

CANADIAN CORONARY ARTERY BYPASS GRAFT (CABG) SURGERY QUALITY INDICATORS



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APPENDIX OF DEFINITIONS

- Those indicators recommended by the consensus panel members to be collected and included in CABG surgery performance reports for the purpose of quality improvement.
- The remaining indicators were rated by the panel as significantly related to quality of care and/or preventable death following CABG surgery.

OUTCOMES

***30-day mortality:** Any death occurring within 30 days following the operative date.

***In-hospital mortality:** A death occurring at any point during the hospital stay.

Hospital postoperative length of stay: The total number of days spent in hospital from the date of surgery to the date of discharge home, or transfer to another acute care facility/long-term care facility. The variables to be collected include: date of surgery, date of discharge, and discharged to either 1. home 2. acute care facility 3. long term care facility (this information must be chart abstracted).

The following outcome is for measurement during the intra-operative time period only:

Reinstitution of CPB after initial separation: The requirement to put a patient back on cardiopulmonary bypass as indicated by the perfusion records through the following flags: administration of protamine, full reheparinization, and re-initiation of cardiopulmonary bypass.

The following outcomes are for measurement during the in-hospital time period only:

New postoperative intra-aortic balloon support: The insertion of an intra-aortic balloon pump at any point after grafting the heart including intraoperatively and in the intensive care unit (administrative data will only indicate if the balloon was inserted on the day of surgery or after this day).

Inotropic support requirement at 24 and 48 hours: The postoperative usage of two inotropes at 24 and 48 hours after the operation in doses to maintain adequate hemodynamic support (systolic bp > 90mmHg, C.I. > 2.2, U.O > 0.5 cc/kg/hr). The names and doses of the inotrope infusions will be abstracted as well as the: cardiac index, cardiac output, weight, height, average urine output over the last 8 hours, and blood pressure (systolic/diastolic) for these timepoints. (eg dobutamine, dopamine, epinephrine, phenylephrine, norepinephrine, vasopressin, milrinone)

***Postoperative in-hospital myocardial infarction ECG criteria:** This will measure an ECG established myocardial infarction (must be a change from the initial preoperative ECG, excluding

those patients with a preoperative bundle branch block or paced rhythm). Established myocardial infarction is defined as either: 1. New onset left bundle branch block 2. Loss of R waves in the anterior leads 3. Any Q wave in leads V1 through V3, Q wave > or = to 30 ms (0.03 s) in leads I, II, aVL, aVF, V4, V5 or V6 (The Q wave changes must be present in any two contiguous leads, and be > or = to 1 mm in depth.) A preoperative ECG will be compared to the latest ECG before discharge from hospital (the date of each ECG will be included in this variable).

Postoperative cardiac arrest on the ward: An incident when a patient is on the ward, where the arrest team is called (either for a respiratory arrest or rhythm with inadequate blood pressure) resulting in the need of defibrillation, chest compressions and/or ventilatory support.

***Ventilation time:** The number of hours during which the patient has an endotracheal tube or tracheostomy with ventilation (ie includes from the time noted at the end of skin closure to the time of removal of the endotracheal tube from the patient and any reintubation ventilation times).

Reintubation rate: The requirement for a patient to be reintubated after initial extubation following surgery at any point during the hospital stay.

***Total units of packed red blood cells transfused:** The total number of units of packed red blood cells transfused intraoperatively and postoperatively during the hospital stay. Administrative data can only capture if red cells were transfused during the admission.

***Total units of allogeneic blood products transfused:** The total number of units of allogeneic blood products (other than packed red blood cells) transfused intraoperatively and postoperatively during the hospital stay. Administrative data can only capture if any allogeneic blood products were transfused.

***Deep sternal wound infection including mediastinitis/osteomyelitis:** A sternal wound infection involving the deep soft tissues (eg fascial, muscle, bone and/or mediastinum) with any one of the following conditions: 1. purulent drainage from deep incision 2. wound opened either spontaneously or by a surgeon with the patient having one of the following signs or symptoms: fever > 38 °C, or localized pain/tenderness, unless incision is culture negative 3. an abscess or other evidence of infection involving the deep incision is found on direct examination, during reoperation or by histopathologic or radiologic examination 4. diagnosis of deep incisional surgical site infection by a surgeon or attending physician.

***New postoperative stroke:** A central neurologic deficit persisting postoperatively for >72 hours with evidence on an imaging study (ie CTSCAN, MRI) and/or neurologist confirmation.

***New requirement for postoperative dialysis:** A new postoperative requirement for hemodialysis (including any new renal replacement therapy –CRRT, CVVHD) at any time during the hospital stay (ie patients are excluded if they have had preoperative dialysis or isolated intraoperative dialysis).

