### Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
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<tbody>
<tr>
<td>DO NOT USE</td>
<td>Use: Daily</td>
</tr>
<tr>
<td>U</td>
<td>Units: 2 mg</td>
</tr>
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### Left Ventricular Impella 5.0/CP/2.5 Order Set

**See Cardiovascular Post-Operative ICU Order Set**

**See Cardiology Interventional POST Orders**

**PATIENT WEIGHT:** _____ kg (required)  **PATIENT HEIGHT:** _____ cm (required)

### PATIENT MONITORING:

**Vital Signs AND Hemodynamic Monitoring**
- Every 15 minutes for 1 hour, then per unit routine AND
- PRN after each pump performance level (P Level) change
- Measure Cuff Blood Pressure opposite of implant, if axillary placement
- Mixed Venous Blood Gas draw every AM

**Monitoring AND Documentation Guidelines**
- Monitor pump placement continuously using dual signal waveforms of motor current AND placement signal
- Measure AND document catheter depth upon admission AND every 4 hours
- Monitor AND document every hour:
  - Pump performance (P Level)
  - Flow (L/min)
  - Placement Signal (mmHg)
  - Purge Pressure (300-1100mmHg)
  - Motor Current
  - Pump position
  - Purge Fluid Infusion Rate (mL/hr)
  - Power AC Battery (60 minute battery life)
- Maintain the appropriate anticoagulation monitoring flowsheet for heparin, argatroban, or bivalirudin

### ACTIVITY:
- Bed rest
  - If **Axillary Placement**: Head of Bed elevated to 30 degrees
  - If **Femoral Placement**: Head of Bed elevated to maximum of 30 degrees

**Nursing Instruction**
- Keep cannulated extremity straight
- Knee immobilizer PRN to maintain straight cannulated extremity
- Turn every 2 hours –logroll only

### NURSING:

**Assessment**
- Vascular checks to cannulated extremity every hour
- Assess insertion site for bleeding, hematoma, cannula kinking or movement every hour

**Interventions**
- Notify MD
  - Change in neurovascular status of cannulated extremity
  - Heme positive stool
  - Hematuria
  - Platelet count less than 50% of ICU admission baseline
  - Signs of bleeding, hematoma or cannula movement
- For alarms that cannot be resolved after troubleshooting with Abiomed Clinical Support

**Device Performance**
- Maintain pump performance level at _____ (P Level) to keep flow at or above _________L/min
- Notify MD if unable to maintain at or above specified flow rate
- **DO NOT** decrease pump performance (P Level) below P2 as long as the pump is in the ventricle;
  - Note: Retrograde flow will occur across the aortic valve if the pump is set below P2

**ALARMS:**

**Nursing Instruction**
- Contact Abiomed Clinical Support PRN for troubleshooting: 1-800-422-8666

**Physician Signature:** Date: Time:

**RN Signing Off Orders:** Date: Time:
ALARMS CONTINUED:
If Suction Alarm:
- Reduce P Level by 2 levels, but do not decrease below P2
- Assess volume (CVP/PAD) status to ensure adequate ventricular filling

If filling issues:
- Follow Impella Hypovolemia protocol for PAD < _____ mmHg or CVP < _____ mmHg (refer to pg 4)

If NO filling issues:
- Increase P Level to previous pre-alarm setting
- Reposition patient-logroll only

If Occlusion Alarm:
- Check for kinks and resolve
- Assess for Catheter Dislocation (See Catheter Dislocation orders below)

OTHER INTERVENTIONS:
If Catheter Dislocation is suspected:
- Decrease P Level to P2
- Notify MD STAT

If Cardiac Arrest:
- Notify MD STAT
- During chest compressions, decrease the P Level to P2
- Follow ACLS guidelines AND defibrillate immediately, if indicated
  
  Note: The Impella system DOES NOT have to be stopped or unplugged to defibrillate

If ACLS successful:
- Increase P Level by 2 levels every 15 minutes until pre-arrest setting is achieved

WOUND CARE:
- Specialty Bed
- Transparent occlusive dressing to insertion site.
- Perform sterile dressing change to insertion site as needed when dressing becomes damp, loosened, or soiled.
- Beginning Post-op Day 2, perform sterile dressing change every 24 hours using transparent occlusive dressing.
- Do not cover catheter sleeve with tape or transparent dressing

CLINICAL DECISION SUPPORT
If Catheter Dislocation is suspected or Cardiac Arrest occurs, a Transesophageal Echocardiogram (TEE) is the best method for confirming placement.

ANTICOAGULATION TREATMENT PLAN:
- Start Systemic Heparin Infusion AND Purge Heparin NOW
- Start Systemic Heparin Infusion AND Purge Heparin on _____/______ at _____:_____
- Start direct thrombin inhibitor (argatroban or bivalirudin) (recommended for patient with HIT)
  See Impella Argatroban Bivalirudin Supplemental Order Set (#)

For Heparin Infusion:
- Baseline ACT prior to starting Heparin infusion
- ACT therapeutic goal between 161-180 sec for Heparin infusion
- ACT every 4 hours until therapeutic goal is achieved AND every 4 hours after each rate change
- ACT every 6 hours after therapeutic goal is achieved
- Repeat ACT in 2 hours if MD orders a bolus of Heparin
- Heparin 25,000 units in 250mL Dextrose 5% Water (100 units/mL) IV
  - Start TOTAL Heparin purge and IV infusion at: ≤100 kg = 10 units/kg/hour
  >100 kg = 10 mL/hr (1000 units/hr)
  - Max initial dose: 1000 units/hour (TOTAL OF PURGE AND INFUSION)
  - Heparin titration orders for IV infusion
    - If ACT less than 141 sec
    - Increase Heparin infusion by 2 units/kg/hour
    - If ACT 141-160 sec
    - Increase Heparin infusion by 1 unit/kg/hour
    - If ACT 161-180 sec
    - No change
    - If ACT 181-200 sec
    - Decrease Heparin infusion by 1 unit/kg/hour
    - If ACT 201-220 sec
    - Decrease Heparin infusion by 2 units/kg/hour
    - If ACT greater than 220 sec
    - Notify MD
### NTRAVENOUS FLUIDS:

