	STAFFORD COUNTY FIRE AND RESCUE DEPARTMENT **EMS TRAINING BULLETIN**	
	NUMBER: 2023-001	**DATE:** January 1, 2023
	ISSUED BY: Brian J. Frankel, Deputy Chief EMS Division	
	SUBJECT: Blood Administration	

PURPOSE:
This training bulletin outlines equipment specifications and step-by-step directions when administering blood by Stafford County ALS Clinicians.

POLICY: Authorized Paramedic level ALS Clinicians may administer blood to patients who meet the criteria as outline in Interim Medical Directive (IMD) 2023-001 *Blood Administration*.

Clinicians shall also refer to FRD Policy-EMS 100.207 *Blood Program* for additional administrative and operational requirements.

DEFINITIONS

HemoRoam 5X Mobile Blood Refrigeration: Enables storage of 3 units of Blood, Military-Grade Aluminum, 15" X 11" X 13.5", 26lbs. Smart change technology automatically switches charge between battery, 12v or 110v without user intervention.

HemoRoam Temperature Controller: Digital microprocessor temperature controller maintains temperatures between 1º - 6 º C (33-42º F) with Easy Log temperature monitoring at 5 minute intervals. Will send text alert to the EMSS if the temperature exceeds < 2º or >6º C.

Hemo-Trac Blood Temperature Indicator:
Visible color indicators that monitor blood temperatures. Each unit of blood includes a Hemo-Trac indicator that shows if the blood has been stored within safe temperature limits.

Blood with a Hemo-Trac sensor displaying **Green** has been stored within safe operating temperatures and is safe to administer.

Blood with a Hemo-Tac sensor displaying **Blue** has not been stored within safe temperature limits and is not safe to administer.

LifeFlow Infuser: LifeFlow is a hand-operated rapid infuser that allows clinicians to rapidly administer blood or crystalloids to critically ill patients.

Low Titer O Positive Whole Blood (LTOWB)
LTOWB is unseparated blood, collected from a donor with "low" IgM (immunoglobulin) and/or IgG (immunoglobulin) anti-A and anti-B. IgM and IgG is often used to define low titer status, the presence or absence of the Rhesus (Rh) antigen is much less relevant during hemorrhagic shock resuscitation. Rh negative patients do not develop sensitivity to Rh positive blood until weeks after exposure, therefore, in the acute trauma setting, Rh positive blood can be administered to Rh negative patients without significant risk of transfusion reaction

<u>Qinflow Warrior Base Unit:</u> Provides battery power to the Qinflow Compact Disposable Unit (CDU) to warm blood to 100⁰ F at a maximum infusion rate of 170 ml/min. IV Fluids can also, be warmed to 100⁰ F with maximum infusion rate of 250 ml/min. An LCD display indicates the incoming and outgoing blood/IV fluid temperature and automatically adjusts the heating to ensure 100⁰ F output. The Base Unit is only a warming device, it is not a pump. The Base Unit and CDU should be operated below the IV Fluid or Blood.

<u>Qinflow Compact Disposable Unit (CDU):</u> The CDU senses the blood or IV fluid temperature and communicates to the Qinflow Warrior Base Unit ensuring fluids are warmed to 100⁰ F. The CDU IV Tubing is connected between the Blood Y Tubing and the patient. The CDU power supply is connected to the Qinflow Warrior Base Unit.

<u>Blood shall never be infused without being warmed with the Qinflow Warrior Base Unit and infusing through a Qinflow CDU</u>

EQUIPMENT
The EMS Supervisor's (EMSS) carries:
- HemoRoam 5X Mobile Blood Refrigeration
- Qinflow Warrior Base Unit with Qinflow CDUs
- Standard Blood Y Administration Sets with 500ml Pressure Infuser Bags
- LifeFlow Infusers with LifeFlow Blood Y Administration Sets
- 2 Units (500 ml) Low Titer O Positive Whole Blood (LTOWB).

