INTRA-AORTIC BALLOON PUMP MANAGEMENT

SETTING	Service Wide
FOR STAFF	All staff
PATIENTS	Adult patients

Introduction

This SOP outlines the principles of safe transfer of a patient receiving Intra-Aortic Balloon Pump (IABP) management. The ACCOTS team must be familiar with an IABP and able to provide safe transfer, monitoring, and prompt identification / troubleshooting of any issues; with the support of cardiac physiologist / cardiac nurse accompanying the patient for the purpose of IABP care.

Principle considerations

Background

The IABP is designed to increase coronary artery perfusion and decrease myocardial oxygen consumption when coronary artery supply is impaired.

An IABP is inserted via the femoral artery and positioned in the descending thoracic aorta, distal to the left subclavian artery and proximal to the renal arteries. Inflation is timed either via pressure or ECG measurement to occur during diastole.

The IABP utilises counterpulsation, the balloon inflation augments diastolic pressures and therefore coronary artery perfusion and myocardial oxygen delivery. Balloon inflation also results in increased blood displacement into the arterial system resulting in reduced end-diastolic aortic pressure. Left ventricular afterload is decreased with deflation occurring just prior to the onset of systole and the reduction in end-diastolic aortic pressure. The combination of these effects results in increased coronary artery perfusion with reduced myocardial oxygen consumption.

IABP's are usually used as a bridge to support patients towards more definitive management.

Indications for Intra-Aortic Balloon Pump

- Cardiogenic Shock
- Refractory unstable angina/high risk myocardial infarction prior to urgent cardiac surgery

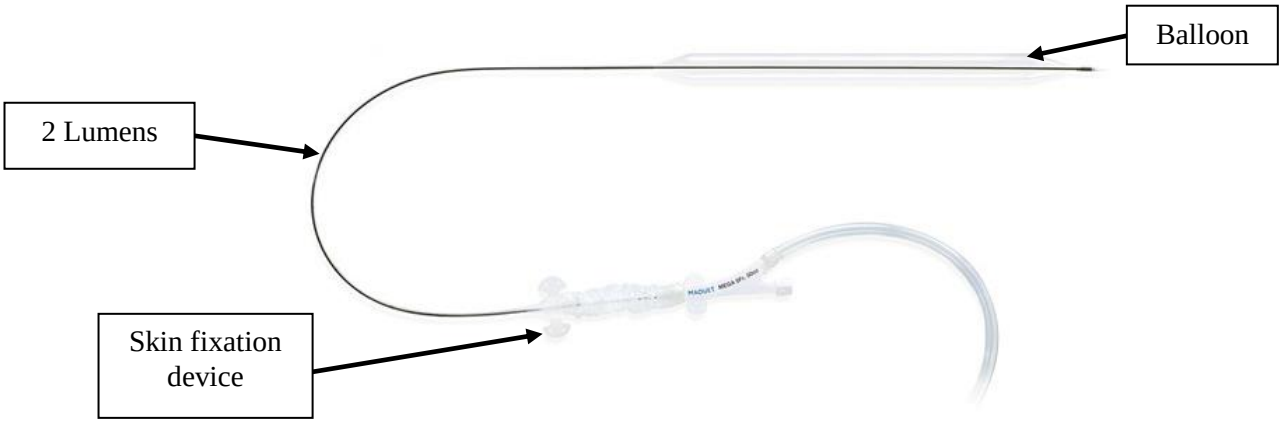
- Ischaemic refractory arrhythmia
- Complications of acute myocardial infarction-. i.e. ventricular septal defect/papillary muscle rupture

