Impella Tip Sheet

Abiomed Clinical Support	1 (800) 422-8666	Call for initial ICU check-in and questions/troubleshooting
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Indications

- High Risk PCI
- Cardiogenic Shock

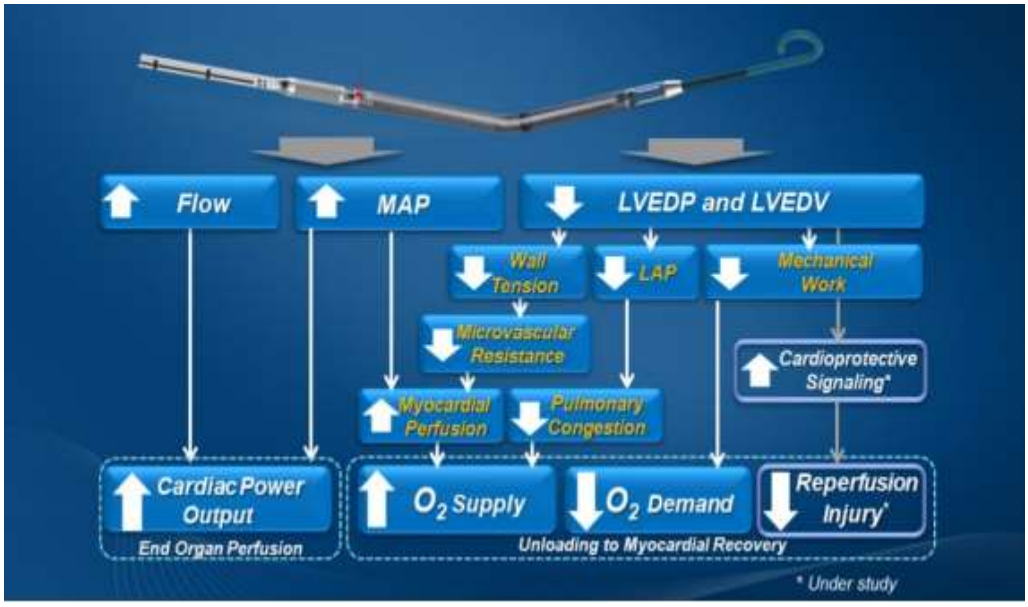
Contraindications

- Left ventricle thrombus
- Mechanical aortic valve
- Aortic stenosis
- Moderate to severe aortic insufficiency
- Severe peripheral arterial disease, resulting in poor access to femoral artery
- Atrial septal defect
- Ventricular septal defect
- Cardiac tamponade

The Basics

Impella is dependent on:

1. Preload
2. Afterload
3. Position



Hemodynamic Effects:

Cardiac Output: Must be obtained by Swan or Fick calculation and entered into Impella

- Update Impella CO entry with any significant change in pressors or any time CO is obtained
- Steps: "Menu" → "Enter Cardiac Output" → Enter value

Cardiac Power Output (CPO): Number one correlation to mortality in Cardiogenic Shock

- CPO = CO x MAP / 451
- Normal: > 1 watt

Pulmonary Artery Pressure Index (PAPi): Determinate of right sided heart failure

- PAPi = sPAP – dPAP / CVP
- < 1 suggest right sided heart failure

General

- Do not decrease below P2 or less than 1.5L while device is in LV

Femoral placement

- Strict bedrest
- HOB maximum of 30 degrees
- Knee immobilizer on leg with pump in to keep leg straight at all times

Axillary/Subclavian placement

- Fall precautions
- Up to chair twice daily
- Mobilize as tolerated (unless otherwise ordered)

Assessment/Nursing Care

- Chest X-Ray upon arrival and daily
- 2D limited Echo upon arrival, daily, and PRN for unknown Impella position
- EKG upon arrival, daily, and PRN for rhythm changes
- Daily labs (CBC with diff, CK, CMP, Haptoglobin, iCal, iSTAT ABG, Lactate, Mag, Phos, Troponin)
- PTT on arrival and every 4 hours
- Bedside glucose every 2 hours (notify provider for two consecutive results greater than or equal to 200 mg/dL)
- Change Site dressing per central line policy or as needed when soiled
    - Angle matching: ensure the angle that the Impella enters the skin is the same angle as the catheter entering the artery to reduce life on the vessel. Manipulate the catheter to achieve an angle with minimal to no oozing from the site, then stabilize with 4x4s beneath the hub before placing tegaderm

Impella Flow Sheet

- Heparin infusion rates hourly
- Performance level, flow, placement signal, motor current, purge pressure, site/pulse check, hemodynamics hourly

Mark and document placement marking (cm) for device with initial assessment and hourly

