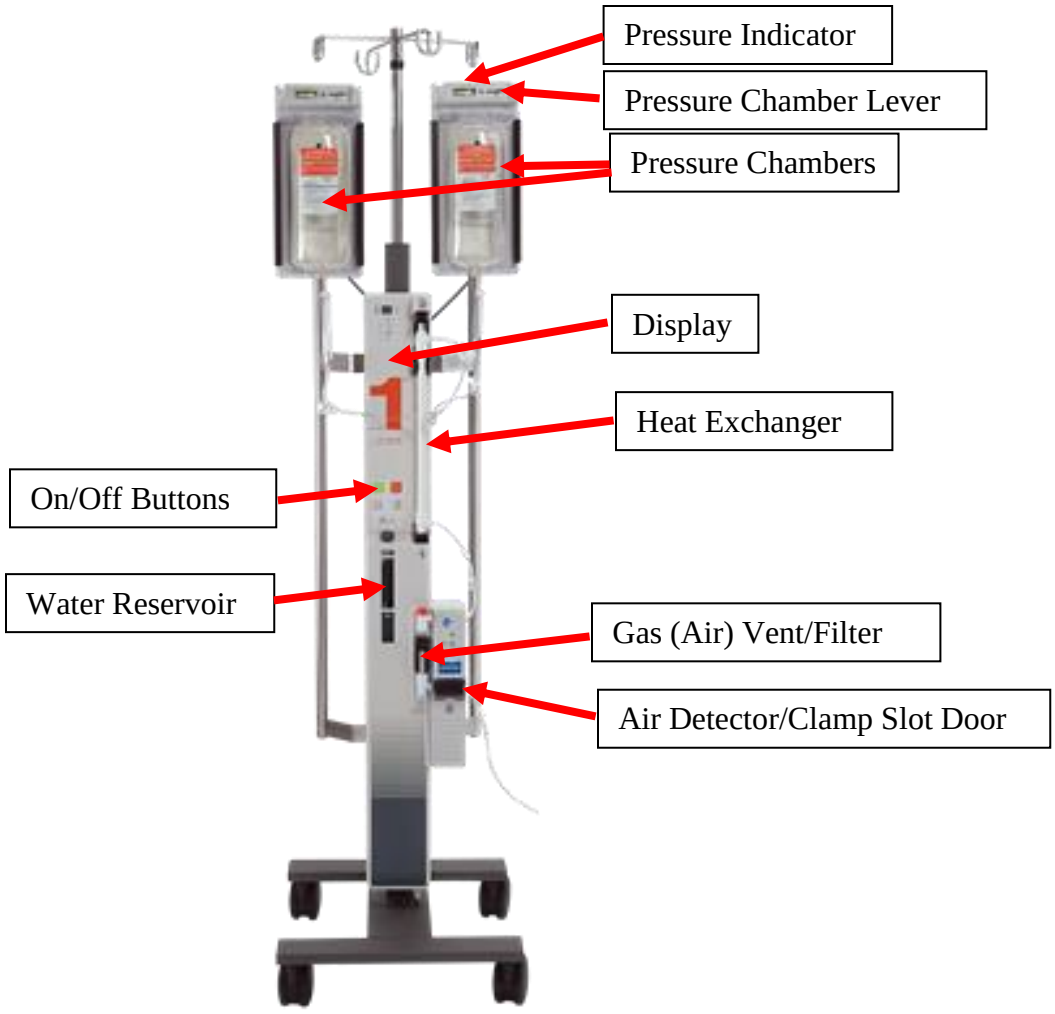
Level 1® H-1200 Rapid Infuser with Integrated Air Detector/Clamp Teaching Points

1. Indicated to provide warm IV fluids and blood products RAPIDLY to the patient in hypovolemic hemorrhagic shock.
2. In addition to the Monitor/Medication Nurse assignment during critical events, another nurse (Level 1 Nurse) needs to be assigned to devotedly manage the rapid infuser as constant anticipation of hanging and starting new bags of blood products is needed.
3. Don full PPE with face shield as when administering blood products, there is a high potential to get exposed to bloody fluid especially on the face with quick movements and pressurized bags.