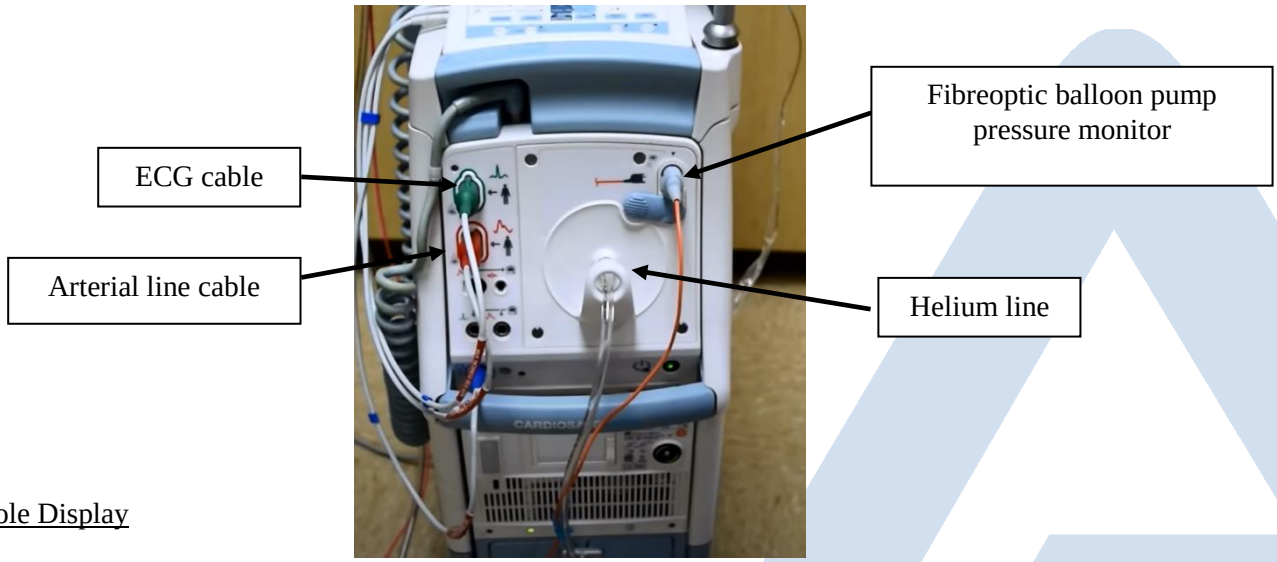
Components

The IABP consists of:

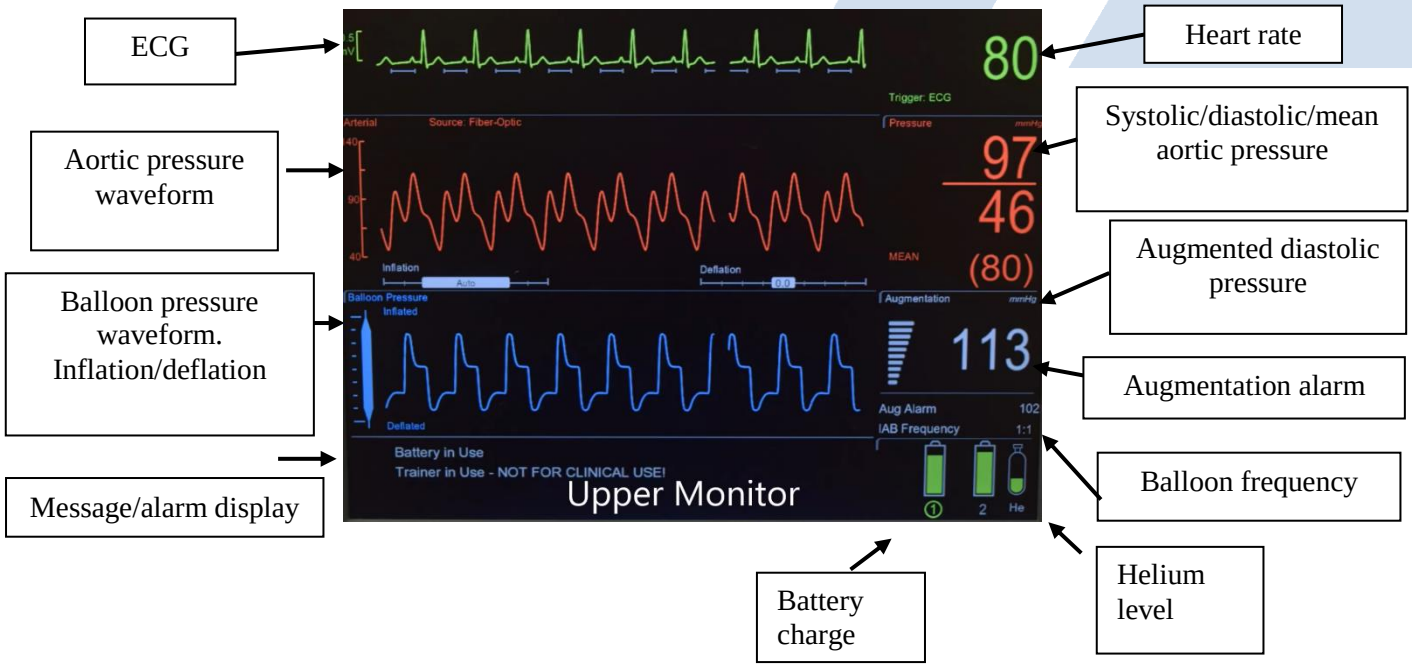
- The balloon with a lumen to it supplying periodic delivery and removal of helium gas to control inflation/deflation. A second lumen is for distal aspiration/flushing and pressure monitoring.