Check infusion screen hourly for infusion amounts for intake and output documentation hourly

Vital signs, patient hemodynamics, access site, device assessment, and distal pulses

- Q 15 minutes for 1 hour
- Q 30 minutes for 2 hours
- Hourly

Vascular assessment on the extremity of Impella insertion hourly

Purge System

Heparinized purge solution to be started once patient is in CVICU/CCU. Connect to infuse via the check valve of the Impella (yellow luer). Purge solution may be:

- Heparinized 12.5 units/mL or 25 units/mL
- Sodium bicarbonate solution (indicated for HIT, major bleeding)
- Alteplase solution 0.04 mg/Ml (for high-pressure, low purge rate condition)
    - Stop heparinized purge solution and replace with alteplase solution until resolution of high pressure system. Contact provider when purge pressures have decreased by 50% for additional guidance and orders. Don't stop systemic heparin drip)

Purge system automatically adjusts to maintain purge pressure between 300-1100 mmHg and purge flow rate between 2-30 mL/hr

Change normal saline and pressure tubing every 96 hours

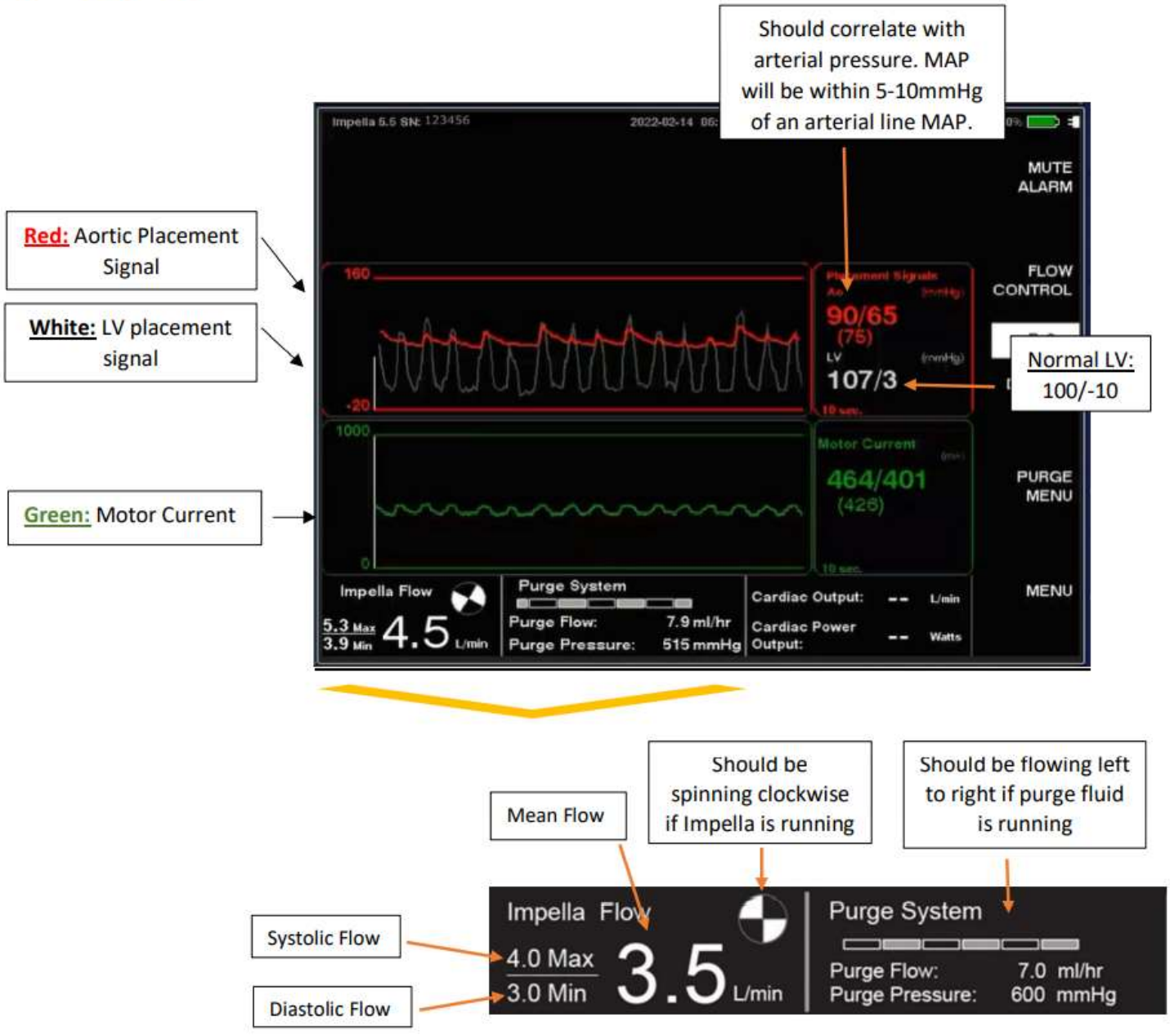
Change purge solution every 24 hours

- Only have 90 seconds to complete the process
- Steps: Order a new bag from pharmacy and have it ready at bedside → "Purge menu" → "Change Purge Fluid Bag" → Follow instruction on the screen

