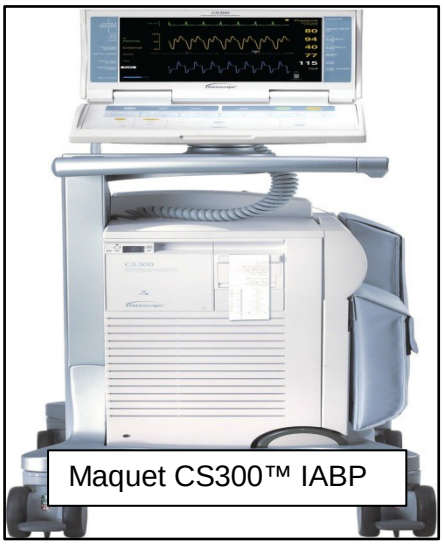
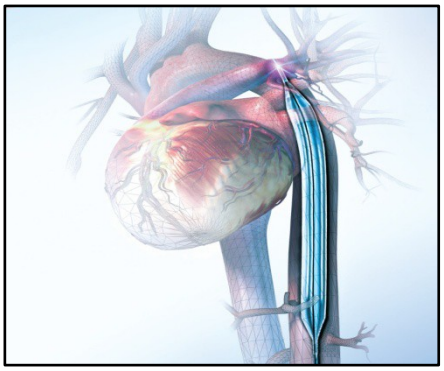
Approved 9/12/18, Effective 1/15/19, replaces all prior versions

5N – INTRA-AORTIC BALLOON PUMP (IABP) MONITORING - ADULT

PARAMEDIC


Maquet CS300™ IABP



Introduction:

Transfer of patients between hospitals is and will be an increasing demand due to an aging society and the increasing invasiveness of recommended therapies. Intra-aortic balloon pumps are used in mechanical circulatory support. The reduction in size and weight of the respective devices now allows an increasing number of interfacility transfers with continuing mechanical circulation support.

Indications for Intra-Aortic Balloon Pump (IABP):

IABP counter-pulsation support is a recommended option for patients with cardiac failure, mainly due to coronary artery disease or congestive heart failure. Early IABP support is used to accompany acute percutaneous coronary intervention (PCI) or cardiac surgery. In addition, IABP support may function as a bridge prior to invasive procedures if these specialties are unavailable at the initial hospital of admission. If in such a situation inter-hospital transfer is mandatory, IABP support must be maintained in clinical settings that may include refractory unstable angina, impending or acute myocardial infarction, ventricular failure, acute valvular disease, and cardiogenic shock.

Objective of the Transport Team:

1. Provide skilled personnel and the equipment to deliver specialized care needed to stabilize, maintain, and transport critically ill patients with IABP support.

   NOTE: Paramedic may provide, or assist in providing mechanical circulatory support during interfacility transport only if they have completed special additional training in the use of IABP including appropriate continuing education and are properly credentialed by the appropriate local medical oversight physician(s) to operate or assist with IABP.

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Protocol 5N: Intra – Aortic Balloon Pump Monitoring (IABP) – Adult, cont.

Before transport of the patient:

1. Together with physician, nurse, or cardiovascular technical staff (as appropriate), ensure that intra-aortic balloon catheter is properly secured, check intra-aortic balloon insertion site for bleeding or drainage, confirm adequacy of distal pulses and perfusion, and record pre-transport intra-aortic balloon pump settings.
    - **NOTE**: IT MAY BE NECESSARY TO USE A DOPPLER STETHOSCOPE TO CONFIRM PULSATILE FLOW IF CARDIOGENIC SHOCK IS SEVERE.
2. Measure and record augmented systolic, mean, and diastolic blood pressure in addition to standard vital signs.
3. If the transport is not accompanied by a physician or nurse, obtain written order for intra-aortic balloon pump settings to be used enroute.
    - **NOTE**: IF YOU ARE NOT FAMILIAR WITH THE TYPE OF INTRA-AORTIC BALLOON PUMP BEING USED, OR DO NOT FEEL COMFORTABLE WITH THE INTRA-AORTIC BALLOON PUMP SETTINGS PRESCRIBED BY THE SENDING PHYSICIAN, DO NOT ATTEMPT TRANSPORT. CONTACT ON-LINE MEDICAL CONTROL FOR FURTHER INSTRUCTIONS.
4. Ensure that the intra-aortic balloon pump being used is properly functioning, that an acceptable ECG trigger is present, and that all settings are correct.

