IABP Management

Counterpulsation, triggers, the four timing errors, nursing care and weaning

HOW COUNTERPULSATION WORKS

A balloon in the descending thoracic aorta fills with helium in diastole and empties just before systole. Light helium moves in and out fast. Support is modest: about 0.5 to 1 L/min of added cardiac output.

PHASE	LANDMARK	EFFECT
Inflate	Mid T wave; dicrotic notch	Raises diastolic pressure and coronary perfusion
Deflate	R wave; just before the upstroke	Lowers end-diastolic pressure, afterload and O2 demand

Position: tip about 2 cm below the left subclavian (on x-ray, about 2 cm above the carina), lower end above the renal arteries. Check on daily x-ray.

Signs it is working: augmentation above the patient's systole, lower assisted end-diastolic and systolic pressures, rising MAP, cardiac index and urine output, falling PAWP, less chest pain.

INDICATIONS AND CONTRAINDICATIONS

Short-term bridge in:

- Cardiogenic shock with a mechanical complication (acute MR, ventricular septal rupture)
- Refractory ischemia awaiting revascularization
- High-risk PCI
- Failure to wean from cardiopulmonary bypass
- Refractory ventricular arrhythmias; bridge to VAD or transplant

Contraindications:

- Moderate to severe aortic regurgitation
- Aortic dissection or aneurysm
- Severe peripheral arterial disease
- Relative: bleeding disorder, uncontrolled infection

EXAM TIP Classic exam answer: aortic insufficiency is the key contraindication. Diastolic inflation drives blood back through the leaky valve and overloads the LV.

EXAM TIP Guideline shift: IABP-SHOCK II showed no 30-day survival benefit in MI-related shock (39.7% vs 41.3% mortality). ACC/AHA (2025) and ESC advise against routine IABP there unless a mechanical complication exists; selected STEMI shock may get a microaxial flow pump instead. Older items may still call shock the classic indication.

TRIGGERS AND ASSIST RATIO

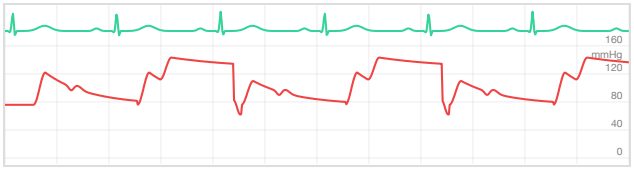
TRIGGER	SENSES	USE WHEN
ECG	R wave	First choice with a clear R wave
Pressure	Arterial upstroke	No usable R wave, regular rhythm; CPR
Pacer (V/AV)	Ventricular spike	100% paced
Internal	Fixed rate, no trigger	Only with no cardiac ejection (bypass, asystole)

1:1 assists every beat. Check timing at 1:2, where each assisted beat sits beside an unassisted one, then return to 1:1. In atrial fibrillation, consoles deflate on each R wave.

READING THE WAVEFORM AT 1:2



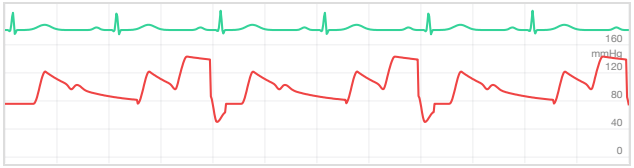
Correct timing: inflation at the notch makes a sharp V and augmentation peaks above unassisted systole. Assisted end-diastolic pressure and the next systole are both lower: afterload is reduced.



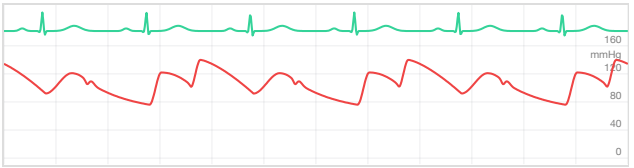
Early inflation: augmentation starts before the notch and cuts into systole. Harm: early aortic valve closure, higher LVEDP and PCWP, more O2 demand.



Late inflation: the notch shows before inflation, with no sharp V; augmentation starts late and lasts a shorter time. Harm: suboptimal coronary perfusion.



Early deflation: a sharp drop soon after the augmented peak leaves a U-shaped dip before systole; assisted systole is not reduced. Harm: little afterload reduction, possible retrograde coronary flow (angina).



Late deflation: assisted end-diastolic pressure equals or exceeds unassisted, and the next systolic upstroke rises slowly. Harm: the LV ejects against a still-inflated balloon, raising afterload and O2 demand.

EXAM TIP Exams favor the two errors that make the LV push against an inflated balloon: early inflation and late deflation.

NURSING CARE

FINDING	THINK	DO
Cool, pale leg, weak pulses	Limb ischemia	Notify; may need removal
Weak left radial pulse	Balloon too high (left subclavian)	Check position; notify
Sudden drop in urine output	Balloon too low (renal arteries)	Check position; trend creatinine
Blood or dried flecks in gas tubing	Balloon perforation	Stop pumping (see warning)
Site bleeding, falling platelets	Anticoagulation, thrombocytopenia	Pressure; labs; notify

- Check the tubing for blood all shift; in one cohort the gas-loss alarm caught only 29% of ruptures
- Head of bed no higher than 30° so the catheter does not kink
- Anticoagulation per protocol; heparin use varies
- Balloon still for over 30 minutes risks clot. If the pump fails and no leak is suspected, inflate and deflate by hand per manufacturer instructions

SAFETY Suspected perforation: pump to standby, disconnect the extender tubing so the balloon deflates, clamp the catheter tubing, notify the provider and prepare for prompt removal. Never keep pumping or hand-inflate a leaking balloon: gas embolism or a trapped, clotted balloon can result.

WEANING

- Start when stable on little vasoactive support (one proposed set: MAP >65, HR <100, CI >2.2, lactate <2)
- Step down by assist ratio (1:1, 1:2, 1:3) or by balloon volume, per protocol; neither has better outcomes
- Reassess BP, HR, CI, PAWP, urine output and lactate after each step
- After removal: hold pressure, then check the site and distal pulses

Sources (16) are listed with links at icubasics.com/sheets/iabp-timing.html. For education and exam preparation only. Not medical advice; follow current guidelines and your institution's protocols. ICU Basics is an independent study aid not affiliated with any certifying body.