MASSACHUSETTS GENERAL HOSPITAL

MGH ERAS CABG

Updated 1.19.2023

PREOPERATIVE BUNDLE

Element	Definition
Preoperative Testing Cardiac Surgery Preop Team	• Albumin and Pre-albumin should be assessed during pre-op visit: • If these lab values are abnormal, then the patient should visit with a dietician • MRSA/MSSA nasal swab: • PPE Visit 3 days prior to surgery if nasal swab negative • PPE Visit 5 days if positive • Hemoglobin A1C: • If Hemoglobin A1C greater than 8 and disease severity allows, endocrine consult • If Hemoglobin A1C less than 8 or if disease severity requires a more urgent operation, then proceed with surgery • Diabetic patients should have a preop fingerstick on day of surgery • Chlorhexidine provided/instructions reviewed at PPE visit:
Preoperative Antibacterial shower Surgeons, residents, fellows Surgical clinic nursing	• Shower/bathe with liquid Chlorhexidine wash starting 2 days before, the day before, and on the morning of surgery (i.e., once daily for 3 days) per the special instructions included for bathing with Chlorhexidine. • If Patient was tested for STAPH and is positive, defer to instructions provided by their surgeon's office for the use of Chlorhexidine wash and mupirocin nasal ointment. Their doctor will let them know if testing is needed. • The Chlorhexidine will be provided by the Surgeon's office.
NPO Status Cardiac Surgery Preop Team	• Nothing to eat after 10 pm • Water allowed up to 2 hrs. before the time of surgery • Patients are NOT to consume a carbohydrate drink 2 hrs. before surgery
Tobacco, Alcohol, Opiates, Herbal Supplements Cardiac Surgery Preop Team	• Tobacco and alcohol cessation: 4 weeks prior to surgery • If history of alcohol abuse, replace thiamine according to thiamine pathway • Patients on long-acting narcotic therapy (i.e. OxyContin or methadone) should take their extended-release narcotic on the day of surgery • Continue suboxone per Suboxone Pathway • If history of polysubstance abuse, contact ACT team • Vitamin/herbal supplements should be held 2 weeks prior to surgery
Preoperative Blood Pressure Medication Management Cardiac Surgery Preop Team	• Hold ACE inhibitors for 2-7 days before surgery • Hold ARBs for 2-7 days before surgery • Consult renal team for patients with known CKD • Take prescribed beta-blockers on the day of surgery
Patient Engagement Tools Cardiac Surgery Preop Team	• Update patient engagement tools to include: • Incentive Spirometry • Sternal Precautions • Cardiac Rehab
Pre-Op Pain 3 Management Cardiac Surgery Preop Team Cardiac Surgery Intra-Op Anesthesia	• Acetaminophen 975 mg PO x 1 for day of surgery.

INTRA-OP ANESTHESIA BUNDLE

Element	Definition
Preemptive Analgesia Cardiac Surgery Preop Team Cardiac Surgery Intra-Op Anesthesia	• Patients should receive 975mg to 1,000mg of acetaminophen orally prior to surgery
Pre-op Fluids Intra-Op Anesthesia	• Saline lock IVs prior to arrival in operating rom
Premedication Intra-Op Anesthesia	• Routine premedication with midazolam is discouraged in patients over 65 years of age
Antibiotic Therapy Intra-Op Anesthesia	• Pre-operative antibiotic therapy within 60 minutes of incision
Intra-Op Monitoring Intra-Op Anesthesia	• Limit use of pulmonary artery catheters • Consider radial artery derived cardiac output monitoring (Flotrac device) • Consider processed EEG monitoring
Intra-Op Antiemetic Prophylaxis Intra-Op Anesthesia	• Unless contraindicated, patients should receive antiemetic prophylaxis with at least two of the following medications administered intraoperatively: 1. Dexamethasone 0.1mg/kg (max 8mg) 2. Ondansetron 4mg IV 3. Haloperidol 1mg IV 4. Scopolamine patch (should not be used in patients over 65)
Intra-Op Pain Management Intra-Op Anesthesia	• After separating from cardiopulmonary bypass circuit, limit hydromorphone to 1mg • Tylenol 1gm IV every six hours after PO Tylenol administered • Initiate dexmedetomidine for ICU sedation after Protamine administration. • *Dexmedetomidine administration from STS Database*
Neuromuscular Blockade Intra-Op Anesthesia	• Discontinue Rocuronium drip after Protamine administered
Anti-Fibrinolytics Intra-Op Anesthesia	• Dose Amikar/tranexamic acid based on renal function
Glycemic Control Intra-Op Anesthesia	• Glycemic control per best practice • Target glucose < 180 • Initiate insulin therapy once glucose exceeds 170 ○ *Insulin administration from STS Database*
Antibiotic Therapy Intra-Op Anesthesia	• Antibiotic therapy within 60 minutes of incision • Vancomycin should be administered no more than 120 minutes prior to incision