<u>EMS2 Blood Bag</u>
All supplies (excluding Whole Blood) is carried in a Red EMS Bag.
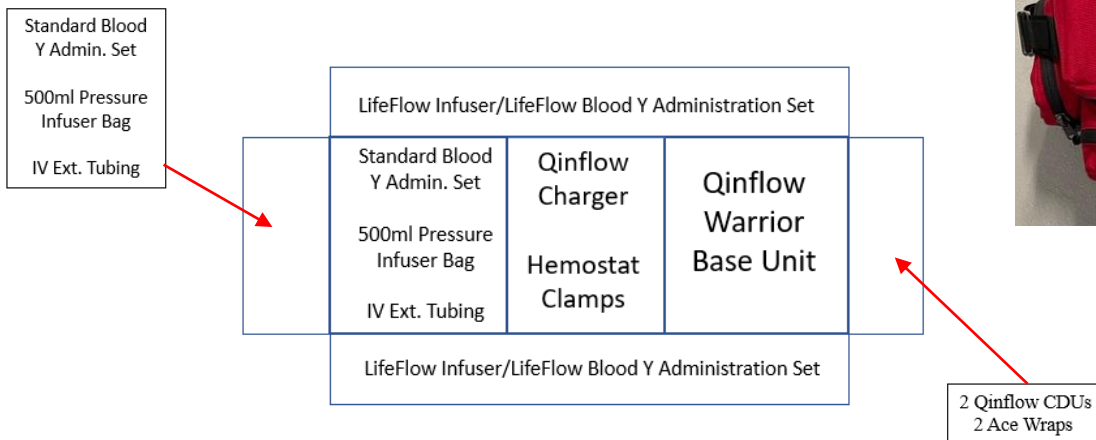
<u>Qinflow Warrior Base Unit</u>
- Connect the Base Unit's power cord to the CDU and turn on Base Unit.
- The display will show "Initializing" and will beep. The display will show the inflow and outflow CDU temperatures. The outflow temperature will be displayed first, with the inflow temperatures in brackets. Example: 38⁰ C (4⁰C).
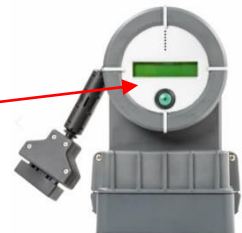
Base Unit Battery Indications

Battery indications	Battery Status	Required Action
Note: Battery is getting Low! The LCD blinks a steady beep sound	25-30% capacity	Pay attention, a "Battery Empty" message will follow
Battery Empty	5-10% capacity	The device will continue warming the fluid until the battery is fully depleted. The system will then shut down. See on page 6 for information on how to replace the battery.

A fully charged battery should warm 3 - 4 units of blood. The Qinflow Warrior Base Unit shall not be left on charge continuously, but recharged periodically, and after each use.

