Biotrans™ BP3
Closed Blood Draw / Closed Flush System
Clinical Education Program
Educational Program for the ...
BioTrans™BP3 Closed Blood Draw / Closed Flush System

- Upon completion of this presentation and the competency for the BioTrans™BP3 System the clinician will be able to:
  - Manage the set up of the system
  - Maintain the system and troubleshoot the system if necessary
  - Obtain blood samples for lab analysis from a UAC or from a peripheral arterial line
  - Perform appropriate flushing and clearing of line after blood draw as per protocol
Umbilical Arterial Lines

- Understands the indications and needs for a UAC
  - Frequent sampling of arterial blood gases
  - Continuous monitoring of arterial pressures
Preparation of Patient for UAC

- Maintain thermoregulation during procedure
- Supporting the infant developmentally
  - Maintaining midline
  - Providing containment
  - Ensuring comfort
  - Protecting infants eyes from lights
Insertion and Maintenance of the UAC

- Insertion of UAC according to hospital protocol / unit procedures
- Acknowledges the size of the catheter and the volume needed to flush the catheter
- Maintains the patency of the catheter during confirmation of placement
- Selects the pump to be utilized during the infusion of fluid thru the UAC and primes tubing according to protocol and ensures that all air has been expelled from tubing prior to connecting to the Biosensors System and to the infant
Selection of Biotrans™ BP3 System

- Complete System
  - Utilizes the re-useable transducer system and closed blood draw / closed flush

- Add-on System
  - Allows the hospital to utilize present transducer system and gain the ability to have a closed blood draw / closed flush
Benefits of the Biotrans™ BP3 Closed Blood Draw / Closed Flush System

- Reduces the risk of blood stream infections
- Provides protection of the patient
- Reduces blood exposure for the clinician
- Eliminates blood waste for the infant
- Provides for low-volume flush
- Allows for use with umbilical and peripheral arterial lines
Biotrans™ BP3 Complete System
Closed Blood Draw / Flush System Components

- Flush Line - spike to flush bag and to system port
- Additional zero port caps
- Transducer dome
- Flush Syringe
- Bioports and c-clamp
Communication / Flush System

- Looks like a “stopcock”, smells like a “stopcock” BUT it is not a “normal stopcock”
- The position of the lever indicates communication with that part of the system
Communication / Flush System

- Fluid path indicated by round holes in side of core
- The position of the lever in this slide indicates communication between the syringe and the fluid path of the patient line
Communication / Flush System

Oval pathway under the lever is unique to this communication / flush system

The oval pathway designates that the communication is taking place with the syringe and the line that the lever is pointed to.

This picture indicates that the lever is directed to the position on the system that does not have a line – this is considered the neutral / monitoring position and the syringe is not communicating with any aspect of the system at this time.
BIOPORTS

Small with virtually zero dead space.

Requires only luer slip syringe for access

DO NOT use a blunt cannula or needle to access these ports

Two red ports are utilized for the UAC blood draw

The blue port provides access for clinician to utilize the set for PAL draws or administration of medications
Protective Sleeve Cover for Plunger on Syringe

- Eliminates touch contamination – provides sterility of the plunger
- Allows for multiple refills of flush syringe
- 10cc syringe utilized to follow guidelines of INS on flushing of small catheters – which allows for low pressure flushing
Transducer Dome

- Traditional squeeze priming
- Traditional zero port
- Prime with zero port to sky - allows air to be purged from system more efficiently

NOTE: Red markings on dome are NORTH to SOUTH before attachment
Re-useable Transducer

Benefits:
Able to isolate a problem – Is it the monitor / cable or is it the plumbing / tubing.

Prior to attaching dome or any time – the clinician may tap on the transducer membrane and see waveforms on monitor. If no waveforms appear – the problem maybe with the cable / transducer.

Replace cable with transducer or check out monitor if problem persists.
Placement of Dome on Re-useable Transducer

Place dome flat on transducer and turn clockwise so that the red markings are in the EAST/WEST position indicating transducer in a locked position.
Communication / Flush Syringe System

The arrow indicates the Flush bag line – The spike set is connected to flush bag and luer locked to the communication/flush port. Fluids are per hospital specifications.

Flush tubing should be primed and all air bubbles should be evacuated then attached to the side port on the communication/flush system).
Priming of BP3 Set

Prior to priming – check all connections, tighten if loose.
Tighten the flush syringe on communication / flush device.
IV spike for flush bag is separate.
Priming of Set – Communication / Flush System

Spike the dedicated flush bag with IV spike set.
Flush tubing should be primed and all air bubbles should be evacuated then attached to side port on the communication / flush device. Draw 2 to 3 ml of flush into syringe, there will be air in the hub of the syringe. This air can be easily expelled by inverting the syringe and pushing air downstream down toward the end of the tubing (patient line) prior to priming the rest of the set.
Priming of the Set – From IV Pump to Patient Connection

Priming of the pump set has already be accomplished and all air removed and attachment made to transducer.