Goal-Directed Fluid Therapy Intra-Op Anesthesia	• Follow MGH Fluid management best practice (Assess fluid responsiveness post CPB) • No specific recommendations for albumin, lactated ringers, normal saline, or Normosol ○ *Intra-Op Blood Products from STS Database*
Temperature Management Intra-Op Anesthesia	• Temperature ⩾ 35.5C prior to leaving operating room
Sedation for ICU Transport Intra-Op Anesthesia	• Dexmedetomidine infusion initiated for transport to ICU ○ *Dexmedetomidine administration from STS Database* • Propofol infusion initiated for transport to ICU

SURGICAL BUNDLE

Element	**Definition**
Pre-Op Pain Management Cardiac Surgery Preop Team, Cardiac Surgery, Intra-Op Anesthesia	• Acetaminophen 975 mg PO x 1 for day of surgery.
Fluid Management Surgeon, Intra-Op Anesthesia	• Intravenous fluid administration • Perfusion fluid management • Blood product administration ○ *Intra-Op Blood Products from STS Database*
Pain Management Surgeon, Intra-Op Anesthesia	• Short-acting and long-acting opiate administration
Antibiotic Therapy Surgeon, Intra-Op Anesthesia	• Antibiotic therapy within 60 minutes of incision

PERFUSION BUNDLE

Element	Definition
Maintenance of Normothermia Perfusion	• Actively warm patient if nasopharyngeal or core temp below 37 degrees Celsius • Manage arterial inflow temperature per perfusion best practice when rewarming the patient • Avoid hyperthermia. (Temperature > 37)
Oxygen Delivery Perfusion	• Maintain oxygen delivery (DO2) higher than 270 mL/min/m2 throughout the case. • If DO2 is less than 270, discuss with anesthesia and surgery.
Prime Volume Perfusion	• Record fluid balance on pump and report to anesthesia at the end of the case so that it can be reported to the ICU

CARDIAC ICU BUNDLE

Element	Definition
Maintenance of Normothermia Cardiac ICU	• Avoid hypothermia • Warming Blankets or BAIR Hugger if temperature less than 36 degrees • Warm IV Fluids prior to administration
Chest Drains Cardiac ICU	• Chest tube management per best practice
Chest Tube Removal Cardiac ICU	• Remove chest tube per chest tube best practice
Delirium Prevention Cardiac ICU	• Screen for delirium once per shift using CAM-ICU/Short CAM scale • Continue dexmedetomidine from intra-op period (if started intraoperatively) • Discontinue propofol after report is given to team
Early Extubation Cardiac ICU	• Extubate within six hours of ICU Arrival. • Respiratory Therapy-initiated pathway for routine cases ○ *Extubation from STS Database*
Glycemic Control Cardiac ICU	• Glycemic control per best practice • Target glucose < 180 • Initiate insulin therapy once glucose exceeds 170
Goal-Directed Fluid Therapy Cardiac ICU	• Titrate fluid administration to following hemodynamic parameters: ○ Mean Arterial Pressure ○ Cardiac Output (if PAC in place) ○ Lactate ○ Urine Output • Please notify intensivist and responding clinician if: ○ CVO<12 ○ Urine output <0.5 cc/kg/hr ○ PAD >20 • Consider noninvasive monitoring for fluid resuscitation • Pulmonary Artery Catheter unnecessary
Postoperative Analgesia Cardiac ICU	• Tylenol 1gm IVx2 doses. Then, 650 mg PO q 6hrs • Ketorolac 30 mg x 6 Doses unless: ○ Age >65 ○ History of DM ○ History of CKD • Consider regional anesthesia
Nausea Prophylaxis Cardiac ICU	• Scheduled ondansetron • Scheduled haloperidol
Post-Op Diet Cardiac ICU	• Advance Diet on POD 0 • Polyethylene glycol on POD 1
Thromboprophylaxis Cardiac ICU	• Enoxaparin initiated on POD 0 if hemodynamically stable • If enoxaparin is contra-indicated, initiate sub-cutaneous heparin
Post-Op Ambulation Cardiac ICU PT / OT	• If able, ambulate on POD 1. *Ambulation data per Epic.* • Out of bed to chair three times per day. • **PT consult on POD 2**. PT will screen patient via chart & during multidisciplinary rounds to determine acute PT needs.