Change purge cassette every 120 hours with daily bag change

- Only have 90 seconds to complete process
- Steps: “Purge menu” → “Change purge cassette and bag” → Follow instructions the screen (ABIOMED should be facing outward on purge cassette when placing into Impella console)
    - *When disconnecting and reconnecting the purge system from the yellow purge hub, keep the yellow purge hub clean by placing on a sterile 4x4. Never use chlorohexidine or an alcohol swab to scrub the yellow purge hub (it can degrade the hub overtime and ruin the Impella)

Placement Screen



Anticoagulation

Heparin infusion 0-30 units/kg/hr

- Initiate at 12 units/kg/hr
- Follow Heparin infusion algorithm for Impella patients in order set

Provider Notification

- CVP less than 12 mmHg
- PCWP less than 16 mmHg
- Cardiac Index less than 2.2 L/min
- Changes in heart rate or rhythm
- Evidence of hematuria
- Changes in Doppler signals or palpable pulses of accessed extremity
- Two consecutive blood glucose are greater than 140 mg/dL
- Signs/symptoms of right heart failure (elevated filling pressures, elevated liver function tests (LFTs), decreased Impella flow)
- Bleeding/hematoma at device insertion site

Emergency Instructions

Do not unplug or stop Impella device if CPR or defibrillation is required.
If practical, decrease to P2 and continue CPR
Confirm catheter position once resuscitation is complete

Weaning Protocol

Target ACT should be less than or equal to 150 prior to explanting device
Rapid weaning:

- Decrease P level by 2 levels or decrease flow if in "auto flow" every 15 minutes until you're at P2/1.5 L flow and then stop
- Once you reach P2/1.5L flow, notify provider
    - Maintain P2/0.5 L flow for 10 minutes to monitor hemodynamic stability
    - MD will explant, immediately stop pump by disconnecting white connector cable from console once the distal tip is in the aorta

Slow weaning:

- Decrease P level by 2 levels or decrease flow if in "auto flow" every 3 hours until you're at P2/1.5 L flow and then stop
- Once P2/1.5 L flow reached, maintain for 3 hours. If patient's stable, notify provider
    - MD will explant, immediately stop pump by disconnecting white connector cable from console once the distal tip is in the aorta

To view weaning trend display: "Display" → "LVEDP/CO Trend"

Successful wean: all values stable as native CO increases
Unsuccessful wean: As P level decreased, MAP decreases, LVEDP increases, CO decreases

