

PURPOSE:

Safely manage the care of patients who receive support from the Impella requiring transport by Aspirus MedEvac. The contents of this document will apply to both left- and right-sided Impella devices.

STAKEHOLDERS:

Aspirus MedEvac

DEFINITIONS:

Impella (LP 2.5, CP, CP with SmartAssist, 5.0, RP, LD) device: This is a catheter-based, impeller-driven, axial-flow pump that is percutaneously inserted and provides support to the left or right ventricle of the heart.

Heparin purge solution: The manufacturer recommends that patients receive a heparin-based purge (a solution that runs through the pump to prevent blood from entering the motor) in combination with systemic intravenous heparin for anticoagulation during the use of the device.

Systemic Heparin Solution: Systemic intravenous heparin infusion for anticoagulation during use of the device. A standard Heparin concentration of 100 units per mL will be utilized.

SUPPORT: 24/7 clinical support center: 1-800-422-8666

PROCEDURAL STEPS:

I. Assessment

- a. Monitor vital signs, insertion site and distal pulses on insertion extremity
- b. Verify that Tuohy-Borst valve is locked and repositioning valve is tightened
- c. Secure tubing to anterior thigh – remind patient not to bend leg or assure leg is straight (use a knee immobilizer if needed)
- d. Document centimeter marking on Impella catheter closest to proximal end of repositioning wheel.
 1. If dressing obscures the centimeter marking, re-dress insertion site using central line technique so that the centimeter marking is visible.
- e. Identify any needs of purging cassette and/or fluids needed for system to reach destination facility prior to departure
- f. Transfer purge system to standard configuration
 1. Press "purge system" soft key; follow on-screen instructions.
 2. Pharmacy will send bag of 500 mL bag of D5W containing 12,500 units of heparin (25 units per mL).

3. Connect D5W with heparin bag to the clear side-arm – this is the device purge solution.
 4. Input change in fluid into console using purge system soft key
- g. Verify with bedside RN that Activated Clotting Time (ACT) is managed appropriately vs Heparin dosing guidelines from pharmacy.
- h. If measuring Central Venous Pressure, optimal reading of 12 or greater is desired.

II. Monitoring for Transport

- a. Keep performance level as prescribed
- b. Maintain head of bed at 30 degrees or less
- c. Verify catheter has not migrated from initial position
- d. Continue to check and document: insertion site, distal pulses/perfusion, urine output, urine color and vital signs per MedEvac policy.
- e. Monitor patient for signs of right heart failure
 1. Reduced catheter flow
 2. Suction alarms
 3. Elevated filling pressures or JVD
 4. Signs of liver failure
 5. Elevated pulmonary artery pressures if pulmonary artery catheter present
- f. Maintain adequate cardiac preload

III. Documentation

- a. Document purge flow rate every hour
- b. Document placement signal, motor current, purge flow rate, purge pressure, P-level, L/min flow and power source every hour
- c. Monitor pump placement using 3 waveforms: left ventricular (white), aortic pressure monitoring (red waveform) and motor current (green). Motor current range is 0 – 1000 mA (displayed as ___/___). Watch for top number increase. There is a risk of pump stoppage when the motor current is > 1000 mA. Document hourly.
- d. In the event that the distal tip of the Impella device becomes displaced, follow troubleshooting guide; call the physician immediately if unable to confirm correct placement.



IV. Cardiac Arrest

- A. Initiate CPR whenever indicated.
 1. Reduce flow rate to P-2.
 2. Resume previous settings if return of spontaneous circulation is achieved
- B. No changes are needed for defibrillation.
- C. During resuscitation, placement monitoring and flow calculations will not be accurate