POST-ICU CARE

Element	Definition
Chest Tube Removal Surgeon Floor Nursing, APPs	• Remove chest tube per chest tube best practice

Epicardial Wire Removal
 	
Surgeon
Floor Nursing, APPs
	• If indicated, remove epicardial wires on POD #3:
	  • Patient receives one dose of beta blocker
	  • Patient has no major rhythm concerns

Wounds & Incisions Surgeon Floor Nursing, APPs	• Discontinue indwelling urinary catheter within 24 hrs. of arrival from ICU unless otherwise indicated
Delirium Prevention Surgeon Floor Nursing, APPs	• Screen for delirium once per shift using CAM-ICU/Short CAM scale
Glycemic Control Surgeon Floor Nursing, APPs	• Glycemic control per best practice • Target glucose < 200 • Discontinue insulin and glucose checks on POD# 2 if no insulin required
Thromboprophylaxis Surgeon Floor Nursing, APPs	• Enoxaparin initiated per institutional best practice • If enoxaparin is contraindicated, initiate sub-cutaneous heparin
Hemodynamics Surgeon Floor Nursing, APPs	• Control heart rate and blood pressure with maximum beta blocker dosing • Add ACE inhibitors and ARB as needed • Discontinue daily EKGs unless otherwise indicated
Bowel Regimen Surgeon Floor Nursing, APPs	• All patients to receive Colace • Goal is one bowel movement prior to discharge • Standing polyethylene glycol, docusate sodium, and Senna for all patients
Post-Op Ambulation Surgeon Floor Nursing, APPs PT / OT	• If able, ambulate on POD 1. *Ambulation data per Epic.* • Out of bed to chair three times per day. • **PT consult on POD 2**. PT will screen patient via chart & during multidisciplinary rounds to determine acute PT needs. • Patient must be able to ambulate up and down **an equivalent number of stairs to what they need to manage at home/in the community** to be cleared for discharge. • For patients discharging to rehab, mobility will progress as individually appropriate in conjunction with PT and/or OT recommendations.

Discharge Planning Surgeon Floor Nursing, APPs	• All patients must have the following tests/studies completed 48 hours prior to discharge: 1. Chest X-Ray 2. Basic Metabolic panel 3. Complete Blood Count 4. EKG 5. PT/INR if the patient is taking warfarin • *Patient must be weaned off oxygen prior to discharge*
Pain Management Surgeon Floor Nursing, APPs	• If possible, transition to ibuprofen and acetaminophen prior to discharge
Fluid & Electrolyte Management Surgeon Floor Nursing, APPs	• Furosemide and potassium supplementation to achieve pre-operative weight • Verify that all incisions are clean, dry, and approximated. If wound care is required, plan of care is established prior to discharge.
Follow-Up Surgeon	• Chest X-Ray to be ordered four weeks following surgery • Consider adding is beta-blockers, statins, and aspirin upon discharge