Hold set vertically while squeezing flush wings, prime transducer and zero port.

Continue to prime thru the flush system while holding vertically.

Prime each Bioport while holding vertically to allow air to escape from ports.

When fluid is present at the end of the set, close c-clamp to hold fluid in place until ready to attach to the UAC line. Make sure that all air bubbles are removed prior to connecting to patient.
Attachment of Primed Set to Transducer

With red lines on dome in the North / South position place dome flat on transducer

Rotate the wheel clockwise to lock in place. Red lines should be in the East / West position.
Preparing for Blood Draw: Positioning of flush syringe

Prior to blood draw, position lever at a 45° angle – this allows for closure to all lines. There is no communication taking place with any line during the blood draw and re-infusing of the holding / waste syringe.
Ready to do blood draw

You will need a 3 cc slip tip and a 1 cc slip tip syringe for the waste and sample.

Clinician to swab ports with hospital directed antiseptic protocol.
Both Bioports can be swabbed at this time.
Use a 5x 360° (circular motion) or as per hospital protocol.
Allow to dry prior to accessing the port.

Please note that the c-clamp on the line is open so that fluid flow to patient is continuing.
Obtaining the Waste / Holding Syringe volume

A 3cc syringe (slip tip) is attached to the (upper) most distal RED Bioport, waste / holding is pulled into this syringe. Expel any air that is in the syringe prior to attaching to the port. Please push straight in and turn slightly in a clockwise direction for a tight fit and hold Bioport during aspiration for stability. It is recommended to aspirate at least 1.5 ml of waste / holding. This should be according to hospital protocol. It is recommended that you aspirate this waste / holding blood slowly over a 30 to 60 sec period to prevent any changes in patient pressure.

Please note that during this process, the communication / flush system has been placed in the 45° position between the transducer line and the monitoring position.

The clamp is open.

Once the waste / holding has been drawn into the syringe, please leave attached to the Bioport for re-infusing to patient.
Obtaining the Blood Sample for testing

Close the c-clamp so that the sample drawn for testing will be a non-contaminated sample - it will be drawn from the RED Bioport closest to the patient / UAC catheter.

If you have not swabbed this port, please do so at this time, prior to taking your sample for testing. Please allow time for the port to dry.
Swabbing the Bioport

If you have not swabbed the port, you will need to swab the RED Bioport closest to the patient / UAC. Use your hospital protocol for this or use 5 x 360° prep for this port.
Obtaining the blood sample for testing

Utilizing the RED Bioport closest to the UAC / patient, attach a 1cc slip tip syringe giving a slight turn clockwise for a tight fit. Remember that prior to attaching the syringe you should expel any air in the syringe. Holding the Bioport for stability is recommended while you are attaching syringe to port.
Obtaining the sample for the Lab

Attach a 1cc luer slip syringe (or larger if multiple labs are to be done).

Make sure that the plunger has been pressed to the end of the syringe barrel to expel any air that has been trapped during the sterilization process.
Aspiration of Blood Sample

Aspirate the volume needed for the blood gas or labs that are needed.

It is recommended that you aspirate slowly
Removal of Syringe from Bioport

Lab sample has been obtained and removal of syringe is necessary.

Hold the syringe as close to the Bioport as you can and slowly turn counter clockwise and rotate out of port.

Syringe with proper labeling is ready to send to the lab.

**DO NOT allow syringe to pop out of port while removing.**

If the above happens, there is the possibility that you will create a micro bubble of air that you will need to evacuate.
Re-infuse the waste / holding

Unclamp the c-clamp
to open line.
Re-infusing waste / holding blood to patient

Holding the waste / holding syringe perpendicular to the line, re-infuse the waste / holding blood slowly back to the patient. You will need to watch as you infuse so as to stop prior to the end of the syringe. REMEMBER that the tip of the syringe had air that cannot be expelled and holding the syringe perpendicular to the line allows for the air to rise to the top of the syringe and infusing can be stopped prior to this air entering the line. Re-infusing this blood should be done slowly over a 30 to 60 sec period of time.
Re-infusing the waste / holding blood

This slide shows the need for the clinician to hold the syringe perpendicular and watch for the air remaining in the syringe and not infusing to the infant.
After infusing the waste / holding syringe

Hold the syringe as close to the Bioport as you can and slowly turn counter clockwise and rotate out of port.