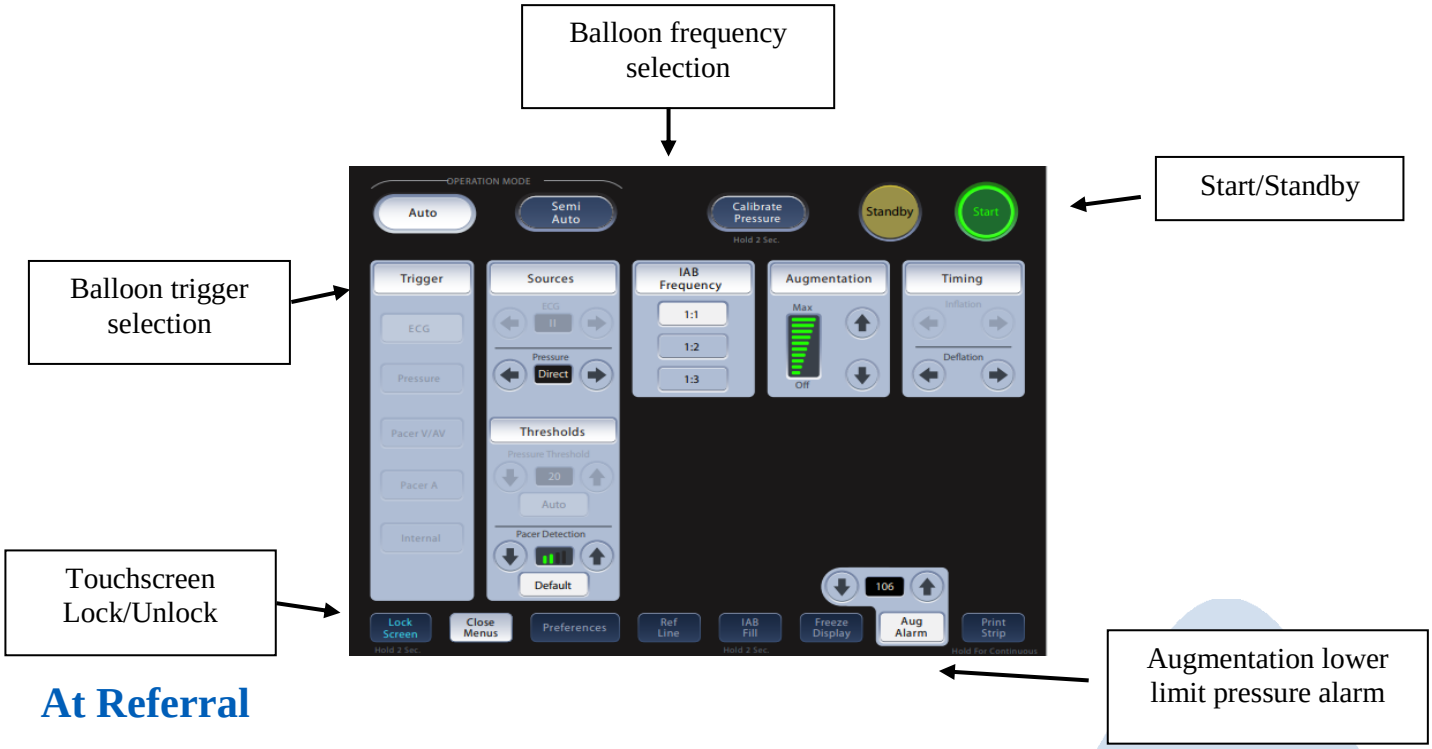
- A mobile control console that houses the helium cannister and controls the balloon inflation/deflation. It monitors/displays ECG, aortic pressure as well as balloon inflation pressures.