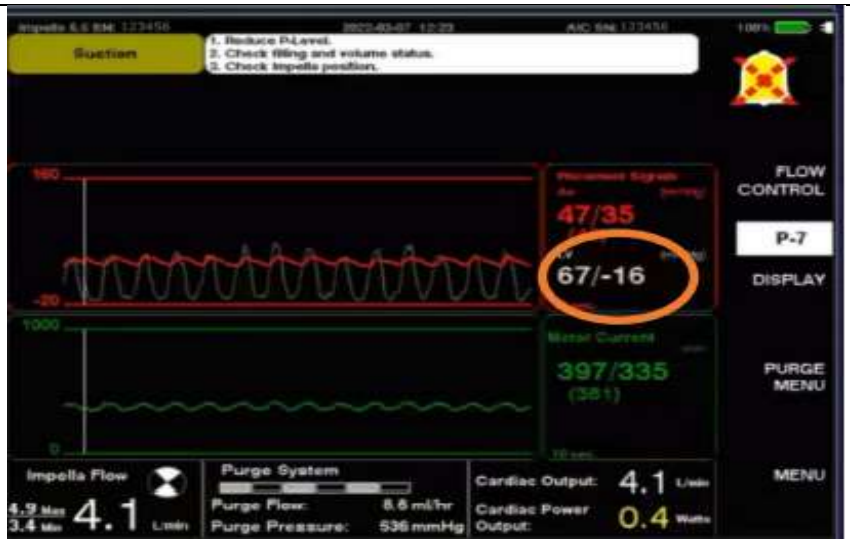
Alarm Management

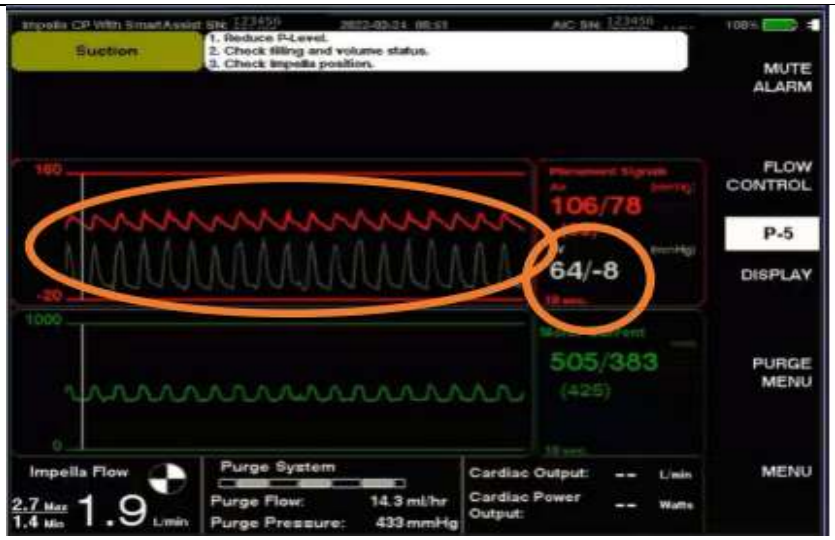
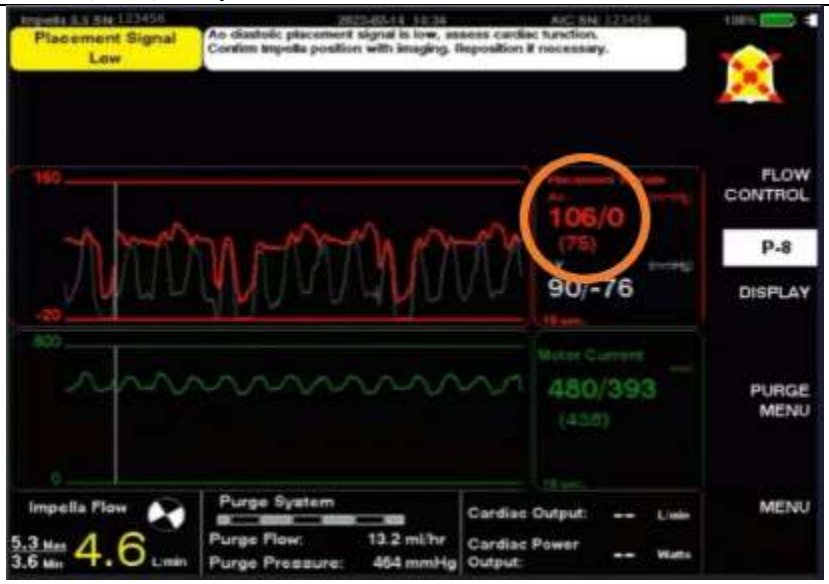
Position check

1. Is the Impella flow within range for the catheter?
2. Is the position signal waveform aortic?
3. Is the motor current pulsatile?

- Red and yellow alarms: silences for 2 minutes
- White alarms: silences for 5 minutes

*LV waveform will disappear at a P level 4

Alarm	Console Screen	Pressures	Treatment
Pump in Ventricle		Ventricular placement signal waveform (not aortic) Motor current is non-pulsatile	Needs to be repositioned by the provider (turn to P2 before repositioning)
Pump in Aorta		Aortic placement signal Motor current is non-pulsatile	Needs to be repositioned by the provider (turn to P2 before repositioning)
Suction (Low Volume		Aortic placement signal Pulsatile motor current Low LV diastolic pressure (<-10)	Reduce P level by 1-2 and assess fluid: Is CVP > 12? Is patient bleeding? Is patient on diuretics? Give fluid

Suction (Position)		Aortic placement signal Pulsatile motor current Decoupling of aortic and LV placement signals Low LV systolic and LV diastolic	Could be sucked up against the wall or in a papillary muscle or a mitral valve apparatus Needs to be repositioned by provider (Turn to P2 before repositioning)
If volume and position have both been addressed but pump is still alarming "suction," check for right sided heart failure (Analyze PAPi, CVP, LFTs)			
Placement Signal Low		Ao diastolic <30	Pump is too deep (can cause hemolysis) Needs to be repositioned by provider (Turn to P2 before repositioning)
Impella Position Unknown		Placement signal dampened or flat Motor current dampened or flat	Patient has low native heart function and can't generate enough pressure difference across the aortic valve Monitor hemodynamics and titrate medications appropriately