Syringe with proper labeling is ready to send to the lab.

**DO NOT allow syringe to pop out of port when removing.**
If the above happens, there is the possibility that you will create a micro-bubble of air that you will need to evacuate.

You should swab off both ports to remove any residual blood.
Flush the line after blood draw

Turn communication / flush syringe so that the lever is pointed in the direction of the patient and slowly infuse .5 ml of flush to move blood in line back to patient. Then give up to 1 ml of new flush to adequately flush the line and catheter so that there is no remaining blood at the tip of the catheter.

After the infusing of the flush, you will want to do a positive pressure close, so place your thumb on the top of the plunger and rotate lever to the monitoring or neutral position the lever is not pointed to any of the tubing lines). The positive pressure close keeps blood from entering the tip of the catheter which could dampen your waveform.

If you should see any residual blood in the tubing, elevating the ports on a blanket roll will allow gravity and the flow of the fluid to clear line.
This slide demonstrates the position that you will utilize when not interfacing with any of the lines. This position of the lever demonstrates the normal pressure monitoring position of the fluid management system.
Clinical Situations & Solutions

- Air in Bioprt or Line
- Dampened Wave Forms
- Blood in Tubing or Catheter
- Blanching or Discoloration of Extremities
- Questionable Lab Values
Peripheral Arterial Lines

- The clinician will need to complete the presentation for the UAC as the following will need to be completed as well for the peripheral arterial line:
  - Priming of the system will be the same as for the UAC
  - Set up of the system / kit will be the same as for the UAC
  - If doing pressure monitoring, the startup of monitoring will follow the same protocol on set up
Preparing for Blood Draw: Positioning of flush syringe

Prior to blood draw, position lever at a 45° angle – this allows for closure to all lines. There is no communication taking place with any line during the blood draw and re-infusing of the holding / waste syringe.
Preparation of **BLUE** port for access

The peripheral arterial draw utilizes the **BLUE** Bioport on the system. Using the 5x 360°(circular motion), swab the **BLUE** lab site with hospital desired antiseptic.

The arrow indicates the **BLUE** port.
Preparation of RED port for access

Also, using the same technique, swab the RED lab, nearest the patient, as per hospital desired antiseptic. Allow both ports dry prior to access.

The arrow indicates the connection of the Biotrans™3 to the Peripheral Arterial Line.
Obtaining the Waste / Clearance Fluid

Using a 1cc slip tip

**self venting**

Syringe pre-set to draw 0.6 ml, push / twist to insert in the BLUE Bioport which is the upper lab site. Holding the syringe stable in the port, allow the patient’s pressure to fill the syringe with fluid in the line until 0.6 ml is drawn into the syringe.

Leave this syringe with waste / clearance fluid in place.
Obtaining the Blood Sample for testing...

Close the c-clamp so that the sample drawn for testing will be a non-contaminated sample - it will be drawn from the RED Bioport closest to the patient / UAC catheter.

If you have not swabbed this port, please do so at this time, prior to taking your sample for testing. Please allow time for the port to dry.
Access the RED Bioport nearest the patient with a 1 cc slip tip *self venting* syringe, pre-set for the desired amount of blood draw. Use a push/twist to insert and allow the patient’s pressure to fill syringe to pre-set level.
Removal of syringe from Bioport for lab sample

Lab sample has been obtained and removal of syringe is necessary.

Hold the syringe as close to the Bioport as you can and slowly turn counter clockwise and rotate out of port.

Syringe with proper labeling is ready to send to the lab.

DO NOT allow syringe to pop out of port while removing.
If the above happens, there is the possibility that you will create a micro bubble of air that you will need to evacuate.
Opening the c-clamp prior to removing the waste / clearance syringe is necessary to eliminate any negative pressure being created in the line.
Removal of Holding / Clearance Syringe

Hold the syringe as close to the Bioport as you can and slowly turn counter clockwise and rotate out of port.

Syringe with proper labeling is ready to send to the lab.

**DO NOT allow syringe to pop out of port when removing.**

If the above happens, there is the possibility that you will create a micro-bubble of air that you will need to evacuate.

You should swab both ports to remove any residual blood.
Line Clearance / Flushing Options: No Initial Flush or Use Initial Flush

**To Flush:**
Rotate the lever / syringe from the 45° off position to point toward the patient. Very slowly over a period of 30 to 60 sec, gently giving up to 0.5ml of lush to push blood back in line to patient. Rotate flush syringe under positive pressure back to the monitoring position. Elevate lab sites to allow pump to clear any residual blood from the line and catheter.
Line Clearance / Flushing Options: No Initial Flush or Use Initial Flush

**NO INITIAL FLUSH**

Using the Communication / Flush Syringe system, rotate the white lever on the syringe from the 45° off position to the monitoring position (opposite the flush bag port). Allow the pump to clear the line over the next 15 to 20 minutes. If line does not clear adequately you may give up to .5ml of flush.