**Purge Pressure Solution**
- 500mL Dextrose 20% in Water (D20W) for CP/2.5 and Dextrose 10% in Water (D10W) for 5.0
- 500mL D20W with **25 units/mL Heparin** for CP/2.5 and D10W with **25 units/mL Heparin** for 5.0

**NOTE:** See Heparin Start Time Above
- D10W purge solution with direct thrombin inhibitor per supplemental orders for patients with HIT
- 1000 mL 0.9% Normal Saline (NS) pressurized bag to be infused via red pressure sidearm PRN for Impella 2.5 AND CP ONLY

### Purge Pressure Maintenance

**Nursing Instructions**
- Change purge solution every 24 hours
- Change purge pressure cassette every 96 hours
- Complete purge fluid change in less than 2 minutes to prevent damage to the catheter pump
- Document changes in purge pressure per policy AND assess trends

**Monitor**
- Purge Pressures after P Level changes

### Purge Pressure Troubleshooting

**For purge pressure LESS THAN 300mmHg**
- If purge flow rate less than 30mL/hour, assess tubing for loose connections or leaks
- If purge flow rate is equal to 30mL/hour, change purge fluid to **500mL Dextrose 40% Water (D40W)** AND Notify MD

**For purge pressure GREATER THAN 1100mmHg**
- If purge flow rate is equal to 2mL/hour, assess tubing for kinks or closed clamps
- If purge flow rate is greater than 2mL/hour, change purge fluid to **500mL Dextrose 10% Water (D10W)**

If low or high purge pressure alarms REMAIN UNRESOLVED after troubleshooting
- Notify Abiomed Clinical Support
- If purge pressure remains less than 300mmHg or greater than 1100mmHg
- Notify MD and Perfusionist

### LABORATORY

- BMP, CBC, ABG, Magnesium, PT/INR, PTT upon admission AND every AM while on device
- ABG, Potassium, Magnesium PRN for hemodynamic instability
- Mixed Venous Blood Gas every AM while on device
- ABG every 6 hours for first 24 hours post device implantation

### RADILOGY

- Portable Chest X-Ray STAT upon admission AND every AM
  - **Indication:** Confirm Impella position in LV – logroll only

### CONSULTS

- Consult WOCN Reason: Low Braden Score (High Risk)

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**Abbreviations**

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Clinical Decision Support:
The Impella automated console will automatically adjust the purge flow rate to maintain a purge pressure between 300-1100mmHg and a purge flow rate between 2-30 mL/hour.

Origin: 12/12
Revised: 2/13; 4/13; 10/13; 11/13; 2/14; 10/14; 11/14; 8/15
If Suction Alarm Assess Volume:  
Per MD orders (see pg 2)  
PAD < ___  
OR  
CVP < ___

Yes

HgB ≥ 7

0.9% NS 250ml bolus X 1  
over 15 minutes

If Suction Alarm persists and  
PAD or CVP less than above  
parameters

Repeat 0.9% NS 250ml bolus X 1  
over 15 minutes  
Recheck HgB

Yes

HgB < 7

Transfuse 1 unit of PRBC

If Suction Alarm persists and  
PAD or CVP less than above  
parameters  
Recheck HgB

No

0.9% NS 250ml bolus X 1  
over 15 minutes

If Suction Alarm persists

Transfuse 1 unit of PRBC.

NOTIFY MD
Do not exceed 750mL of Crystalloids or 2 units PRBC without notifying MD

RN Signing Off Order: _____________________ Date: ____________ Time: ____________
**Full-dose Heparin Flowsheet for Left Ventricular Impella**

*Keep in MAR section of the Chart (not to be used when only the purge heparin is being administered)*

Complete when full-dose heparin initiated:  
Patient weight (kg): ____________

<table>
<thead>
<tr>
<th>Date/Time of ACT</th>
<th>ACT Value (sec)</th>
<th>Current IV Dose (units/kg/hr)</th>
<th>Current IV Rate (mL/hr)</th>
<th>Current IV Dose (units/hr)</th>
<th>Purge Dose (units/hr)</th>
<th>Total Dose (units/hr)</th>
<th>Change needed</th>
<th>Change made at (time)</th>
<th>On Hold Until (time)</th>
<th>Dose change ↑ or ↓ (units/kg/hr)</th>
<th>New IV Dose (units/kg/hr)</th>
<th>New IV Rate (mL/hr)</th>
<th>ACT* due at (time)</th>
<th>Signature</th>
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*Time of repeat ACT is from the time that the infusion rate is changed

Total dose of heparin initially ordered (purge + standard IV infusion) = 10 units/kg/hr = ______________ units/hr (max 1000 units/hr)

Purge Heparin Infusion = current purge rate (________ mL/hr) * 25 units/mL = ______________ units/hr

Begin Heparin IV infusion (100 units/mL) at ______________ units/hr = ______________ units/kg/hr  Signature ______________ Date/Time__________

Complete following each ACT measurement:

<table>
<thead>
<tr>
<th>ACT information</th>
<th>Heparin dosing information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal = 161-180 sec</td>
<td></td>
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</tbody>
</table>

* Origin Date: 11/12; 10/14 ; 8/15

Y / N