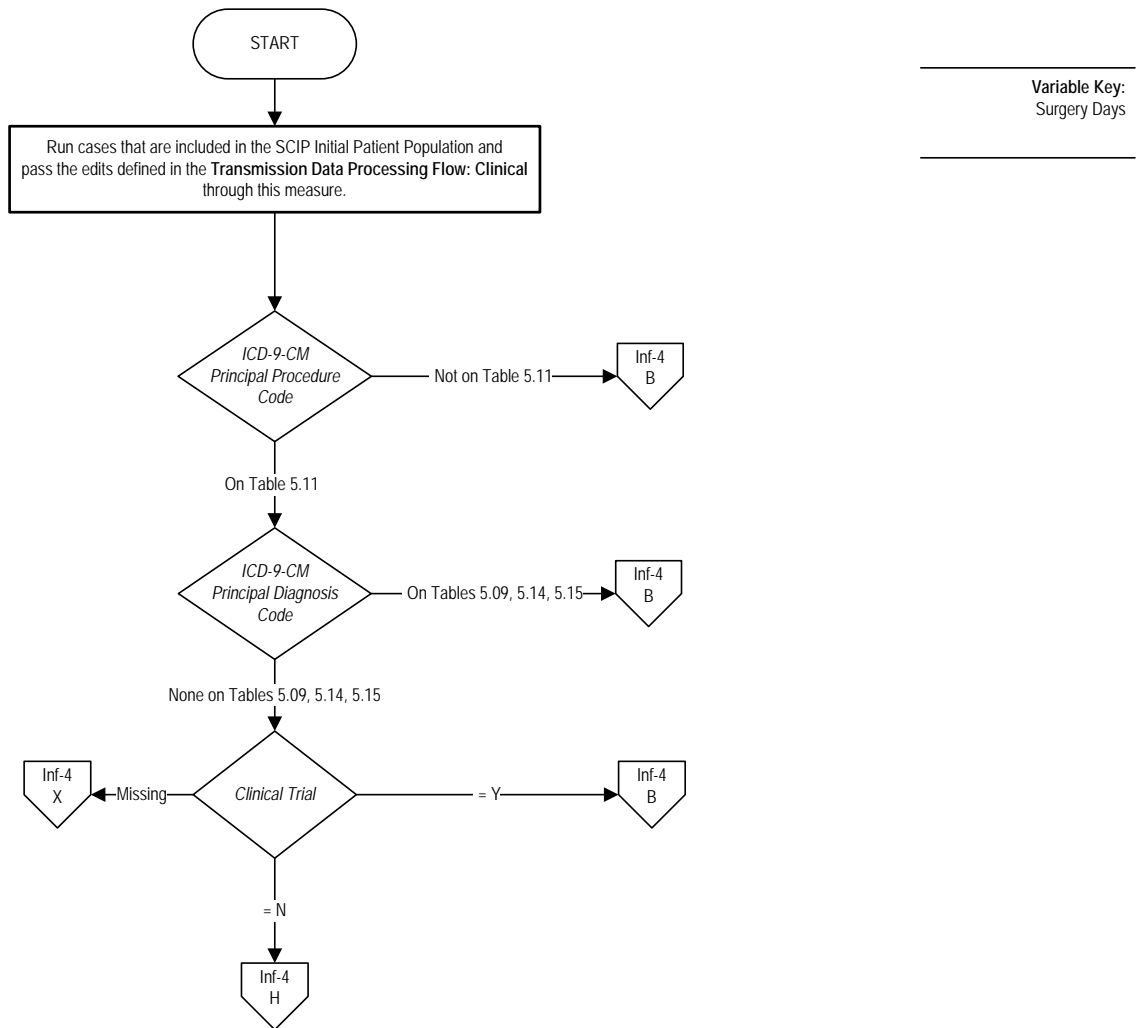
Data Reported As: Aggregate rate generated from count data reported as a proportion.