During transport of the patient:

1. Continuously monitor augmented systolic, mean, and diastolic blood pressure in addition to standard vital signs.
2. In the event of mechanical failure, and the patient remains stable, attempt to identify and correct the problem.
3. In the event of a clinical emergency, and a physician, nurse practitioner, or physician surrogate IS present, assist with intra-aortic balloon pump management on request, and contact on-line medical control (or duly authorized agent) as soon as possible (without compromising patient safety).
4. In the event of a clinical emergency, and a physician, nurse practitioner, or physician surrogate is **NOT** present, proceed with cardiopulmonary resuscitation as indicated, and contact on-line medical control as soon as possible (without compromising patient safety).
    - **NOTE**: CARDIOPULMONARY RESUSCITATION AND DEFIBRILLATION MAY BE PERFORMED WHILE THE INTRA-AORTIC BALLOON PUMP IS FUNCTIONING.

After transport of the patient:

Record type and model of intra-aortic balloon pump used, settings employed in-transport, and augmented systolic, mean and diastolic blood pressures obtained post-transport, as well as any changes in patient condition, modifications in intra-aortic balloon pump settings, and unusual incidents occurring enroute.

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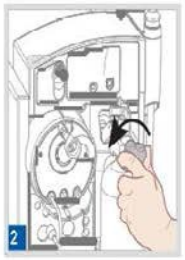
Protocol 5N: Intra – Aortic Balloon Pump Monitoring (IABP) – Adult, cont.

Troubleshooting the Maquet CS300™ IABP – (see protocol Special Note):

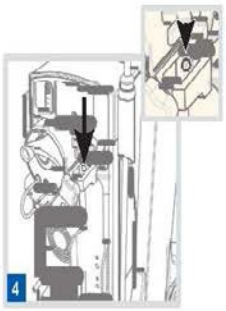
CHANGING THE HELIUM TANK

Fully close helium tank valve clockwise.



Slowly loosen yoke T-handle counter-clockwise.

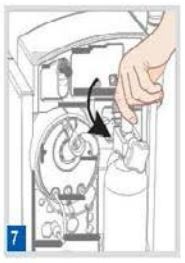
Remove helium tank.



Replace washer, if available.

Install fresh helium tank.

Fully tighten yoke T-handle clockwise.



Slowly open helium tank valve counter-clockwise.

Verify full helium level via indicator on monitor display.

Note: Once the helium alarm sounds, there are 24 Autofills remaining in tank.

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Protocol 5N: Intra – Aortic Balloon Pump Monitoring (IABP) – Adult, cont.

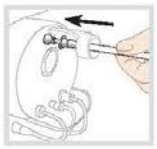
Troubleshooting the Maquet CS 300™ IABP, cont:

ALARMS

Augmentation Below Limit Set

Probable Cause	Corrective Action
Hemodynamic status has changed: ↑HR, ↓SV, ↓MAP.	Treat patient, adjust alarm limit as appropriate.
Alarm limit set too high.	Press AUG. ALARM key, change limit.

Autofill Failure



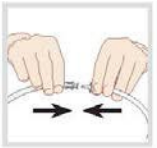
Probable Cause	Corrective Action
IAB disconnected.	Attach IAB catheter.
Helium tank is closed.	Open helium tank.
Helium tank is empty.	Change helium tank.
Incorrect IAB catheter extender tubing length.	Ensure only one IAB catheter extender tubing is connected from IAB to pump.

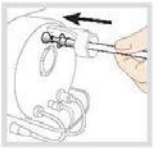
ALARMS

Check IAB Catheter

Probable Cause	Corrective Action
Kink in IAB catheter or tubing.	Relieve kink if possible, press START.
Membrane has not completely unfolded.	Manually inflate and deflate IAB.
IAB remains in sheath.	Check the markings of the IAB and withdraw sheath if indicated.

IAB Disconnected





Probable Cause	Corrective Action
IAB catheter or extender tubing is disconnected.	Reattach IAB, press START.

Protocol 5N: Intra – Aortic Balloon Pump Monitoring (IABP) – Adult, cont.

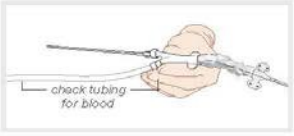
Troubleshooting the Maquet CS300™ IABP, cont:

ALARMS

Prolonged Time in Standby

Probable Cause	Corrective Action
IABP has been in STANDBY mode for an extended period of time.	Verify whether it is appropriate to resume pumping.

