<table>
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<th>Date &amp; Time</th>
<th><strong>POST-OP CARDIAC SURGERY (TAVR) CLINICAL PATHWAY</strong></th>
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<td><strong>Admit to CVR Status-Post:</strong> Anesthesia End Time:</td>
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**Nursing Orders:**

- □ All of the following orders will be ordered as a group:
  - DISCONTINUE ALL PRE-OPERATIVE ORDERS.
  - Initiate ACLS guidelines
  - Notify cardiologist and primary care physician of patient’s admission to unit.
  - Notify Interventional Cardiologist If any bleeding or hematoma noted and apply pressure.

**Monitoring/Vital signs:**

- Vital signs: Document q 5 minutes until stable; q 15 minutes x 4; q 30 minutes x 4; q 1 hour x 24 OR until de-lined and off vasoactive infusions; then q 4 hours. Keep SBP 120-140mmHg or as ordered by MD.
- Neuro checks Q 2 hours for 4 hours then Q4 hours for 24 hours.
- Assess distal extremities for warmth & pulses with vital signs
- Strict I+O q 1 hour.
- Daily weight until discharged
- Apply NIBP to non-A line arm (if not contraindicated). Release cuff after each measurement. If NIBP does not correlate with ABP within 10-15 points systolic monitor NIBP every hour.
- Connect FloTrac to EV1000 monitor on arrival to unit and prior to anesthesiologist leaving patient’s room.
- Maintain continuous ABP, CO/CI, CVP, SVRI, SVV monitoring (include temperature and PAP if swan present), document per vital sign order.
- Notify surgeon if: CI < 2.2, HR <60 or >90, RR <12 or >20, Temp >37.5 C, O2 sat < 94%, PAD <12 or > 20, CVP <5 or >15, PVCs > 6/minute.
- If patient has a femoral A-line and a functional radial A-line, AND is hemodynamically stable, remove femoral A-line post extubation.
- If core temperature is < 95 degrees F, use heated vent circuit and bair hugger blanket until temp is >= 98.6 degrees F. USE FLUID WARMER FOR ALL IV FLUIDS IF TEMP < 97.0 DEGREES F.
- If temp is >= 102 degrees F and not relieved by Tylenol, apply cooling blanket and notify MD.

**Lines/Tubes:**

- Nurse may insert Salem-sump NGT/OGT prn nausea/vomiting/prolonged intubation, if not already present. Connect to low continuous wall suction. Irrigate with water q 2 hours prn to keep patent. Discontinue with extubation. May reinsert prn nausea/vomiting unrelieved with antiemetic.
- Chest tubes to Atrium drain at 20cm H2O suction. Assess tubes q 5-10 minutes on arrival to CVR/immediate post op.
- If patient has Blake drains, milk/strip as needed until drainage decreases then q 1h and prn. DO NOT milk/strip unless visible clot is present. Call surgeon if bleeding exceeds parameters.
- Record chest tube output q 15 minutes if patient is bleeding. Notify surgeon if CT drainage is > 300ml in hour 1; > 200 ml in hour 2; > 100 ml in any hour thereafter.
- Pull Sheath when ACT is less than 180
**POST-OP CARDIAC SURGERY (TAVR) CLINICAL PATHWAY**

**Pharmacy Mnemonic:** POTAVRP2

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<td>Leave cordis/introducer in place while patient is in CVR. If unable to keep central access patent, notify MD for line change or consult for PICC team. Discontinue all central line access on patients prior to transfer to floor (PICC line is okay). PT MUST HAVE 2 FUNCTIONING IVs PRIOR TO TRANSFER (20g OR LARGER)</td>
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<td>Patient MUST have 2 patent INT prior to d/c of cordis/central lines. If unable to place INT consult PICC team for INT or PICC (double lumen). If PICC placed put PICC line protocol on chart.</td>
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<td>If patient is off vasopressors and/or inotropes and CI is stable, discontinue Swan at 0500 on POD #1. <em>Do not pull swan on post-op valve.documented bad ventricle/EF&lt;45% patients until seen by MD)</em>.</td>
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<td>MAINTAIN ALL VASOACTIVE/VASOPRESSOR DRIPS ON A CENTRAL LINE.</td>
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<td>Convert all peripheral sites to INT on POD #1 if stable.</td>
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<td>Maintain base IVF @ KVO to cordis/introducer until discontinued.</td>
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<td>Do not discontinue central line until transfer to 2East.</td>
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<td>Confirm with MD need for central line and/or removal POD#5 due to infection control.</td>
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**Nursing Care:**

- Dressing: Pressure dressing with dry gauze and Tegaderm; place Neosporin and bandaid POD 1.
- Vaseline gauze/4x4 gauze directly to CT sites for 24 hours, then open to air on POD #2. If pt continues to have drainage from sites, redress prn *(all shifts are responsible for dressing changes if needed)*.
- Change pleural chest tube dressings daily and prn. Once sternal dressing is changed, Change mediastinal tube dressings daily and prn.
- If patient has IABP in place, redress insertion site with betadine ointment and sterile dressing daily and prn. If patient has an iodine allergy, use Neosporin ointment instead.