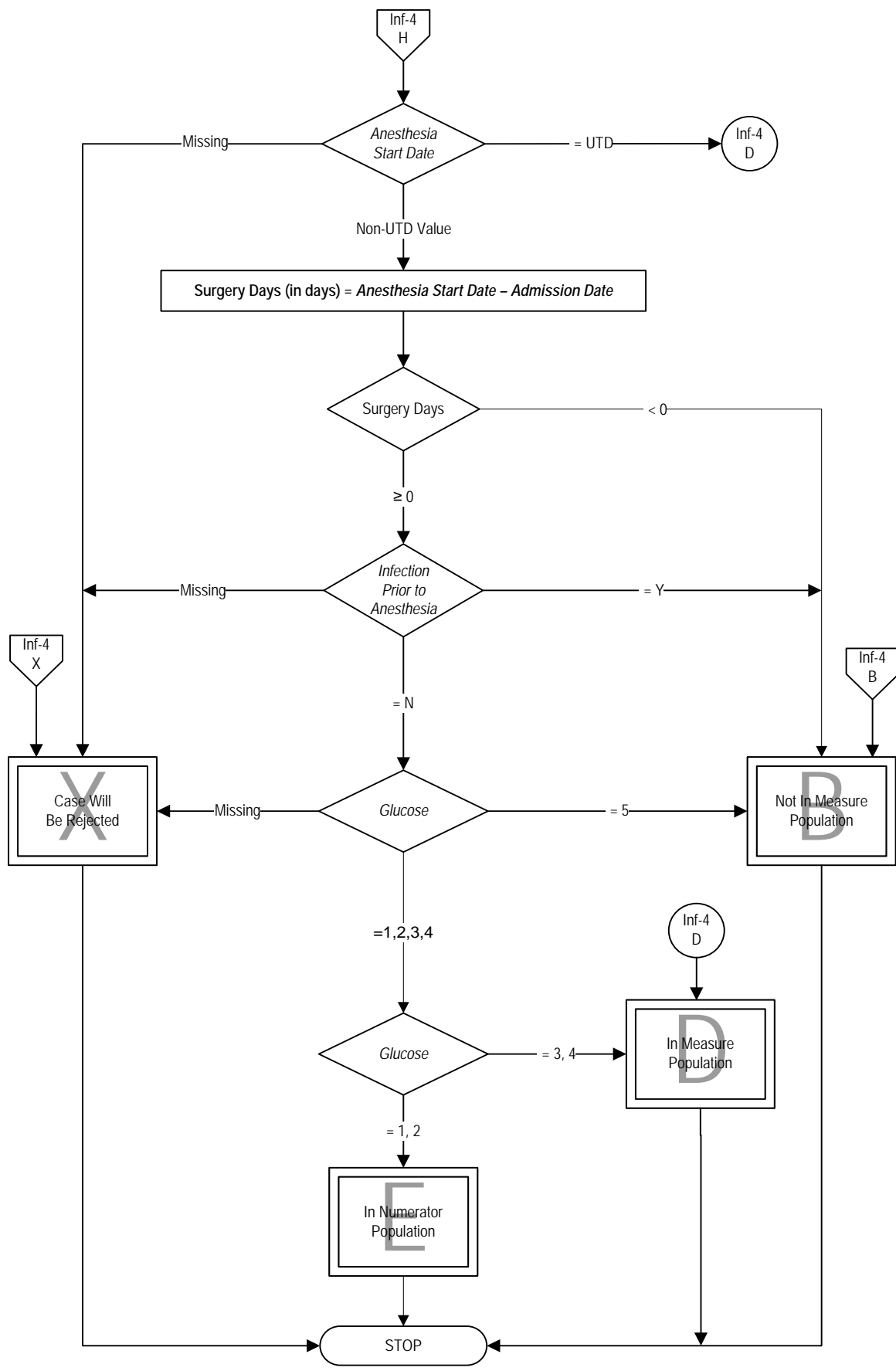
Selected References:

- Dellinger E. Preventing Surgical-Site Infections: The importance of timing and glucose control. *Infect Control Hosp Epidemiol.* 2001;22(10):604-606. PMID: 11776344.
- Dellinger EP, Gross PA, Barrett TL, et al: Quality standard for antimicrobial prophylaxis in surgical procedures. Infectious Diseases Society of America. *Clin Infect Dis.* 1994;18: 422-427. PMID: 8207176.
- Estrada CA, Young JA, Nifong LW, et al. Outcomes and perioperative hyperglycemia in patients with or without diabetes mellitus undergoing coronary artery bypass grafting. *Ann Thorac Surg.* 2003 May;75(5):1392-1399. PMID: 12735552.
- Furnary AP, Zerr KJ, Grunkemeier GL, et al. Continuous intravenous insulin infusion reduces the incidence of deep sternal wound infection in diabetic patients after cardiac surgical procedures. *Ann Thorac Surg.* 1999;67:352-360. PMID: 10197653.
- Golden SH, Peart-Vigilance C, Kao WH, et al. Perioperative glycemic control and the risk of infectious complications in a cohort of adults with diabetes. *Diabetes Care.* 1999 Sep;22(9):1408-1414. PMID: 10480501.
- Gordon SM, Serkey JM, Barr C, et al. The relationship between glycosylated hemoglobin (HgA1c) levels and postoperative infections in patients undergoing primary coronary artery bypass surgery (CABG.) *Infect Control Hosp Epidemiol.* 1997;18(No.5, Part 2):29(58.) PMID: 00000.
- Latham R, Lancaster AD, Covington JF, et al. The association of diabetes and glucose control with surgical-site infections among cardiothoracic surgery patients. *Infect Control Hosp Epidemiol.* 2001 Oct;22(10):607-612. PMID: 11776345.
- Lazar H, McDonnell M, Chipkin S, Furnary A, Engelman R, Sadhu A, Bridges C, Haan C, Svedjeholm R, Taegtmeier H, Shemin R. The Society of Thoracic