4. **CRITICAL STEP:** Timely discussion with EM Attending MD/Trauma Attending MD about ordering Emergency Release Blood/MTP should occur early on as the patient scenario is unfolding. Awareness of whether blood products are enroute to the patient room or have already arrived is key to effective preparation of the Level 1® Rapid Infuser.
5. Secure D-300 special tubing, inspect tubing and tighten all luer lock connections as they are purposefully loosened for long term storage so plastic does not crack with expanding and contracting air.
    a. D-300 tubing has a flow rate of 1000mL/min. when used with a 8.5 Fr catheter.

6. Prepare various pinch clamps (6)/only one (1) roller clamp for use:
    a. **CLOSE** all pinch clamps **ABOVE** the trifurcation
    b. **CLOSE** the pinch clamp DISTAL to the #4 "Gas Vent/Filter Assembly"/#3 Air Detection Unit/Clamp Slot Door
    c. Leave pinch clamps above and below heat exchanger section **OPEN**
    d. **CLOSE** the one and only distal roller clamp**.**
7. DO NOT connect any fluid bags to tubing yet. **The Level 1® tubing is primed with fluid AFTER loading into the machine, NOT before.**
8. Place unprimed tubing in the 1-2-3-4 system sites on the machine in that order. The Gas (Air) Vent/Filter Assembly is now Step. 4 after loading the tubing into the "Clamp Slot Door" which is Step. 3. Both these steps require some adjustment of the tubing so there is enough tubing between the #4 block and the #3 Clamp Slot door. Make sure the pinch clamp that is immediately distal to the #3 Air Detector Unit is free of the Clamp Slot door and remains closed.
    a. **IMPORTANT NOTE:** Double check that the top hinge of the Clamp slot door is inserted correctly to engage the metal tab to close. Yellow light will flash and alarm will sound if door is not closed correctly. This is the most common reason for the machine to alarm, indicating tubing is not positioned correctly. The second most common reason for the machine to alarm is that the Gas (Air) Vent/Filter Assembly is not snapped into the #4 block securely.
9. **STEPS FOR PRIMING TUBING AND STARTING INFUSION:**
    a. **CRITICAL STEP:** IF BLOOD PRODUCTS are already in the room, spike just ONE bag of NS. Direct other team members to start checking blood product bags with the patient ID. (Level 1 Nurse should focus first on priming tubing with NS and connecting the tubing to the patient BEFORE adding blood products to the two open spikes.)
        i. IF BLOOD PRODUCTS have not arrived yet, spike TWO bags of NS. Remove the spikes and expel the air out of the bags and respike.
    b. Hang spiked NS bag(s) in the Pressure Chamber.
    c. Close the door(s) and secure the latches. Do **NOT** deploy the Pressure Chamber lever yet.
    d. Squeeze the drip chamber(s) so it/they become(s) ¾ full of fluid. Open the pinch clamp **BELOW** the drip chamber of **one** bag of NS. Fluid will start flowing through the tubing.
    e. Press the green power ON button.
    f. Allow as much air as possible to be vented before opening the distal pinch clamp and roller clamp. You will know this has occurred when the "Green" light is consistently on and there is no alarm indicating the air clamp is deployed. Then OPEN the pinch clamp distal to the Clamp Slot door and to remove all additional air to prime the rest of the tubing.
    g. **Slowly OPEN the ROLLER CLAMP to control the flow of fluid.** All other pinch clamps should be open except the one or two below the drip chambers of the unused spikes.
    h. Once all air is removed ("Air Detected Alarm" is not sounding anymore) and tubing is primed, select IV access on patient and connect the tubing.
        i. Cannula size must be 18 gauge or greater. Remove all injection cap devices as they decrease the gauge size and ensure extension tubing is 18 gauge or greater (Radiology extension tubing is 18 gauge).
    i. Open roller clamp and move Pressure Chamber lever to the + position to initiate pressure and flow.
10. Confirm that the fluid is flowing by the following:
    a. Actually observe fluid stream in drip chamber
    b. Due to high pressure and fast flow rates, fluid tends to fill up the drip chamber so actual flow stream is not visible. Two other ways to confirm that the fluid is flowing is by observing turbulence in the drip chamber AND visibly seeing the fluid level decreasing in the fluid/blood bag.

c. If you are not reassured that fluid is flowing, then you need to close the pinch clamp below the drip chamber, invert the drip chamber and squeeze fluid back into the bag until the drip chamber is ¾ full of fluid again. It is likely that the drip chamber will fill completely full again due to high pressure and fast flow rates.