**Core Measures:**

- □ All of the following orders will be ordered as a group:
  - **CM: SCIP-Surgical Care Improvement Project** *(Nursing order-do not delete)*.
  - **CM: SCIP – Foley will be discontinued on Post-Op Day 1 unless MD or NP documents exception below:**

  DO NOT discontinue foley since patient meets one of the following EXCEPTIONS:

  - Urinary tract obstruction – Patient unable to pass urine
  - Neurogenic bladder dysfunction including urinary retention
  - Urologic studies/procedures or surgery on contiguous structures
  - ICU only – Patient is intubated
  - ICU only – Patient requires strict I&O monitoring
  - Stage III or IV sacral decubitus ulcer
  - End of life/comfort care patient
  - Other:

  1. Maintain Foley to gravity. Document UOP q 1 hour. Notify MD if UOP<60 ml/2 hrs. Or less than 0.5 ml/kg/hr. Remove Foley once ambulating/prior to transfer to 2East. If patient has not voided 6-8 hours after removing Foley, nurse will do a bladder scan. If residual is >750ml, straight cath patient. If patient continues to have difficulty voiding, notify MD. *(IF FOLEY WAS PLACED BY UROLOGY, DO NOT REMOVE UNLESS PER THEIR ORDER)*

- **CM: VTE prophylaxis (mechanical):** Apply TEDS and SCDs to all patients on arrival to CVR ONCE STABLE. If pt arrives with ACE wraps, leave in place until POD #1, then remove ace and apply TED. If unable to get a proper fit with TEDS, reapply ACE wraps.

  1. Mechanical

     - □ SCDs plus TED hose □ Bilateral □ Right □ Left

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**DOCTOR'S ORDERS**

REV 12/15; SD40-3
### Activity:
- Bedrest for 6 hours. Assess access site for bleeding/hematoma Q 15 min x 4, then Q 30 min x 4, then Q1hr, with percutaneous closure keep accessed leg straight, until bedrest is complete.
- Elevate HOB 15-30 degrees immediately post op (as patient tolerates).
- Progress to standing at bedside with assistance.
- Sitting at edge of bed or up in chair for all meals, as tolerated.
- Ambulate 3-5 times on POD #1-begin at 0530, as tolerated.
- Ambulate 5 times daily starting on POD #2 and continue until discharge.
- When not ambulating, have patient sitting up in chair for 2 hours 3x/day.

### Diet:
- NPO until extubated. Once extubated, start sips of water/ice chips. Do not advance diet if pt develops nausea/vomiting.
- POD #1 advance diet to 60/60/60.
- POD #2 advance to 75/75/75.
- If patient requires diet modification due to preexisting comorbidities, is NPO >48 hrs. Or if pt requires prolonged intubation, consult Nutrition Support Team for nutrition recommendations (enteral/parenteral).

### Labs/Orders: **NOTE:** If A-line available get labs from A-line not venous**
- Immediately on arrival to CVR:
  - CBC with diff, BMP, serum magnesium, PCXR, EKG, ABG complete.
  - Coag Profile, including fibrinogen, ACT on arrival and then Q1h until less than 180
  - Total CPK, CK-MB on arrival and then Q8h x 2 (nurse will put in order)
  - Hgb/Hct q 6 hours x 2, unless bleeding, then as directed by surgeon.
  - Serum K+ and Mg q 6 hours x 2 (unless using CC electrolyte protocol, then follow labs per protocol).
  - Accuchecks q 2hr x 3, then q 4 hours x 24 hours (if pt not already on intensive insulin protocol). Initiate intensive insulin per protocol if glucose> 150 and place order set on chart.
  - Nursing order: If pt has elevated BUN/creatinine or known renal disease do BMP q 6 hours x 2.
  - Nursing order: Infuse cell saver if not done in OR.
  - Nursing order: If HCT <21, transfuse 2 unit PRBCs x 1, then per MD orders.
  - Nursing order: If platelets are < 100,000, change flush bag(s) on A-line/CVP/swan to 0.9%NS.
  - Nursing order: If Ionized Calcium is <1 or serum Calcium is <8.9 on immediate post-op labs, give Calcium Chloride 1 Gm/50ml D5W over 30 min x 1.
  - Notify MD if Creatinine>2, Platelets<100,000, or HCT<24.
PCXR POD #1 and # 3 Indication: s/p Cardiac surgery