***ICU readmission:** The requirement of a patient to be transferred to the intensive care unit after initial discharge to the ward (not including step down units, include date of readmission and date of discharge).

***Intensive care unit length of stay:** The total number of days spent in the intensive care unit after surgery (not including step down unit stays) including readmission stays to the ICU (include date of initial discharge from ICU).

***Chest Reopening for any reason:** Requirement of chest re-opening after surgery (ie after the patient has left the OR) for any reason (the reason will be abstracted: 1. suspected intrathoracic hemorrhage, 2. cardiac tamponade, 3. graft occlusion 4. arrest 5. low output syndrome 6. sternal rewiring/debridement 7. other:reason to be listed) during a patient's hospital stay.

The following outcomes are for measurement in those patients that are discharged alive:

***365-day repeat cardiac operation requiring cardiopulmonary bypass:** A re-operation within 365 days of the surgery post discharge identified through the Ontario Health Insurance Plan (OHIP) billing code for cardiopulmonary bypass, and/or repeat coronary bypass operation (this variable would exclude Kingston).

***365-day repeat revascularization –angioplasty:** An angioplasty procedure within 365 days of the surgery (post discharge) identified through the Ontario Health Insurance Plan (OHIP) billing code for angioplasty.

365-day myocardial infarction: Applicable to those patients discharged alive and readmitted to hospital as identified from the Canadian Institutes of Health Information with an ICD-9 or ICD-10 code for myocardial infarction.

365-day readmission for cardiac diagnosis (MI, UA, CHF): A readmission to hospital for the primary diagnosis of myocardial infarction, unstable angina or congestive heart failure within 365 days of the surgery post discharge identified through the Canadian Institutes For Health Information (CIHI) database.

30-day all cause readmission rate: Applicable to those patients discharged alive and readmitted to hospital as identified from the Canadian Institutes For Health Information with an ICD-9 or ICD-10 codes.

Intraaortic Balloon Pump (ie severe LV dysfunction/shock/persisting anginal symptoms): The preoperative insertion of an intra-aortic balloon pump before grafting or precardiopulmonary bypass for any reason (the reason for insertion will be recorded: hemodynamic instability, severe left ventricular dysfunction (EF<20%) and/or unstable angina not alleviated by maximal medical therapy).

IV nitroglycerine until time of surgery if patient has CCS Class IV angina (if bp permits): The continuation of nitroglycerin (IV, PO, TD) in those patients having angina at rest with maximal medical therapy and an adequate blood pressure without a requirement for inotropic or intra-aortic balloon support.

Continue IV heparin/LMWH until time of OR for those with recent ACS (eg MI, UA): The continuation of intravenous heparin or low molecular weight heparin (ie dalteparin should be stopped 12 hours in advance, enoxaparin should be stopped 24 hours in advance) until the time of OR in those patients who are having surgery during the same hospital stay as an admission for an acute coronary syndrome.

Stop ADP inhibitors: The stoppage for urgent and elective patients of: ADP inhibitors (adenosine diphosphate inhibitors eg ticlopidine) at time of the decision for urgent surgery (if <5 days from planned date of surgery) or >=5 days before planned elective surgery date (the preoperative use of plavix and the date that plavix is stopped will be abstracted).

Continue ASA until day of surgery for elective patients: The continuation of aspirin (ASA) until the day of surgery in those patients who are having elective surgery (this excludes those patients that have an absolute contraindication to aspirin ie allergy, gastric ulcer or other physician stated reason). The preoperative usage of aspirin will be recorded as well as the date that aspirin was stopped by the patient.

PROCESSES OF CARE

***Waiting time to surgery (ie OR date from time of referral to surgery):** The number of days between the surgical referral date, surgical acceptance date, and the operative date (this will be obtained from the CCN database).

***Facility responsiveness (CABG completed within recommended waiting time):** If the surgery was completed within the Cardiac Care Network (CCN) recommended waiting time, based on the relative urgency of the patient's clinical status.

Timely administration of wound infection prophylactic antibiotics (within 30 minutes of incision and again if the OR exceeds 3-4 hours): The administration of the appropriate antibiotic choice (ie cephalosporin or vancomycin for penicillin allergy) within 30 minutes of the skin incision for every patient undergoing CABG surgery (document the time antibiotics given intraoperatively in relation to skin incision time – a maximum of two doses will be recorded, for those who are penicillin allergic and receive vancomycin a second dose will not be required).