Console Display





At Referral

The ACCOTS co-ordinator should seek the following information:

- Suitably trained professional available to accompany the patient transfer, solely for care of the IABP (e.g. perfusionist / cardiac physiologist)
- Recent issues and any significant issues at any stage with IABP
- Fully charged batteries – checked to ensure they are fully charged when unplugged from mains power with spares available for transfer.
- Full helium cannister – spare available for transfer.

Pre-Transfer Checks

In addition to bedside pre-transfer checks, specific checks and documentation for IABP include;

- Date of insertion, current length at skin (compared to at time of insertion), catheter size. Insertion site review, swelling/bleeding/infection.
- Position confirmed as satisfactory (chest X-ray/transoesophageal echo). Ensure if length at skin changed since insertion, position has been reconfirmed.
- Foot pulses present (palpable/Doppler). If not present discuss with team prior to departure. Should be documented pre and post transfer.
- Fully charged batteries plus spare. Ensure console works when unplugged from mains.
- Full helium cannister plus spare. Inspect helium lumen/line and any signs of rupture; blood or rust coloured precipitant.
- Balloon inflation/deflation trigger - ECG/Aortic pressure (recommend set trigger to pressure for transfer).

- Ratio of balloon inflation to heartbeat/contraction, 1:1, 1:2, 1:3.
- Current systolic/diastolic pressures as per arterial line and current systolic/diastolic aortic pressures as per console display
- Current augmented diastolic pressure and augmentation alarm (set 10mmHg below target)
- Pressure bag 300mmHg, 500ml 0.9% saline +/- 1000 i.u. of heparin

Pre-transfer concerns regarding IABP should be escalated before beginning transfer.

The coordinator will ensure the destination hospital have confirmed onsite professional responsible for receiving the IABP, setting up and transferring over to a new console. This MUST BE CONFIRMED prior to departure. Where possible contact details should be given to be able to alert if any issues with the balloon pump in transit.

Transferring

On/Off the transfer trolley

A pat slide and slide sheet should be used when transferring laterally from bed to trolley.

Patients usually can be sat up to 30 degrees but the leg with the balloon pump in should remain straight.

A designated person should be allocated to manage the IABP during this process, ensuring it remains secure without tension/risk of displacement. Where possible have one person watching / holding tubing near the patient and a second person to move the console as the patient is transferred.

Post moving ensure no changes in waveforms/augmentation pressures.

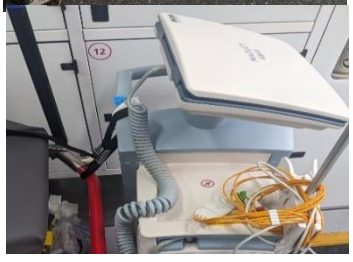
Transferring to and from the ambulance

A minimum of four people is suggested, utilising the ambulance driver and staff members from the referring hospital.

Once on the trolley position the console at the feet end of the bed placing two straps, one top and bottom as shown. Ensure no tension on the balloon pump/connectors.

When the trolley is in motion, to the vehicle, we recommend having two people allocated to the IABP either side, each with one hand on the trolley and the other on the console.

In addition to these two people, utilise one person at head end of trolley and the other person (ideally transfer doctor/practitioner) to carry the transfer bag and maintain an overview.



Depending on size of lifts the IABP maybe needed to be positioned alongside the trolley whilst in the lift. Releasing the bottom strap will allow repositioning whilst maintain the top strap for security. Prior to or once out the lift the IABP can be repositioned at the end of the bed and the bottom strap reapplied.

Transferring onto the ambulance

Trolleys should be winched up as per standard practice. The winch operator should operate from the controls by the ramp to be positioned with direct vision of the console throughout slowly loading.

The two persons allocated to the IABP console should continue to support and move it up the ramp with the trolley.

At all times the console should remain close to the trolley to prevent tension/displacement. Once in position all four wheel brakes should be applied.