Daily:
- CBC with diff, BMP, Mg
- PT/INR x 2
- ABG daily and prn if pt on vent, bipap, aquanox, or if having respiratory distress.
- PCXR if patient has CTs, is on vent, and 4:00am day after extubation, prn for resp. distress.
- Daily EKG X 3 days. EKG prn with chest pain or any EKG/rhythm changes.

Respiratory therapy orders:
☐ All of the following orders will be ordered as a group:
  - Obtain ABG on arrival to CVR, on spontaneous, post extubation, and prn.
  - If base excess is ≤ -2, give 100 meq NaHCO3 IVP and call surgeon.
  - Repeat ABG 30 min after each dose of NaHCO3.
  - Post-extubation: O2 via nasal cannula, face mask, Bipap, or Aquanox to keep O2 sat > 92%.
  - EZpap q 4 hrs. X 24 hrs. Then change to incentive spirometry if pt tolerates.
  - Incentive spirometry q 1 hr. x 10 breaths, while awake.
  - If incentive spirometry < 750ml, start IPPB q 4 hrs.
  - RN to deep breathe, cough, and turn pt q 2 hrs., as tolerated, while awake.
  - HHN: UDP prn wheezing. If pt is on home nebulizers, inhalers, or bipap/cpap continue if okay with MD.
  - If new onset A-fib avoid beta-2 adrenergic stimulators

Medications:

IV FLUIDS:
☐ Dextrose 5% and 0.45% Sodium Chloride with 40 mEq KCl at 50 mL per hr.
☐ 0.45% Sodium Chloride with 40 mEq KCL at 50 mL per hr. for patients with A1C >6
☐ Dextrose 5% and 0.45% Sodium Chloride at 50 mL per hr. for patients with K+>5

Volume expanders:
☐ Albumin 5%-250ml infuse over 30 minutes for systolic less than 90 or MAP less than 65. May repeat x 1.
☐ Lactated Ringers 1000ml: bolus 250cc for systolic less than 90 or MAP less than 65. May repeat x 3 for a maximum of 1000ml total
☐ For renal patients: 0.9% Sodium Chloride 1000ml: bolus 250cc for systolic less than 90/ MAP less than 65 /May repeat x 3 for a maximum of 1000ml total
☐ IF PT HAS NO RESPONSE FROM FLUID BOLUS, CALL SURGEON FOR ORDERS.
Infusions: NOTIFY SURGEON IF STARTED

- HYPERTENSION/VASODILATORS:
  - Cardene (nicardipine) 20mg in sodium chloride 200 mL at 5 mg/hr. Increase by 2.5 mg/hr every 15 minutes PRN to maintain SBP<140 mm HG. Max rate is 15 mg/hr. Call MD if not effective. (If volume restriction is needed, call pharmacy for double-strength concentration.
  - Nursing order: If patient has a radial artery harvest, infuse Nitroglycerin 25mg/250ml D5W at rate received from OR. Do not titrate for hypertension. If MAP<70 hold infusion and call surgeon.

- HYPOTENSION/VASOCONSTRICTORS:
  - Levophed (norepinephrine) 8mg/250ml D5W. Start at 5 mcg/min. Increase by 2.5 mcg/min every 10 minutes PRN to Keep MAP 65-85 mm/Hg. Once rate is at 10mcg/min, add Vasopressin and call MD
  - Vasopressin 20 units/100ml 0.9% NS at 0.04 units/min (12 mL/hr)
  - Epinephrine 4mg/500ml D5W. Increase by 1 mcg/min every 5 minutes PRN to keep MAP 65-85mmHg. Call MD before starting. Start at _______mcg/min. Epinephrine: Max rate is 20 mcg/min for weight < 90 kg, 30 mcg/min for weight > 90 kg. Notify MD if max rate is reached.
  - Dopamine 800mg/250ml D5W. Increase by 2.5 mcg/kg/min every 5 minutes PRN to keep MAP 65-85mmHg. Call MD before starting. Start at 5mcg/kg/min. Max rate is 20mcg/kg/min.