Base Unit Notifications and Troubleshooting

Description	LCD Notification	Audio Notification	User Action (if Required)
System Initializing	QiF-01 (VX.X) Is Initializing	Steady beep	Monitor the LCD
System waiting for Disposable Unit connection	System is ready Connect the DU	None	Connect the Disposable Unit / Compact Disposable Unit to the Base Unit using the Connecting Cable
Normal Operation	Heating Tout: XX°C (YY°C) (XX°C is the outflow temperature; YY°C is the inflow temperature)	None	Keep track of the LCD display
Fluid Flow Irregularities	Change in flow XX°C (YY°C)	None	Open the IV roller clamp until the required flow is reached; Look for any IV kinks and release them Replace the IV tubing if necessary.
No display on the LCD although the system is turned on	No display	NA	Check if the On / Off switch is in the "I" position; if it is, replace the battery; if the display still does not work after changing the battery then do not use this unit until it is repaired by Quality in Flow Ltd. or one of its representatives.
Battery energy is at 25-35% capacity	Note: Battery is getting low! the LCD blink	Steady beep	Pay attention, a "Battery Empty" message will follow. You can Mute the audio notification with a short press on the Self-Test/Mute button.
Battery is critically low	Battery Empty Tout: XX°C (YY°C)	Steady beep	Replace the empty battery with a fully charged battery (see Battery Replacement During Administration on page 6). You can mute the audio notification with a short press on the Self Test / Mute button.
Fluid is warmer than 41°C (~106°F)	Fluid is hot! Tout: XX°C (YY°C) the LCD blink	None	"Fluid is Hot" message might appear due to flow irregularities (e.g. block, back flow, large bubbles) or sudden and significant changes in flow rate (e.g. changing from 180 ml/min to 40 ml/min). If none of the above conditions is apparent, turn off the Base Unit and replace the Disposable Unit / Compact Disposable Unit with a new one. You can Mute the audio notification with a short press on the Self-Test/Mute button.
Fluid is warmer than 42°C (~108°F)	Fluid is hot!!! Tout: XX°C (YY°C) the LCD is blinking	Steady beep	
Fluid outflow temperature decreased to 35°C (95°F) or lower, even though it previously reached a temperature above 35°C (95°F)	T-out indication is 35°C (95°F) or below	Short beep	Check if the fluid input temperature is not lower than 4°C (39.2°F). Check battery status. Monitor the fluid temperature on the LCD display.
System Malfunction (HW / SW)	System Error	Steady beep	Make Sure that the Disposable Unit / Compact Disposable Unit is flushed and filled with fluid and restart the system by shutting it off and then on again. If the problem is not resolved shut off the system, replace the Disposable Unit / Compact Disposable Unit with a new one, flush the air out of the Disposable Unit / Compact Disposable Unit, and turn the system back on. If the problem is not resolved contact the manufacturer or its representative.
General Malfunction	*MALFUNCTION!!* Tout: XX°C (YY°C)	Steady beep	

BLOOD ADMINSTRATION

Option 1: Standard Blood Y Administration Set with a Pressure Infuser Bag

- Establish two large bore IVs.
- Identify the largest IV for infusing blood
- Attach short IV Extension Tubing to IV Catheter
- Open Blood Y Administration Set and add Qinflow CDU
- Close both upper roller clamps and lower roller clamp
- Double spike bag of Normal Saline to one side of the Blood Y Administration Set
- Open Normal Saline upper roller clamp
- Squeeze drip chamber half-full and flush tubing
- Attached Qinflow CDU to Patient (IV Extension Tubing).
- Attach Qinflow Warrior Base Unit cable to CDU
- Power on Qinflow Warrior Base Unit
- Close Normal Saline upper roller clamp
- Complete Blood Inspection (refer to 2023-001 IMD *Blood Administration).*
- Blend the unit of blood by <u>gently</u> rotating the bag end over end.
- Spike unit of blood to other side of Blood Y Administration Set
- Open blood upper roller clamp
- Place blood in a 500ml Pressure Infuser Bag
- Open lower roller clamp and infuse blood, inflate pressure bag to increase infusion rates.
- Monitor Qinflow Warrior Base Unit display to ensure the outflow temperature is 38º C (100º F)
- After the blood administration, close the blood upper roller clamp.
- Open Normal Saline upper roller clamp and flush the tubing with a small amount of Normal Saline.
- Reassess Patient
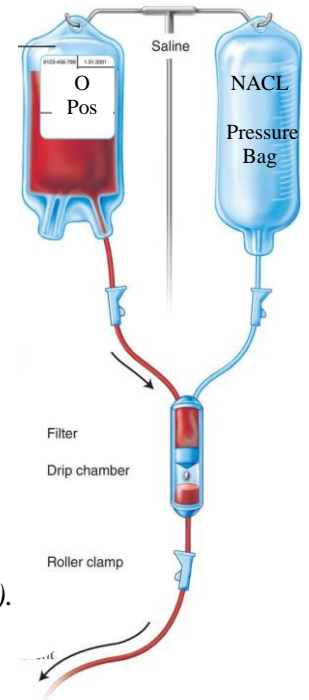
You can over-whelm the warming capabilities of the CDU using a Standard Blood Y Administration Set with the Pressure Infuser Bag. Maximum blood administration rates using the CDU is 170ml/min. Decrease the rate of infusion if the outflow temperature begins to decrease.
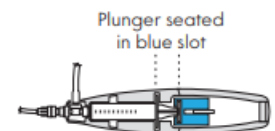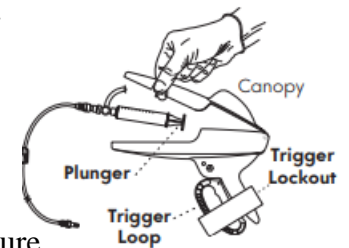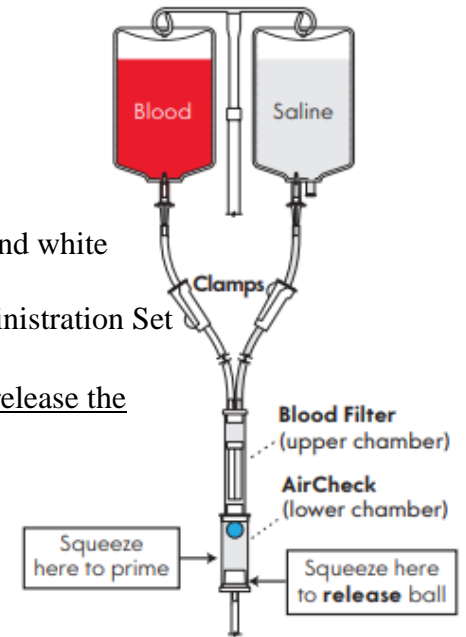
<u>If using IV Extension Tubing with a hep-lock or spin-lock valve, disconnect the valve and connect directly into the large bore opening</u>. This valve narrows the administration orifice, breaks down blood components and decreases infusion rates.

