

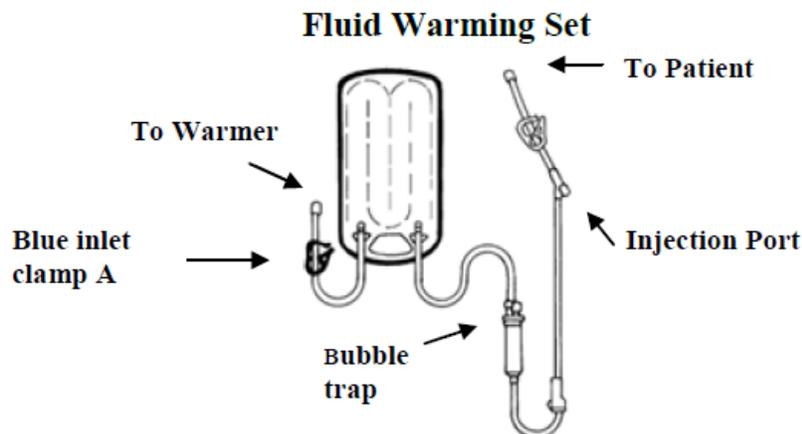
Manitoba Transfusion Best Practice Resource Manual

Blood Warming Devices Guiding Principles

1. Rapid infusion (exceeding 3L/hr or 50ml/kg/hour) of fluids increases the risk of hypothermia.
2. Appropriate and facility approved warming devices should be used to maintain normothermia.
3. Warming devices should be equipped with a temperature sensing device and a warning system to detect malfunctions and prevent hemolysis or other damage to blood or blood components.
4. Warming devices must be validated by Biomedical Engineering and maintenance and testing of alarms performed according to manufacturer's recommendations.
5. There must be a physician's order for the use of blood warming devices.
6. Blood/fluid administration sets must be changed after every 4 units of blood products or after 4 hours of use when administering blood products.
7. Blood/fluid warming administration sets must be changed every 24 hours if in use for the administration of intravenous fluids (non-blood products).
8. During the administration of warmed fluids the display temperature should be documented initially and at least hourly thereafter.

Instructions for use Ranger® Blood/Fluid Warmer.

1. Plug Ranger® warming unit into AC power source.
2. Ensure all luer lock connections are secure.
3. Slide the warming cassette into the opening on the front of the warming unit. **Do not prime** the warming cassette before attempting to insert it into the warming device.
4. Using aseptic technique connect blood or IV solution as ordered to the appropriate tubing/infusion set and prime the line. To prevent air embolism **all air must be removed** from the IV solution bag and the drip chamber should be completely filled when fluids or blood are administered under pressure.
5. Close the blue inlet clamp in the warming cassette. See image below.



6. Connect the shorter inlet tubing on the warming cassette to the administration set.
7. Open all clamps. Prime the warming cassette by inverting the bubble trap to fill 2/3 full. Turn the bubble trap right side up and continue to prime the line.
8. Close all clamps when priming is complete.

Manitoba Transfusion Best Practice Resource Manual

9. Tap the bubble trap against the warming unit to remove any trapped air from the tubing. To prevent air embolism the **bubble trap must be completely filled** when fluids or blood products are administered under pressure.
10. Place the bubble trap into the holder on the warming device.
11. Attach threaded cannula to distal end of warming cassette tubing and connect to the patient.
12. Turn warming switch on. It will take approximately 2 minutes to warm to 41°C. Once the display reaches 41° the warming device is ready for use.
13. Open all clamps.
14. Adjust infusion rate by using the roller clamp or setting the flow rate on the pump. Flow rates can be 10ml/min to 150ml/min. If pressure bag is used **do not exceed a maximum pressure of 300mmHg.**
15. Monitor temperature on display window.

Infusing very cold fluids at a high flow rate may temporarily cause an under-temperature alarm. If the temperature reaches $\leq 33^{\circ}\text{C}$, an audible alarm sounds and the LED will alternately display "LO" and the temperature. Continue to use the unit. The alarm should stop when the temperature rises above 33°C .

An over temperature alarm will sound if fluids are pre-warmed to $>43^{\circ}\text{C}$ or flow rates are too low. Hemolysis may occur if temperature exceeds 43°C . Turn off the warming unit and discontinue the infusion.

Fluids should never be pre-warmed before infusing through a warming device.

Instructions for removal of cassette, Ranger® Fluid/Blood Warmer.

1. Close the blue inlet clamp between the IV solution and the warming cassette and patient.
2. Allow fluid to drain from the warming cassette to the patient.
3. Close all clamps. Disconnect distal end of warming cassette from the patient.
4. Using aseptic technique remove empty cassette from the warming device and discard as appropriate.
5. Clean the warming device according to facility policy.

Instructions for use of the HOTLINE® Fluid Warmer.

1. Check the condition of the HOTLINE® warmer before use. Check that the level is above the minimum level mark on the reservoirs. Add recirculating solution to the reservoir through the fill-port if required.
2. Plug the device into a properly grounded power outlet.
3. Prime the recirculating solution path before connecting to the intravenous extension set. The extension set is **single use only and not meant for re-sterilization.**
4. Turn on the power switch. The green operating LED on the display panel illuminates. The recirculating solution path will automatically prime.
5. Remove the end cap and inspect the patient end of the HOTLINE® warmer set for leaks to confirm integrity of the intravenous pathway.

Manitoba Transfusion Best Practice Resource Manual

6. Connect the IV fluid and intravenous set to the HOTLINE® warming device.
7. Fully prime the intravenous administration set. Connect the distal end of the HOTLINE® warming set to the patient's intravenous access site.
8. Wait until the recirculating solution temperature display reaches 41°C. Adjust the rate of IV flow using the clamp on the intravenous administration set.

Activation of the OVER Temperature warning signal indicates that warming has stopped and immediate operator intervention is required to clear the over temperature condition.
Not for use with pressure devices generating over 300mmHg.

Instructions for discontinuation of the HOTLINE® Fluid Warmer.

1. Turn OFF the power switch.
2. Remove the HOTLINE® Fluid Warming Set and insert the reflux plug into the socket. Dispose in a safe manner according to regional/site policy.
3. Wipe down the external surfaces according to regional/site policy.

For Operating Instructions on other Fluid Warming devices please see the manufacturer's *Instructions for Use*.

References

1. American Association of Blood Banks. (2016). Standards for Blood Banks and Transfusion Services, 30th edition. Bethesda, MA, USA: ISBN.
2. Canadian Transfusion Medicine Society. (2011). Standards for Hospital Transfusion Services, version 3. Ottawa: ON: CSTM.
3. HL-90 Operating Instructions, Operators Manual. January 31, 2017.
4. ORNAC-Operating Room Nurses Association of Canada Standards. (2015) <https://ornac.ca/en/28-standards>
5. WRHA policy, Deer Lodge Centre: Ranger®Blood/Fluid Warming System, (December 2015).