- INOTROPES:
  - Dobutrex (dobutamine) 500mg/250ml D5W Start at _______mcg/kg/hr.
  - Primacor (milnirone) 40mg/200ml D5W. Start at _______mcg/kg/hr.

Electrolyte replacement:

- All of the following orders will be ordered as a group:
  - Place Critical Care IV Electrolyte Replacement Orders on chart.
  - Potassium chloride-if K+ < 4.5, give 20meq KCl/100ml sterile water over 1 Hour. Follow Critical Care Electrolyte Replacement Orders after first dose Infused.
    (CENTRAL LINE INFUSION ONLY)
    - Magnesium sulfate-if Mg is <2, give 2Gm/50ml D5W over 2 hours. Follow Critical Care Replacement Orders after first dose infused. (MAY BE INFUSED VIA PERIPHERAL IV, CENTRAL LINE INFUSION PREFERED.)
### Sedation Orders:

**□ All of the following orders will be ordered as a group:**

- Dexmedetomidine (Precedex):
  - Determine if pt meets criteria for using drug:
    - Awake/arousable with residual paralytic effects
    - Hemodynamically stable on NO more than 1 pressor and HR<70
    - No excessive chest tube output (ex. 3ml/kg/hr. over 2 consecutive hours)
  - No ventricular assist devices in place (ex. IABP)
  - Extubation attempt is expected within 24 hours
  - Place Dexmedetomidine order set on chart.
  - Dexmedetomidine 200mcg/50ml 0.9% NaCl; begin infusion at 0.2 mcg/kg/hr.
    - Increase by 0.2 mcg/kg/hr every 30 minutes PRN to RASS -1 to 0. (Maximum rate is 0.8 mcg/kg/hr.). Hold for HR<60 or MAP<70.
  - DO NOT INFUSE BEYOND 24 HOURS. If pt requires prolonged sedation, does not achieve sufficient level of sedation, does not tolerate drug, or has a known allergy to the drug, call MD for different sedation medication (ex. Diprivan, Fentanyl, Versed). If any of these drugs used, place appropriate order set on chart.
  - For breakthrough pain (>3-4/10) and/or agitation give ½ doses of adjunct pain med or sedation.
  - DISCONTINUE DEXMEDETOMIDINE UPON SUCCESSFUL EXTUBATION

### Pain Management:

- Dr. Keller requests no IV pain med after patient is extubated and tolerating PO. If patient is unable to achieve pain level <= 3/10 with po meds, call MD for orders.
  - Morphine 1mg IVP q 4 hour PRN for moderate pain
  - Morphine 2mg IVP q 4 hour PRN for moderate pain
  - Morphine 4mg IVP q 4 hour PRN for severe pain
  - If patient has a morphine allergy or pain unrelied by 2 doses of morphine give:
    - Dilaudid (hydromorphone) 0.5 mg q2h PRN for moderate pain
    - Dilaudid (hydromorphone) 1 mg q 2h PRN for severe pain

**DO NOT EXCEED MORE THAN 3 GRAMS OF ACETAMINOPHEN IN 24HOURS**

- Norco (hydrocodone/acetaminophen) 5/325 one tab PO q 4 hours PRN moderate pain (5-7/10)
- Percocet (oxyocodone/acetaminophen) 5/325 one tab PO q 4 hours PRN severe pain (8-10/10)
- Tylenol (acetaminophen) 325 mg 1-2 tab(s) PO q 6hr PRN mild pain (3-5/10) or fever> 101 degrees F
- Tylenol (acetaminophen) supp 650mg 1 PR q 6 hours PRN mild pain (3-5/10) or fever> 101 degrees F. Use if patient is unable to take PO

- Nursing Order: Consider Toradol if pain not relieved by narcotics. **OBTAIN ORDER FROM MD FIRST.**
  - Do not administer Toradol if: creatinine > 1.0; history of GI bleeding; peptic ulcer disease; gastric disease; or patient is > 60 years old, or platelets less than 100,000

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**DOCTOR'S ORDERS**

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**bottom edge of patient label**

REV 12/15; SD40-3
**MEDICATION:** Administer medication utilizing range order guideline.

Post-op **ANTIBIOTICS:** Antibiotics should not be administered more than 48 hours after the documented Cardiac Anesthesia End Time unless specifically and additionally ordered by a physician. Suspected infection should be clearly documented.

- Administer Ancef (cefazolin) 2 grams IV if patient < 120 kg (start within one hour of skin incision)
- Administer Ancef (cefazolin) 3 grams IV if patient ≥ 120 kg (start within one hour of skin incision)
- If allergic to PCN or meets criteria listed below Substitute: Vancocin (vancomycin) 15 mg/kg IVBP q 12 hours x 2 doses.