Option 2: LifeFlow Infuser and LifeFlow Blood Y Administration Set.
The LifeFlow Infuser and LifeFlow Blood Y Administration Set should be used for pediatric patients
(<12yo) who require defined dose amounts, or when administering blood through an IO.

- Establish two large bore IVs.
- Identify the largest IV for infusing blood
- Attach short IV Extension Tubing to IV Catheter
- Open LifeFlow Blood Y Administration Set and add Qinflow CDU
- Close both upper roller clamps
- Open LifeFlow Infuser canopy, load syringe (with number visible, and white plunger in the blue slot
- Double spike bag of Normal Saline to one side of the Blood Y Administration Set
- Open Normal Saline upper roller clamp
- Squeeze drip chamber half-full, squeeze bottom of drip chamber to release the blue ball upward
- Point LifeFlow Infuser upward and cycle trigger to prime tubing
- Attached Qinflow CDU to Patient (IV Extension Tubing).
- Attach Qinflow Warrior Base Unit cable to CDU
- Power on Qinflow Warrior Base Unit
- Close Normal Saline upper roller clamp
- Complete Blood Inspection (refer to 2023-001 IMD *Blood Administration*).
- Blend the unit of blood by gently rotating the bag end over end
- Spike unit of blood to LifeFlow Blood Y Administration Set
  A Pressure Infuser Bag shall not be used with the LifeFlow Infuser.
- Open blood upper roller clamp
- Trigger LifeFlow Infuser to infuse blood, each trigger cycle infuses 10ml
- Monitor Qinflow Warrior Base Unit display to ensure the outflow temperature is 38º C (100º F)
- After blood infusion, close the blood upper roller clamp.
- Open Normal Saline upper roller clamp and flush the tubing with a small amount of Normal Saline. Trigger LifeFlow Infuser to flush tubing.
- Reassess Patient

If using IV Extension Tubing with a hep-lock or spin-lock valve, disconnect
the valve and connect directly into the large bore opening. This valve narrows
the administration orifice, breaks down blood components and decreases
infusion rates.

Blood can be administered through an IO however the flow rate is comparably slower than an IV.
Clinicians will initially observe normal IO administration rates as the medullary cavity fills and then
administration rates will decrease. These slow administration rates are due to the large molecules
(colloids) and their ability to pass from the medullary space into the central circulation system.
Clinicians should use the LifeFlow Infuser and LifeFlow Blood Y Administration Set when using IO
access.