



Division of Cardiac Anesthesia

Department of Anesthesia, Critical Care and Pain Medicine

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Colleagues

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Dear Colleagues,

Effective **May 1, 2021**, the Division of Cardiac Anesthesia, Cardiac Surgery Division, and Heart Center Intensive Care Unit Teams (HCICU) will launch an Enhanced Recovery After Surgery (ERAS) Initiative. The overall focus of the initiative is to improve the quality of care while reducing unnecessary costs.

Only **non-emergent patients undergoing coronary artery bypass grafting (CABG)** are included in the initiative.

There are several areas of interoperative management that the anesthesia team will focus or modify our practice (Appendix 1). We recognize that patients undergoing cardiac surgery are quite complex and that clinical conditions change quickly and require physician judgment for optimal outcomes as well as patient safety.

Specific changes to clinical practice:

1. Pre-operative with **midazolam is NOT RECOMMENDED** for patients over 64 years of age.
2. **Pulmonary artery catheterization (PAC) should be avoided** in patients with normal LVEF. Use of a cardiac output monitor such as the FloTrac should be considered.
3. **Initiation of insulin infusion for glucose >170mg/dL.**
4. Patients should receive **2 antiemetics**.
5. **Dexmedetomidine should be initiated** after protamine administration for sedation for ICU transport as well as propofol.
6. **Rocuronium should be discontinued after protamine** administration. Muscle relaxation reversal should be administered by the anesthesia team prior to leaving the intensive care unit.
7. **Fluid administration according to Cardiac ERAS Fluid Administration Protocol** (Appendix 2).

Our current clinical practice should continue to include attention to on-time antibiotic administration, maintaining patient warmth ($\geq 35.5^{\circ}\text{C}$), and administration of antifibrinolytics (Amikar/TXA).

We will be following certain metrics to evaluate our compliance, impact, and progress overtime (Table 1). We plan quarterly reports with the first iteration in September 2021.

Table 1 – Cardiac ERAS measures

Measure	Data	Source
Blood product administration	RBCs FFP Platelets	STS
Dexmedetomidine	Initiation prior to leaving operating room	STS
Antiemetic administration	Administration of at least 2 antiemetics (dexamethasone, haloperidol, scopolamine patch, ondansetron)	EPIC
Fluid administration	Total	STS
Narcotics	Narcotics administered	STS
Administration of acetaminophen and gabapentin	Frequency administered prior to surgery	EPIC
Insulin administration	Initiation for glucose level > 170 mg/dL	STS

RBCs (red blood cells); FFP (fresh frozen plasma); STS (Society of Thoracic Surgeons)

Thank you for your involvement in this effort.

Sincerely,



Michael G. Fitzsimons, M.D.

Appendix 1- Intraoperative Cardiac Anesthesia ERAS Bundle

Element	Definition
Preemptive Analgesia Intra-Op Anesthesia	<ul style="list-style-type: none"> Patients should receive 975mg to 1,000mg of acetaminophen orally prior to surgery Gabapentin 300 mg PO x 1
Pre-op Fluids Intra-Op Anesthesia	<ul style="list-style-type: none"> Saline lock IVs prior to arrival in operating room
Premedication Intra-Op Anesthesia	<ul style="list-style-type: none"> Routine premedication with midazolam is discouraged in patients over 65 years of age
Antibiotic Therapy Intra-Op Anesthesia	<ul style="list-style-type: none"> Pre-operative antibiotic therapy within 60 minutes of incision

Intra-Op Monitoring <i>Intra-Op Anesthesia</i>	<ul style="list-style-type: none"> Limit use of pulmonary artery catheters Consider radial artery derived cardiac output monitoring (Flotrac device) Consider processed EEG monitoring
Intra-Op Antiemetic Prophylaxis <i>Intra-Op Anesthesia</i>	<ul style="list-style-type: none"> Unless contraindicated, patients should receive antiemetic prophylaxis with at least two of the following medications administered intraoperatively: <ol style="list-style-type: none"> Dexamethasone 0.1mg/kg (max 8mg) Ondansetron 4mg IV Haloperidol 1mg IV Scopolamine patch (should not be used in patients over 65)
Intra-Op Pain Management <i>Intra-Op Anesthesia</i>	<ul style="list-style-type: none"> 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. <i>Dexmedetomidine administration from STS Database</i>
Neuromuscular Blockade <i>Intra-Op Anesthesia</i>	<ul style="list-style-type: none"> Discontinue Rocuronium drip after Protamine administered Reversal of paralysis prior to leaving ICU
Anti-Fibrinolytics <i>Intra-Op Anesthesia</i>	<ul style="list-style-type: none"> Dose Amikar/tranexamic acid based on renal function
Glycemic Control <i>Intra-Op Anesthesia</i>	<ul style="list-style-type: none"> Glycemic control per protocol Target glucose < 180 Initiate insulin therapy once glucose exceeds 170 <ul style="list-style-type: none"> <i>Insulin administration from STS Database</i>
Antibiotic Therapy <i>Intra-Op Anesthesia</i>	<ul style="list-style-type: none"> Antibiotic therapy within 60 minutes of incision Vancomycin should be administered no more than 120 minutes prior to incision
Goal-Directed Fluid Therapy <i>Intra-Op Anesthesia</i>	<ul style="list-style-type: none"> Follow MGH Fluid management protocol (Assess fluid responsiveness post CPB) No specific recommendations for albumin, lactated ringers, normal saline, or Normosol <ul style="list-style-type: none"> <i>Intra-Op Blood Products from STS Database</i>
Temperature Management <i>Intra-Op Anesthesia</i>	<ul style="list-style-type: none"> Temperature $\geq 35.5^{\circ}\text{C}$ prior to leaving operating room
Sedation for ICU Transport <i>Intra-Op Anesthesia</i>	<ul style="list-style-type: none"> Dexmedetomidine infusion initiated for transport to ICU <ul style="list-style-type: none"> <i>Dexmedetomidine administration from STS Database</i> Propofol infusion initiated for transport to ICU

Appendix 2 – Cardiac Fluid administration protocol

MGH Cardiac ERAS Fluid Management Protocol

OVERVIEW

1. Start Continuous Hemodynamic Monitor (EV1000) with A-line placement.
2. Goal directed fluid therapy to start after chest closure and upon arrival to the HCICU
3. Enter Patient Demographics: Height, Weight, Gender, Age
4. Not to be used in Severe AI. (SVV not to be used in Atrial Fibrillation, Paced rhythm, or open chest)