Rapid Gas Loss or Leak in IAB Circuit



Probable Cause	Corrective Action
Gas loss has been detected in IAB circuit.	If blood observed - STOP pumping. Prepare for removal of IAB.
	If blood is not observed, verify connections are leak-free.
	With Rapid Gas Loss, resume pumping by pressing START key.
	With Leak in IAB Circuit, press IAB FILL key for 2 seconds to initiate an AUTOFILL, then resume pumping by pressing START key.

ALARMS

Unable to Calibrate IAB Optical Sensor

Probable Cause	Corrective Action
Patient's pulse pressure is inadequate for calibration.	When patient's pulse pressure improves, press ZERO PRESSURE key for 2 seconds while the IABP is assisting.
	Provide alternate A.P. source (i.e.: radial).
Extender tubing or balloon catheter may be restricted.	Relieve restriction.
	Attempt calibration by pressing ZERO PRESSURE key for 2 seconds while IABP is assisting.
IAB FILL mode is set to MANUAL.	If appropriate, set IAB FILL mode to AUTO via PUMP OPTIONS menu.

IAB Optical Sensor Calibration Expired

Probable Cause	Corrective Action
A calibration update has been intentionally post-poned because either patient's mean arterial pressure may be too low to pause assist or less than 15 minutes have elapsed since last calibration.	Assess patient to determine if a brief pause in assist would be toler-ated, and if so, press ZERO PRESSURE key for 2 seconds while IABP is assisting.
	Provide alternate A.P. source (i.e.: radial).
Pump is either in STANDBY or the IAB FILL mode is set to MANUAL.	Verify that IAB FILL mode is set to AUTO.
	Resume pumping, then press ZERO PRESSURE key for 2 seconds to initiate a calibration.

Protocol 5N: Intra – Aortic Balloon Pump Monitoring (IABP) – Adult, cont.

Troubleshooting the Maquet CS300™ IABP, cont:

ALARMS

A.P. Optical Sensing Module Failure

Probable Cause	Corrective Action
There has been a failure of the A.P. Optical Sensing Module in the pump console.	Replace CS300, if available.
	If replacement pump not available, an alternate A.P source (i.e.: radial) must be provided.
	Contact MAQUET Service for optical module repair.

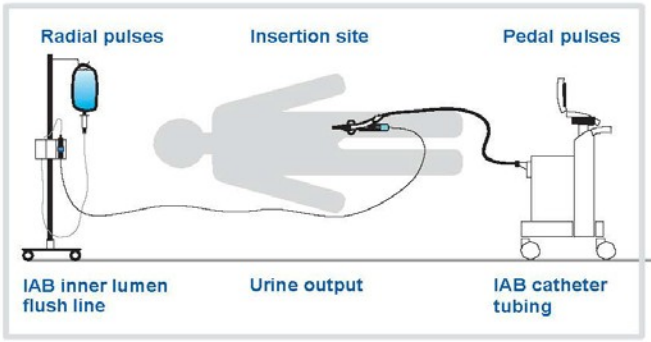
IAB Optical Sensor Failure

Probable Cause	Corrective Action
There has been a failure of the Optical Sensor in the IAB.	Unplug Sensor Connector and reconnect.
	If problem persists, provide alternate A.P. source (i.e.: radial).

Unable to Update Timing

Probable Cause	Corrective Action
Poor waveform quality.	Check cable connections. Verify transducer was not left vented, if in use.
	If transducer is in use, aspirate and flush fluid circuit.
	If problem persists, switch operation mode to SEMI AUTO, verify TRIGGER SOURCE, adjust timing, resume pumping.
Sustained heart rate is less than 30 BPM or greater than 150 BPM.	Switch to SEMI AUTO, verify TRIGGER SOURCE, adjust timing.
Poor diastolic augmentation.	If diastolic augmentation is poor, when AUGMENTATION level is set to MAX, attempt to improve patient's hemodynamic status.

PATIENT ASSESSMENT



Assessment	Corrective Action
Radial pulses Left radial pulse weak or left arm ischemia.	Check position of IAB.
Insertion site Excessive bleeding from insertion site.	Apply pressure, ensure distal flow.
Pedal pulses Limb ischemia detected.	Consider removing IAB, consider insertion via opposite limb.
IAB inner lumen flush line Pressure waveform damped (If using a conventional IAB).	Aspirate inner lumen. If line patent, flush for 15 seconds (with IABP on Standby).
Urine output Urine output low.	Check position of IAB.
IAB catheter tubing Blood observed in catheter tubing.	STOP pumping and prepare for IAB removal.