**To Flush:**

Rotate the lever / syringe from the 45° off position to point toward the patient. Very slowly over a period of 30 to 60 sec, gently giving up to 0.5ml of flush to push blood back in line to patient. Rotate flush syringe under positive pressure back to the monitoring position. Elevate lab sites to allow pump to clear any residual blood from the line and catheter.
Line Clearance / Flushing Options:
No Initial Flush or Use Initial Flush

USE INITIAL FLUSH:
Take the Communication / Flush Syringe and rotate the white lever on syringe from the 45° off position to point towards the patient. Very slowly over a period of 30 to 60 sec, gently give up to 0.5ml of flush solution to push blood in line back to patient.

Rotate the flush syringe under positive pressure back to the monitoring position.
Helpful Hint....For Line Clearance

You may want to elevate the lab sites over the next 15 to 20 minutes and allow the pump to clear any residual blood from the line and catheter.

Also, remember to swab the lab sites to remove any residual blood from the draws.
Clinical Situations and Solutions

**AIR IN BIOPORT or LINE**

(prevention and removal of air bubbles)

- Priming of the line to be air free is most important initially on setup.

  Holding of Bioports in a vertical position during initial prime and “finger thumping” of Bioports to expel any air.

- If air is present after set-up and start of infusion – air can be removed by using the Bioports and clamping appropriately and using a syringe to remove air bubble.

- When obtaining waste or blood sample make sure that the syringe plunger is fully depressed, prior to use, assuring the air in the syringe due to sterilization process is eliminated. **When removing a syringe from the port**...support the port from below, grasp the syringe at the base (near the tip of the syringe), and gently pull the syringe out of the port. Remove the syringe gently so the syringe does not “pop” out when removed from the site. Popping the syringe out can create air in the line.

- When giving back waste/holding blood make sure not to fully depress plunger and infuse all blood in syringe as there is air in the tip of the syringe.

Always hold the syringe in a vertical position when aspirating, so that any air bubble will rise to the top of the syringe making this removal process easier.
DAMPENED WAVE FORMS

- **Catheter Tip Location** – If up against the vessel wall, no pulsatile flow will be able to get through efficiently (reposition catheter).

- **Air in Line** – Particularly in the Transducer or Bioports (remove air).

- **Silicone catheters** – Compared to polyurethane catheters can cause some dampening due to their compliant nature.

- **Extension tubing near the catheter** - Extension tubing is usually not made of pressure monitoring material and will damp some of the line pressure.

- **Inadequate flushing of catheter after a blood draw** – blood is more viscous than saline, leaving blood in the catheter could possibly clot over time.

- **Condition of the umbilical artery after several days of use.**

- **Condition of the patient** – exhibits low pressures without strong heart contraction.
BLOOD IN TUBING OR CATHETER

- Improper position of white lever on the communication port during blood sampling process.
- Inadequate flushing leaving blood in the catheter or tubing
- Did not utilize positive pressure on flush syringe when rotating white lever on the communication port to monitoring (neutral) position.
- Flow rate too low to offset higher patient pressures.
- Increased intra-abdominal pressure – commonly caused by the infant crying vigorously.
- Leak in the tubing or transducer – check and tighten all connections.
- Infusion pump malfunction
- During waste draw – Pulling waste blood too quickly can cause blood to mix in line above waste port.
- Do not allow a gap between blood and syringe plunger, as this creates negative pressure in the tubing.
BLANCHING or DISCOLORATION OF EXTREMITIES

- Catheter tip placement

- Aspiration of waste or sample too fast.

- It is recommended that withdrawal of blood waste takes a minimum of 30 seconds. (waste is the larger 1.5cc volume)

- If vasospasm occurs, review of aspiration techniques, placement confirmation, and warming of the opposite extremity will cause simultaneous vasodilatation of the opposite extremity.
QUESTIONABLE LAB VALUES

- Patient line not shut off: at transducer or flush syringe facing wrong direction.
- Clamp not in lock/closed position for blood draw
- Inadequate blood waste withdrawn.
- If using dual lumen UAC, shut off both lines before blood draw
• Bradshaw WT, Turner BS, Pierce JR. *Handbook of Neonatal Intensive Care, Physiologic Monitoring.* 2006; Mosby, pp 139-156.


• Macklin, Denise. What’s Physics Got to Do with it?. *JVAD* Summer. 1999;7-11.