Administration of antifibrinolytics for reoperative CABG surgery: The administration of aprotinin or tranexamic acid for patients undergoing reoperative CABG surgery to minimize blood loss.

TEE at beginning and end of case for every patient: The use of intraoperative transesophageal echocardiography to monitor ventricular function, aortic disease, and mitral valve competency at the beginning and end of the case.

Assessment of aorta (ie by epiaortic ultrasound scanning): The assessment of the aorta before cannulation to avoid atherosclerotic +/- calcified plaques by epiaortic ultrasound scanning.

Internal Mammary Artery to LAD if no absolute contraindication: The use of an internal mammary artery (the type of grafts either right or left, in-situ or free will be recorded) to bypass the territory supplied by the left anterior descending coronary artery in a patient with no absolute contraindications where the IMA is unavailable (the reason for it being unavailable will be recorded including the options of injury and previous usage at primary CABG).

Complete revascularization: The grafting of all major territories of coronary artery circulation where there is a significant stenosis present (the assessment includes: coronary dominance, anatomy of significant stenoses defined as those $\geq 70\%$ except for left main where a significant stenosis is $\geq 50\%$).

Assessment of graft patency/flow: The assessment of the flow or patency of grafts intraoperatively using either doppler study, TEE, or intraoperative angiography.

Myocardial protection with blood cardioplegia: The use of blood cardioplegia to provide optimal myocardial protection during cross clamping for those patients undergoing on-pump CABG.

CPB time: The time in minutes spent on cardiopulmonary bypass during the initial surgery.

Initiation of aspirin (or other antiplatelet) within 24 hours following surgery: The use of aspirin or ADP inhibitor (if ASA not tolerated) within 24 hours following bypass surgery involving vein grafts (ie the time and date of the first dose of postoperative ASA will be recorded).

Insulin infusion postop (for diagnosed and undiagnosed diabetics) within 24 hours of surgery: The initiation of an insulin infusion in the ICU for those patients with a random blood glucose of > 11.1 mmol/L within 24 hours following surgery (ie the time and date of the initiation of the insulin infusion will be recorded, as well as peak glucose level in this time period).

Initiation of beta-blocker: The use of Beta Blockers within the 24 hours following surgery if no absolute contraindications were present including: patient with cardiogenic shock (including inotrope or IABP use) or systolic bp < 100 mmHg, severe documented COPD, active asthma, bradycardia (HR<50/min or symptomatic bradycardia), conduction disorder (ie second or third degree heart block), CHF with left ventricular dysfunction, or physician documentation of other contraindication (ie the preoperative use of beta-blocker will be documented as well as the time and date of initiation of postoperative beta blocker usage).

Continuous telemetry: The use of continuous telemetry monitoring of CABG patients at least until 24 hours before discharge (ie for patient's with average length of stay).

Aspirin: The prescription of aspirin or antithrombotic (ie warfarin) in-hospital on the ward and on discharge from hospital or other antiplatelet if the patient has an absolute contraindication (ie allergy, gastric ulcer or other physician stated reason).

Anticoagulation with intravenous heparin at 48 hours after initiation of atrial fibrillation: The initiation of full anticoagulation with heparin, low molecular weight heparin or equivalent (ie in case of HIT) after sustained atrial fibrillation > 48 hours.

Beta-blocker: The prescription of a Beta-blocker in-hospital on the ward and/or on discharge from hospital except for the following contraindications: systolic bp < 100 mmHg, severe documented COPD, active asthma, bradycardia (HR<50/min or symptomatic bradycardia), conduction disorder (ie second or third degree heart block), CHF with left ventricular dysfunction, or physician documentation of other contraindication (ie the preoperative use of beta-blocker will be documented as well as the time and date of initiation of postoperative beta blocker usage).

Anti-hyperlipidemic: The prescription of an anti-hyperlipidemic in-hospital on the ward and/or on discharge from hospital.

Ace-inhibitor: The prescription of an ace-inhibitor or angiotensin II receptor blocker in-hospital on the ward and/or on discharge from hospital.

STRUCTURE

***Institutional volume:** The institutional yearly volume of CABG procedures.

Nursing to patient ratio in the ICU: The minimum ratio of nurses to patients on average in the ICU for each institution (if this varies greatly –the range and reasons for variation).

Nursing to patient ratio on the ward: The minimum ratio of nurses to patients on average on the ward for each institution (if this varies greatly –the range and reasons for variation).

Daily ward care managed by dedicated nurse practitioners or family physicians: The use of designated care providers on the floor that manage day-to-day postoperative care (ie the providers involved in care will be recorded ie nurse practitioners, family physicians, residents, staff, surgical assistants).