V. Troubleshooting

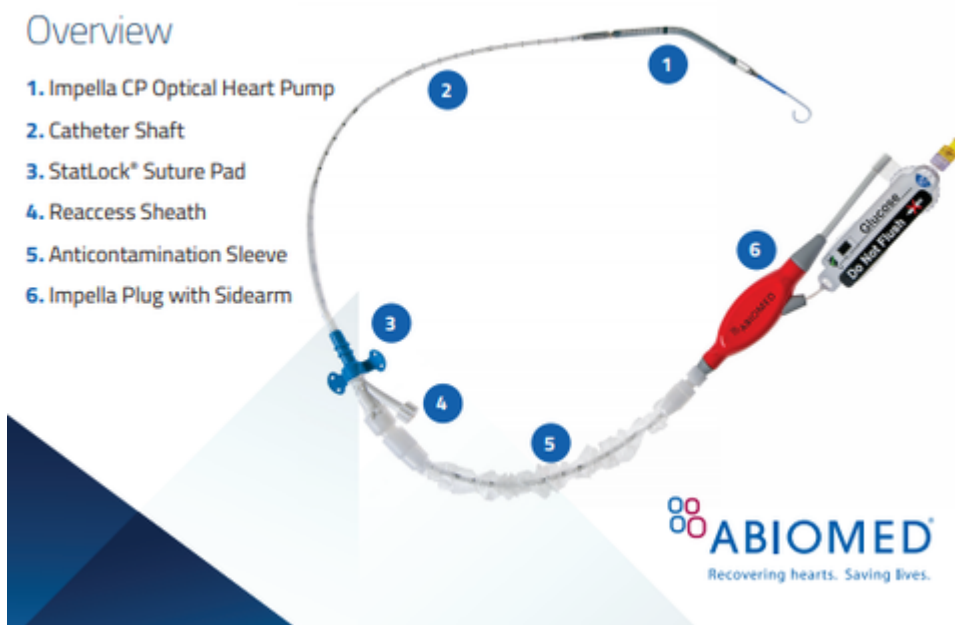
- A. Keep instruction manual and replacement tubing in the basket attached to the device.
- B. Impella in the wrong position
 1. Reduce to P2
 2. Indications of malposition;
 - a. Check for ventricular waveform on the placement signal.
 - b. Check for aortic waveform on the placement signal
 - c. Check for a flat motor current waveform
 3. Notify receiving facility of issue
 4. Verify aortic pressure and pulsatile motor current after repositioning
 5. Return to previous P-level setting and observe waveforms
 6. Assure Tuohy-Borst valve is locked and repositioning wheel is tightened
- C. Low Purge Pressure
 1. Check for cracks, leaks and/or loose connections on the (1) purge cassette, (2) yellow luer lock connection to the Y-connector, (3) yellow luer lock connection to the purge sidearm, or (4) purge side arm.
 2. Assess the yellow check valve, pressure reservoir and infusion filter for leaks
 3. Change purge cassette, if leaking. To change the purge cassette, open the PURGE SYSTEM menu and select "Change purge cassette". Follow the instructions on the screen to change the purge cassette
- D. High Purge Pressure/Purge System Blocked
 1. Check for kinks in (1) purge tubing, (2) purge sidearm, (3) Impella catheter shaft
 2. Make sure the plastic clip on the pressure reservoir of the purge sidearm is snapped to the connector cable such that the purge sidearm is not kinked
 3. Decrease the dextrose concentration. Open the PURGE SYSTEM menu and select "Change purge fluid." Follow the instructions on the screen and change purge fluid (notify receiving facility of change in purge solution)
 4. Monitor the motor current for any upward trends in motor current

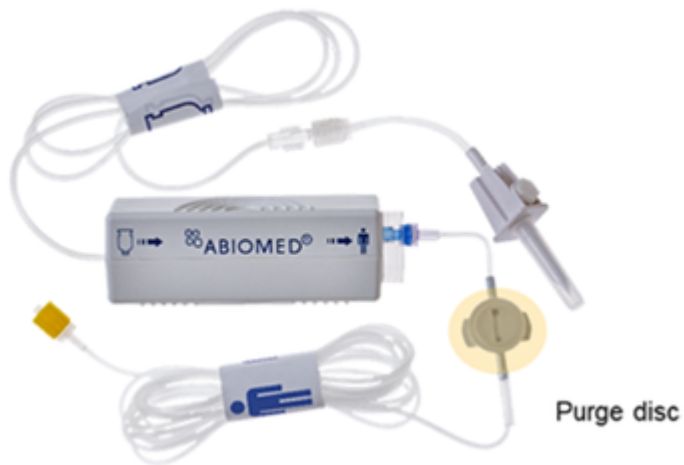
E. Impella Flow Reduced/Suction

1. The main causes of suction are (1) low volume (preload), (2) incorrect Impella position and (3) RV failure
2. "Impella flow reduced" white advisory alarm: If the controller detects suction, it displays this alarm and automatically reduces motor speed to reduce flow
3. "Suction" audible yellow alarm: If suction is still detected at the lowest motor speed, the controller displays this alarm
4. In P-Level "suction" audible yellow alarm: if suction is detected the controller displays this alarm
5. Reduce Performance level to break suction
6. Consider giving volume if CVP (or other preload measure) is < 10 mmHg
7. Hyperdynamic left ventricular contractility can result in competition if the right ventricle becoming hypodynamic

F. Impella Stopped

1. If alarm indicates Controller Failure, switch to backup controller
2. If alarm does not indicate Controller Failure, immediately try to restart pump at Auto (or P-8)
3. If restart fails, wait 1-2 minutes and try to restart again at P-2
4. If, after several attempts, you cannot restart the Impella Catheter, notify receiving facility immediately. There is danger of damage to the aortic valve if the impella is malpositioned too long





REFERENCES:

Impella Device PDF available at:

https://d1edr79mp9g5zc.cloudfront.net/5eb0affe-1991-449b-bfc0-a5a0516548bf/db839ea8-fe59-41a9-94c2-a7264c54041b/db839ea8-fe59-41a9-94c2-a7264c54041b_source_v.pdf Accessed 3/25/2021.

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<https://www.heartrecovery.com/education/education-library/abiomed-automated-impella-controller-aic> Accessed 3/25/2021.

Abiomed: Impella ventricular support systems; Instructions for use and clinical reference manual.

Percutaneous Ventricular Assist Device (PVAD) - Impella Procedure CVICU Aspirus Wausau Hospital Policy