Clinical Pathway: Catheterization to Coronary Artery Bypass Graft (CABG), Inpatient

Updated: March 8, 2021

Clinical algorithm:

Preoperative exclusions:
- Any procedure other than Isolated CABG
- Any patient able to go home prior to surgery

Patient Identified with Coronary Artery Disease by Cath

Cardiology to initiate CABG Evaluation Order Set: Cardiac Surgery Evaluation

Evaluation Phase:
- Surgical Pathway Low EF Algorithm:
- Preoperative Anemia Management
- Cath-CABG Guidelines:

Heart Team Discussion as needed

Cardiothoracic surgery to initiate Preoperative Cardiac Surgery Order Set

CVI (If patient on 5 Heart, does not go to CVI first)

OR

CVRU

7 Heart/5 Heart Depending on clinical status

Subacute rehab

Depending on clinical status, patient needs to go to 7 heart BEFORE discharge home.

Discharge Home with home health care

LTACH From 5 Heart or 7 Heart
Clinical guideline summary

CLINICAL PATHWAY NAME: Catheterization to CABG, Inpatient, Clinical Pathway

PATIENT POPULATION AND DIAGNOSIS: Adult Inpatient with Coronary Artery Disease

APPLICABLE TO: Spectrum Health West Michigan

BRIEF DESCRIPTION: The Spectrum Health Cardiac Surgery program performs over 600 CABG surgeries annually; the highest volume in Michigan. Clinical pathways provide a means of implementing the most up-to-date guidance into the clinical setting to improve the value and efficiency of the care provided. As health care systems shift to a value-based care system, quality of care will have a direct impact on reimbursement and financial penalties. Governmental and commercial payers have increased the urgency for initiatives, interventions, and care models that will impact readmission rates and lower healthcare cost. Implementing best practices and promoting optimal care as recommended by American Heart Association and American College of Cardiology guidelines will help to reach our quality goals as a system when caring for heart failure patients.

Optimized Clinical Decision Support:
- Cardiac Evaluation Order Set [30410001470]
- Preoperative Cardiac Surgery order set [30410001156]

OVERSIGHT TEAM LEADER(S): Richard McNamara, MD., Stephane Leung, MD., Sarah Stillo, & Bree Stuk

OWNING EXPERT IMPROVEMENT TEAM (EIT): Cardiothoracic Surgery Expert Improvement Team

MANAGING CLINICAL PRACTICE COUNCIL (CPC): Cardiovascular Health Clinical Practice Council

CPC APPROVAL DATE: 3/8/2021

OTHER TEAM(S) IMPACTED (FOR EXAMPLE: CPCs, ANESTHESIA, NURSING, RADIOLOGY): Nursing, Pharmacy, Anesthesia, Operating Room, PT/OT, Care Management, Nursing Education, DGMS, Nephrology, Neurology, Radiology, Ultrasound, Lab, Surgical Optimization Center, Infection Prevention, Infectious Disease, Quality, Informatics, Non-Spectrum Health Cardiology Groups.

IMPLEMENTATION DATE: 3/10/2021

LAST REVISED: 3/8/2021

FOR MORE INFORMATION, CONTACT: Sarah Stillo, Bree Stuk

Clinical pathways clinical approach

TREATMENT AND MANAGEMENT:

In alignment with the Society of Thoracic Surgeons, American Heart Association and American College of Cardiology, this care pathway will highlight best practices to support the management of CABG patients and standardize clinical decision making by clinicians. In turn, patients will receive comprehensive care in a timely manner during a hospital stay.
Surgical Pathway Low EF Algorithm:

Patient meeting low EF surgical pathway criteria:
- EF <25%
- LVIDd >6.5

1. Order pre-operative testing per open heart testing guidelines
2. Order viability testing if CABG (CMR preferred)
3. Order RHC or PA catheter placement
4. Consult AHF cardiologist
5. Consult CTS
6. Documented goals of care discussion
7. Strong consideration for Heart Team Review (or mini Heart Team)

AHF or VAD/transplant surgeon decides +/- VAD evaluation based on risk of need for short or long term MCS

- Yes: Expedited VAD Eval
- No: Heart Team

Heart Team:
- Surgery
- PCI or structural heart procedure

Medical Management:
- Potential VAD / transplant candidate?

AHF physician review + VAD/ transplant selection committee

VAD in non VAD surgery or procedure per physician review?
- YES
- NO: VAD / Transplant or medical management
**Preoperative Anemia Management in Cardiovascular Patients:**

**Cath-CABG Guidelines:**

Testing for ALL patients:
- CBC
- CMP
- PT/INR
- Hgb A1c - Diabetic management if Hgb A1c >6.5
- Chest x-ray/lateral (if no prior in last 90 days)
- CV Echo complete (within last 6 months)
- Incentive spirometer instruction
- USV Carotid Duplex Bilateral *consult Vascular surgery if stenosis >80% or symptomatic
- 5-meter walk
- Smoking cessation counseling

If Hgb< 13 for men or < 12 for women, order the following labs, if not drawn within the past 14 days:
- CBC without diff, Iron and IBC Level, Ferritin, Retic count w/ hemoglobin, CRP, and guaiac stool

**Microcytic (MCV < 80)**
- Consider Fe deficiency, anemia of chronic disease, thalassemia.
- Physician referral as appropriate.

**Normocytic (MCV 80-100)**
- Consider anemia of chronic disease, renal insufficiency, hemolysis, nutritional deficiency.
- Physician referral as appropriate.