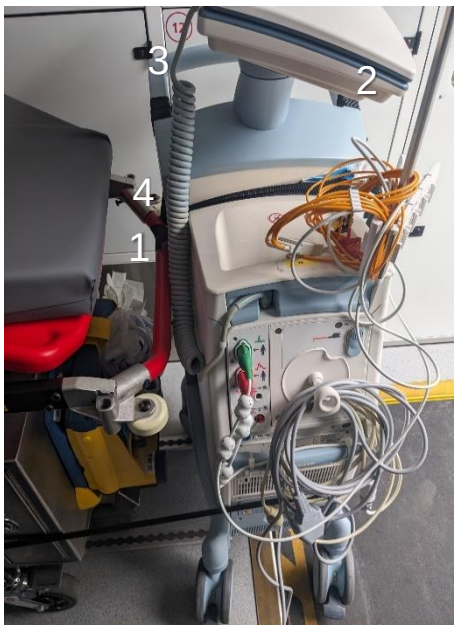
Positioning/Securing in the ambulance

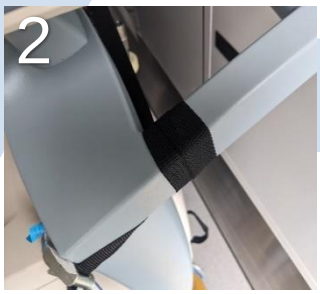
Once inside the ambulance the IABP console will need to be initially positioned alongside the trolley (see pictures) this is to enable the ramp to be moved back in.

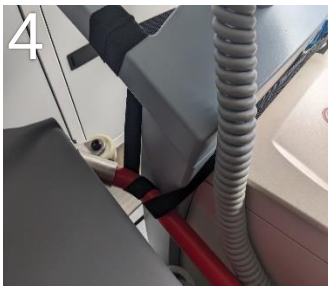
The bottom strap should be removed to facilitate this with the top strap left on for security. Once the ramp is inserted and doors closed the console can be positioned back at the end of the trolley. Replace the bottom strap as previously and apply all brakes.

The top strap can now be reconfigured for transfer (see pictures below). The different configuration is to provide additional support throughout the ambulance transfer.

Ensure that the console's power cable is plugged in for transfer and charging, leaving dependence on batteries for outside the ambulance (Macquet Cardiosave approximately 90minutes per battery). Position the display facing towards you.







Transferring off the ambulance

Once at the destination, unplug the power cable, switch the top strap back to the initial format.

When offloading the reverse process to loading should be followed. Please note: Ramp cannot be immediately deployed until IABP unstrapped and moved off the ramp to allow deployment.

Remove the bottom strap and then position the console alongside the trolley to facilitate unfolding of the ramp. Once the ramp is deployed the console can be positioned back at the end of the trolley with the bottom strap reapplied.

Upon arrival additional personnel to meet and help with unloading/transfer to the unit may be useful. Coordinators can help to facilitate this.

Troubleshooting/Emergencies

Alarms

Alarms are displayed at the bottom of the screen (see console display picture). The 'Help Available' menu can provide information.

Damped Pressure Trace

Immediately investigate the cause and rectify in the same way you would approach a damped arterial line trace. Ensure appropriately zeroed.

IABP Disconnection

If the helium lumen becomes disconnected reattach immediately and press start (see console display above) to reinitiate inflation/deflation and support.

IABP Failure

Degree of deterioration will depend on the patient's underlying heart function. Immediately escalate to the coordinator so this emergency can be relayed to the receiving hospital and a replacement plan formulated for arrival.

DO NOT REMOVE BALLOONS (risk of bleeding from artery/ongoing need for groin pressure).

Cardiac Arrest

In order for balloon inflation/deflation to synchronise with CPR 'Pressure' must be used as the trigger. If not already on 'Pressure', select semi-auto mode and set Trigger to 'Pressure' with a 1:1 ratio. If CPR generates sufficient pressure the IABP will detect and synchronise inflation/deflation.

Balloon Rupture

Gas leakage alarms may occur but do not always due to tamponade of ruptured balloon with thrombus. Failure to achieve augmentation pressure can occur but is not specific to balloon rupture. Blood, brown/rust precipitant within the lumen/catheter tubing indicates balloon rupture. Upon identifying;

Immediately disconnect the IABP helium, allowing any residual gas to be released.

Clamp (available in ACCOTS transfer bag) line.

Escalate to the coordinator so this emergency can be relayed to the receiving hospital and a replacement plan formulated for arrival.

Returning IABP to referring site

If IABP transfer to a new console is complete prior to ACCOTS team departure it can be transported back to referring hospital with the staff member responsible for it. However, if not it is the responsibility of the medical physics departments at the referring and receiving sites to arrange.