**CM: SELECT REASON FOR USE OF VANCOMYCIN BELOW:**
- Significant penicillin allergy or allergy to cephalosporin
- High-risk due to inpatient hospitalization within the last year
- Increased MRSA rate either facility-wide or procedure-specific
- High-risk due to residence in long-term care setting within the last year
- Known prior colonization with MRSA
- Patient has chronic wound care or on dialysis
- Hospital inpatient for >24 hours prior to procedure

**ROUTINE MEDS:**
- Pepcid (famotidine) 20 mg IV slow push q 12 hours. Change to PO post extubation or if pt remains intubated may give via NGT/OGT.
- Colace (docusate) 100mg PO q 12 hours. May substitute liquid form if patient has NGT/OGT, hold if patient has diarrhea
- Enteric coated aspirin □ 81mg or □ 325mg po daily. If NPO give via NGT/OGT
- **If unable to take PO/NGT/OGT substitute:** ASA 300mg Suppository PR daily
- Plavix (clopidogrel) 75mg PO daily, hold if platelet count < 100,000.
- Plavix 300mg PO NOW **comments: after sheath is pulled.**
- Vitamin C (ascorbic acid) 1 Gram PO/NGT daily
- TheragranM (multivitamin with minerals)1 tab PO daily (give liquid vitamin supplement if patient has NGT(If unable to give via NGT, consider IV vitamin replacement per pharmacy)
- Lopressor (metoprolol) 12.5 mg PO BID Start on POD #1.
- Nursing order: If patient has been on beta blocker preoperatively resume home dose.
- Nursing order: Hold metoprolol or home beta blocker AND NOTIFY MD if:
  - AV block, 2nd degree or higher
  - HR <70 or SBP<100
  - CI <2
  - Any inotropic/vasopressor therapy
- Lipitor (atorvastatin) 10 mg PO daily at 2100
- Nursing order: if patient has been on a statin pre-op, resume home med/dose
- Prinivil (lisinopril) 5 mg PO daily. Begin POD #1. Hold if SBP<100, HR< 70, or creatinine>1.3, Notify MD.
- Lasix (furosemide) 40mg IVP q 12 hours x 3 days. Begin POD #1. Discontinue when patient’s weight is within 2 pounds of preop weight.
- Lasix (furosemide) 20mg IVP □ daily or □ q 12 hours x 3 days. Begin POD #1. Discontinue when patient’s weight is within 2 pounds of preop weight.
- Potassium chloride 30 meq PO twice daily while on Lasix. Begin POD #1. Do not give if Lasix has been discontinued. Do not give if serum K+ is >5.0.
- 0.9% NS 10 ml flush to all unused central line/swan ports q 6 hours and prn
- 0.9% NS 3 ml flush to all unused peripheral/INT sites q 6 hours and prn
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**PRN MEDS:**
- MOM Concentrate (milk of magnesia) 10-20mL q 12 hours PRN constipation
- Senokot 1 tab BID PO PRN constipation
- Nursing order: If patient does not have results from PO meds: check for fecal impaction.
- Dulcolax (bisacodyl) 10mg suppository PR x 1 dose if impacted
- Fleets enema PR x 1 dose if no results from Dulcolax
- Zofran (ondansetron) 4mg IVP q 6 hours prn nausea/vomiting. If ineffective, call MD for secondary antiemetic. (Do not give Phenergan to Dr. Kennedy’s patients).
- Maalox Plus 15-30ml PO q 6 hrs prn indigestion
- Restoril (temazepam) 15mg PO q HS prn sleep. May repeat x 1. Do not give after 0200.
- Benadryl (diphenhydramine) 25 mg PO q HS prn sleep. May repeat x 1. Do not give after 0200.

**Consult Orders**
- All of the following will be ordered as a group:
  - Pharmacy: glycemic control
  - Pharmacy: ID home meds
  - Nutrition Services: Cardiac surgery pathway
  - Cardiopulmonary Rehab: “Cardiac Surgery Clinical Pathway” for inpatient rehab. Arrange for outpatient rehab or Ornish program.
  - Social Services for discharge planning: please update chart routinely.
  - PT: evaluate and treat POD: 1
- Consult JPA - Indication: Post-Op TAVR
- Re-consult Cardiology
- Consult:___________________________________________

_____ / ________        _______ _________________________
Date        Time                        Physician Signature

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**DOCTOR’S ORDERS**