**DOCTORS ORDERS**

**IMPELLA**

1. Impella device inserted by: Dr. ________________________  □ Interventional Cardiology  □ CT Surgery

2. Admit to CVU

**ACTIVITY:**

3. Complete bedrest; May logroll side to side. May have head of bed elevated up to 30 degrees.

4. Use knee immobilizer to avoid leg flexion on side of device insertion.

**RADIOLOGY / EKG:**

5. Portable Chest X-ray upon arrival to CVU and daily.

6. 2D Limited Echocardiogram (acquire parasternal long axis view) upon arrival to CVU and daily.

7. EKG upon arrival and daily.

8. Obtain 2D Limited Echocardiogram as needed if unknown placement per waveform

9. EKG as needed with rhythm change or Impella wave change

**LABS:**

10. CBC, Haptoglobin, CMP, iCa, Mg, Phos on arrival to CVU and daily.

11. STAT PTT on arrival, and every 3 hours (run STAT), per nomogram.

12. CK, Troponin in morning

13. Fingerstick glucose every 2 hours. * If 2 consecutive glucose results are greater than 200, institute CVU Insulin Protocol and notify the practitioner.

14. ABG as ordered.

15. **Maintenance Solution:** Maintain RED pressure sidearm port with 1000 ml 0.9% Sodium Chloride (Normal Saline) on a pressure bag and arterial line pressure tubing. Remove the transducer end connecting tubing. (This line is not transduced.). Remove Y pigtail set / dextrose when this solution is hung.

16. Change saline and pressure tubing every 96 hours.

17. **PURGE SOLUTION:** Heparin 25,000 units / 500 ml 20% Dextrose (D20W) – obtain from pharmacy.

18. Connect purge solution to infuse via the Check Valve of the Impella device (yellow port).

   Purge Solution Fluid is changed every 24 hours. Purge Cassette is changed every 96 hours with daily bag change.

**ANTICOAGULATION**

Heparin Intravenous infusion: 25,000 units/500 ml D5W premix (50 units/ml) as needed to maintain target PTT: 50-70

- PTT every 3 hours and as needed

- **Adjust systemic Heparin dose hourly to maintain desired total dose of Heparin**

  **** = amount delivered via purge solution, plus amount delivered systemically. To calculate dose to set on the Intravenous pump: Take the units/hour delivered by Impella (found on infusion screen), divide by patient weight to get # units/kg/hour delivered by the purge solution, then subtract this from desired total dose (units/kg/hour) to determine the systemic heparin dose (unit/kg/hour) to be set on the Intravenous pump.

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**Physician/Date/Time:**

**Nurse/Date/Time:**

**Secretary/Date/Time:**

**Original to Patient’s Chart**

Original: 8/13

**Fax to Pharmacy**

Reviewed: 

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19. Notify the physician if 2 consecutive PTTs are out of target range.

20. **NOMOGRAM FOR HEPARIN DOSE ADJUSTMENT**

<table>
<thead>
<tr>
<th>APTT</th>
<th>HOLD INFUSION (minutes)</th>
<th>RATE</th>
<th>REPEAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 35</td>
<td>60 units/kg</td>
<td>0</td>
<td>+4 units/kg/hr</td>
</tr>
<tr>
<td>36-49</td>
<td>30 units/kg</td>
<td>0</td>
<td>+2 units/kg/hr</td>
</tr>
<tr>
<td>50-70</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>71-100</td>
<td>0</td>
<td>0</td>
<td>-2 units/kg/hr</td>
</tr>
<tr>
<td>&gt; 100</td>
<td>0</td>
<td>60</td>
<td>-3 units/kg/hr</td>
</tr>
</tbody>
</table>

**NOTE:** **All Heparin rates and adjustments must take into account the units of Heparin delivered via the Impella Heparinized Purge Solution**

**NOTE:** **2 DIFFERENT HEPARIN SOLUTIONS MAY BE USED – HIGH ALERT / DOUBLE CHECK**

PATIENT MONITORING / CARE:
21. Assess Vital signs including CVP, condition of arterial puncture site, and distal pulses every 15 minutes times 4, every 30 minutes times 2, then hourly for the duration of Impella support.
22. Hemodynamic Monitoring via PA catheter: **Notify physician if CVP less than 12.**
23. Place foley catheter, if not already in place.
24. Hourly intake and output
25. Change site dressing as needed with transparent dressing / sterile technique.

DEVICE MONITORING / CARE:
26. Monitor Impella flow rate and purge system. In AUTO mode, the Purge system automatically adjusts to maintain Purge pressure between 300-1100 and purge flow rate 2-30 ml/hour.
27. Monitor pump placement using the dual signal waveforms of motor current and placement signal.
   **NOTE:** In event the monitor current or signal indicates that the distal tip may be displaced, notify the physician immediately. Lower the Impella flow rate to 1 L/min. Also notify Abiomed Clinical Support.
28. Mark & document placement marking (cm) for the Impella device with initial shift assessment and evaluate position hourly.
29. Check infusion screen hourly for infusion amounts for intake and output documentation & Heparin dose delivered.
30. Change purge solution every 24 hours (Press Purge System button for directions for purge fluid change)
31. Change purge cassette / tubing every 96 hours. (Press Purge System button / Purge system change).

Physician/Date/Time: Nurse/Date/Time: Secretary/Date/Time:

Physician is required to date, time and sign every page and only one nurse and one clerical signature is required.
### DOCTORS ORDERS

**IMPELLA**

#### 32. NOTIFY Physician for:
- Bleeding or hematoma arterial insertion site
- Signs of limb ischemia / changes in color, temperature, pulses or ABI in accessed extremity
- Significant change in vital signs, heart rhythm, or hemodynamics
- Reduced urine output / tea colored urine (may indicate hemolysis)
- Change in Impella flow / waveform
- Unresolved high or low purge pressure
- Mal-positioned pump.

### EMERGENCY: CPR/Defibrillation

33. **DO NOT** unplug or stop the Impella device if CPR or Defibrillation is required.

34. Reduce Impella Flow to 1 L/min with chest compressions. **NO** change is needed for defibrillation; Confirm placement post-CPR / defibrillation.

### WEANING: Per Physician order only – follow specifically ordered parameters.

- Only an Impella trained physician may remove the Impella device. Upon removal, the physician is responsible for a manual hold (typically about 45 minutes, or 20 minutes with application of a femostop)

#### Weaning Recommendations: (not part of order set)

- **Optimal flow will be 2.5-2 L.** Initiate wean by decreasing flow by 0.5 L every 3-5 hours, down to 1 L.
- **Once at 1L, maintain for 5 hours and evaluate patient’s ability to handle own cardiac output.** If patient experiences hemodynamic instability, increase liter flow, or put pump back in “Auto” mode.
- **NOTE:** With the device across the aortic valve, 1 liter is the lowest flow to be maintained. Flow control can be reduced to 0.5 at the time of catheter removal. Once the device has crossed the aortic valve upon removal, decrease flow to zero and unplug power connector prior to the catheter exiting the body.

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**Physician/Date/Time:**

**Nurse/Date/Time:**

**Secretary/Date/Time:**

Physician is required to date, time and sign every page and only one nurse and one clerical signature is required.

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