- Surgeons practice guideline series: Blood glucose management during adult cardiac surgery. *Ann Thorac Surg.* 2009;87;663-669.
- McAlister FA, Man J, Bistritz L, et al. Diabetes and coronary artery bypass surgery: an examination of perioperative glycemic control and outcomes. *Diabetes Care.* 2003 May;26(5):1518-1524. PMID: 12716815.
 - Menzin J, Langly-Hawthron C, Friedman M, et al. Potential short-term economic benefits of improved glycemic control: a managed care prospective. *Diabetes Care.* 2001 Jan;24(1):51-55. PMID: 11194241.
 - Pomposelli JJ, Baxter JK 3rd, Babineau TJ, et al. Early postoperative glucose control predicts nosocomial infection rate in diabetic patients. *J Parenter Enteral Nutr.* 1998 Mar-Apr;22(2):77-81. PMID: 9527963.
 - Terranova A. The effects of diabetes mellitus on wound healing. *Plast Surg Nurs.* 1991;11(1):20-25. PMID: 2034714.
 - Trick WE, Scheckler WE, Tokars JI, et al. Modifiable risk factors associated with deep sternal site infection after coronary artery bypass grafting. *J Thorac Cardiovasc Surg.* 2000 Jan;119(1):108-114. PMID: 10612768.
 - Trick WE, Scheckler WE, Tokars JI, et al. Risk factors for radial artery harvest site infection following coronary artery bypass graft surgery. *Clin Infect Dis.* 2000 Feb;30(2):270-275. PMID: 10671327.
 - Van den Berghe G, Wouters P, Weekers F, et al. Intensive insulin therapy in the critically ill patients. *N Engl J Med.* 2001 Nov 8;345(19):1359-1367. PMID: 11794168.
 - Woodruff RE, Lewis SB, McLeskey CH, et al. Avoidance of surgical hyperglycemia in diabetic patients. *JAMA.* 1980 Jul 1;244(2):166-168. PMID: 6991732.
 - Zerr KJ, Furnary AP, Grunkemeier GL, et al. Glucose control lowers the risk of wound infection in diabetics after open heart operations. *Ann Thorac Surg.* 1997 Feb;63(2):356-361. PMID: 9033300.

SCIP-Inf-4: Cardiac Surgery Patients With Controlled Postoperative Blood Glucose
Numerator: Cardiac surgery patients with controlled postoperative blood glucose (less than or equal to 180 mg/dL) in the timeframe of 18 to 24 hours after anesthesia end time.
Denominator: Cardiac surgery patients with no evidence of prior infection.





SCIP Infection (Inf) 4: Cardiac Surgery Patients With Controlled Postoperative Blood Glucose

Numerator: Cardiac surgery patients with controlled postoperative blood glucose (less than or equal to 180 mg/dL) in the time frame of 18 to 24 hours after anesthesia end time.

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

Variable Key: Surgery Days

1. Start processing. Run cases that are included in the Surgical Care Improvement Project (SCIP) Initial Patient Population and pass the edits defined in the Transmission Data Processing Flow: Clinical through this measure.
2. Check ICD-9-CM Principal Procedure Code
 - a. If the ICD-9-CM Principal Procedure Code is not on Table 5.11, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing.
 - b. If the ICD-9-CM Principal Procedure Code is on Table 5.11, continue processing and proceed to ICD-9-CM Principal Diagnosis Code.
3. Check ICD-9-CM Principal Diagnosis Code
 - a. If the ICD-9-CM Principal Diagnosis Code is on Table 5.09, 5.14 or 5.15, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing.
 - b. If the ICD-9-CM Principal Diagnosis Code is not on Table 5.09, 5.14 or 5.15, continue processing and proceed to Clinical Trial.
4. Check Clinical Trial
 - a. If Clinical Trial is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
 - b. If Clinical Trial equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing.
 - c. If Clinical Trial equals No, continue processing and proceed to Anesthesia Start Date.
5. Check Anesthesia Start Date
 - a. If Anesthesia Start Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
 - b. If Anesthesia Start Date equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing.
 - c. If Anesthesia Start Date equals a Non Unable to Determine Value, continue processing and proceed to the Surgery Days calculation.

6. Calculate Surgery Days. Surgery Days, in days, is equal to the Anesthesia Start Date minus the Admission Date.
7. Check Surgery Days
 - a. If Surgery Days is less than zero, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing.
 - b. If Surgery Days is greater than or equal to zero, continue processing and proceed to Infection Prior to Anesthesia.
8. Check Infection Prior to Anesthesia
 - a. If Infection Prior to Anesthesia is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
 - b. If Infection Prior to Anesthesia equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing.
 - c. If Infection Prior to Anesthesia equals No, continue processing and proceed to Glucose.
9. Check Glucose
 - a. If Glucose is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
 - b. If Glucose equals 5, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing.
 - c. If Glucose equals 3 or 4, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing.
 - d. If Glucose equals 1 or 2, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Stop processing.