**Macrocytic (MCV > 100)**
- Check Folate and B12 levels
- If deficient, start: Folic acid 5mg PO daily
  - Cyanocobalamin 2000mcg PO daily
- Evaluate ongoing need at discharge

**Iron Studies Assessment**

- Ferritin < 100mcg/L with:
  - TIBC > 400mcg/dL, Iron Sat <20%, and/or CRP > 5mg/L
- Low Iron Stores
  - Treat with IV Iron* (Ferrous sulfate 325mg BID after surgery)
  - If possible, treat underlying chronic inflammatory disease
  - If ferritin < 30ng/mL and Hgb < 10, consider GI consult

- Ferritin 100-500mcg/L with:
  - Iron Sat < 20%
  - TIBC > 400mcg/dL
  - CRP > 5mg/L
  - Functional Fe Deficiency
  - Treat with IV Iron* (Ferrous sulfate 325mg BID after surgery)

- Ferritin 100-300mcg/L
  - TIBC 220-400mcg/dL
  - Iron Sat 15-50%
  - No Iron Deficiency
  - Treat with epoetin alfa*
  - Recheck iron labs 7 days after surgery; may need to give PO/IV Iron post-op if functional deficiency develops

- Ferritin 100-300mcg/L
  - Other iron study profile and/or Hgb <10, consider Hematology consult

- Consider epoetin alfa
  - if Iron Sat > 20% and Ferritin > 100

**Contraindications to epoetin alfa therapy:**
- Platelets > 450,000, history of VTE, active malignancy, renal impairment (SCR > 2.0), uncontrolled BP > 160/100.
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<tr>
<th><strong>TEST TO BE PERFORMED</strong></th>
<th><strong>PATIENT POPULATION</strong></th>
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<tbody>
<tr>
<td>CT Thorax without IV contrast</td>
<td>▪ All patients <strong>EXCEPT:</strong> Re-do sternotomy or Moderate or severe Aortic Stenosis</td>
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<tr>
<td>Chest CT Angio Thorax with IV contrast (Consider if renal function allows (GFR&gt;60) and known patent LIMA to LAD)</td>
<td>▪ At discretion of surgeon</td>
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<tr>
<td>CT Angio Thorax Abdomen Pelvis with IV contrast (Indication: TAVR protocol)</td>
<td>▪ Moderate or severe Aortic Stenosis at discretion of surgeon</td>
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</table>
| USV Vein Mapping Lower Extremity Duplex Bilateral                                        | ▪ Morbid Obesity (large legs)  
  ▪ Previous vein stripping  
  ▪ Venous Stasis  
  ▪ Previous SVG use  
  ▪ Prior VTE  
  ▪ Physical findings (significant varicosities, etc.)                                                                                                        |
| CV Transesophageal Echo (if Transthoracic Echo Shows)                                    | ▪ Moderate or Severe  
  ▪ Mitral Regurgitation  
  ▪ Mitral Stenosis  
  ▪ Aortic Insufficiency  
  ▪ Severe Tricuspid Regurgitation  
  ▪ Consider for Aortic Stenosis  
  ▪ Moderate to severe or severe pulmonary hypertension  
  ▪ RV enlargement                                                                                                                                        |
| USV Radial Artery Duplex Bilateral                                                      | ▪ At discretion of surgeon                                                                                                                                                                                              |
| USV Arterial Physio ABI with Doppler Lower Extremity if                                   | ▪ Prior lower extremity vascular surgery  
  ▪ Claudication                                                                                                                                                    |

**TESTING RECOMMENDATIONS FOR SPECIFIC COMORBIDITIES**

**Lung Disease**

| Bedside Spirometry                                                                      | ▪ COPD  
 ▪ >30 pk yr. smoking history  
 ▪ Use of inhaled bronchodilators  
 ▪ Dyspnea w/ mild exertion                                                                                                                      |
| Pulmonary Function Testing (PFT) With ABG                                               | ▪ Chronic systemic steroid use  
 ▪ Home O2  
 ▪ Results of bedside spirometry indicate: Moderate COPD FEV1 50-59% or Severe COPD FEV1 <50%                                                                 |

**Other Heart Disease**

| Advanced Heart Failure Consult                                                          | ▪ EF< 25%  
 ▪ Significant Diastolic Dysfunction: GR III or greater  
 ▪ Double Valve surgery needed and EF <30%                                                                                                      |
| Atrial Fibrillation                                                                    | ▪ Consider LA exclusion with CHADSVasc score ≥ 2  
 ▪ Consider Maze procedure  
 ▪ Consider Pulmonary Vein Isolation                                                                                                             |

**Other Co-Morbid Conditions**

| Renal Disease eGFR < 45                                                                 | ▪ Urinalysis  
 ▪ Urine spot protein/creatinine  
 ▪ Phosphorus  
 ▪ Renal Ultrasound – Reason: Evaluate size/symmetry of kidney; r/o obstruction (for pts with AKI or CKD)                                                                 |
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<th>Anemia</th>
<th>Consulting Gastroenterology if Hgb &lt;10 and evidence of microcytic anemia or iron deficiency</th>
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<tr>
<td></td>
<td>Consult Hematology if Hgb &lt;10 and no clear reason for anemia</td>
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**MEDICATIONS:**

- ASA 81 mg p.o. (for CABG only)
- Continue Beta Blocker
- Discontinue P2Y12 inhibitors**
- Ticagrelor (Brilinta) – 3-5 days before surgery
- Clopidogrel (Plavix) – 5-7 days before surgery
- Plasugrel (Effient) – 7 days before surgery

** Check Verify Now P2Y12 Assay if given any of the above

- Discontinue NSAIDS or COX2 inhibitors
- Discontinue ACE/ARBs 48hrs prior
- Hold OACs [Xarelto, Eliquis and Pradaxa]; Use bridging therapy as indicated per discussion w/ Cardiology

**References:**