11. IF BLOOD PRODUCTS are already in the room, while beginning to infuse 1st bag of NS, spike 2nd, 3rd spikes with already checked blood products, place on appropriate hanger for smaller bags, close door, close pinch clamp to bag of NS, open pinch clamp below drip chamber of one unit of blood and apply pressure (+), repeat with subsequent bags of blood. **IMPORTANT NOTE:** The air in the tubing between the drip chamber and the trifurcation of the newly spiked bags will be expelled by the "Gas (Air) Vent/Filter Assembly".
12. Constantly monitor flow.
13. If fluid is not flowing:
    a. First, check that all appropriate pinch clamps/roller clamp are open.
    b. Second, repush spikes into bags to ensure they are completely spiked.
    c. Third, reposition bags in pressure chamber and ensure spike/drip chamber part of tubing is/are not compressed by door.
    d. Fourth, disconnect from patient and observe if fluid will free flow into basin – if there is free flow then quickly reconnect to a different assess site if available and/or when appropriate, assess patient access site by flushing access catheter as that is what is impeding flow.
14. When using the Level 1® rapid infuser, device-specific tubing is used for fluid or blood products and should be changed every 3 hours or when the "Gas (Air) Vent/Filter Assembly" (#4 section on lower part of machine) becomes clogged (detected by diminished flow rates), whichever comes first (manufacturer's recommendations). As long as fluid is infusing, the same tubing can be used for numerous blood products. Over 20 units of blood have infused using the same tubing with no problem. There is no need to change tubing if changing from PRBCs to FFP and back again. However, once the flow becomes sluggish and flow does not increase with troubleshooting, do not hesitate to change the tubing in order to achieve the goal of rapid flow.
15. When administering blood products rapidly, it will be impossible to determine if a reaction to a specific bag of product is occurring due to patient's condition. Also with rapid infusion of multiple bags, it will be impossible to determine which bag caused a reaction. The following is an adjusted procedure for administering blood products fast using Level 1® rapid infuser:
    a. As soon as the first unit is verified, the rapid infusion begins and all subsequent verified units are infused by the nurse managing the rapid infusion. The *Product ID Tag Form t*o will be marked on each Form "#1, or #2, or #3, etc." in the order of transfusion, as much as possible. Some patients will have multiple venous access lines and use of the Level 1® rapid infuser allows simultaneous infusions, resulting in not being able to identify the order of transfusion units.
    b. The 2 (two) licensed professionals other than the infusion nurse who verified all the transfusions will sign in the appropriate places on every *Product ID Tag Form* as soon as time allows.
    c. During these intense clinical scenarios, selected vital sign parameters based on the clinical situation are being monitored continuously. The recorder will make every effort to obtain a temperature if not obtained already prior to the first transfusion. The recorder may choose to document required vital sign parameters on the *Product ID Tag Form*, or on a hand written flowsheet, or in the electronic documentation system. The recorder nurse completing the documentation will select the closest set of vital signs prior to the initiation of the first transfusion and document them as the "Pre" transfusion vital signs for ALL units in the selected mode. If a nurse is using the *Product ID Tag Form*, the same "Pre" vital signs will be documented on all report forms.
    d. The 15 minute vital signs cannot be obtained as the resuscitation with rapid infusion of blood products may still be occurring at that time or may already be completed. As soon as time allows, the nurse completing the documentation will select the closest set of vital signs post transfusion or pre-transfer to the next treatment area and document them as the "Post" transfusion vital signs for ALL

units in the selected mode of documentation. If the nurse is using the *Product ID Tag Form*, the same "Post" vital signs will be documented on all report forms. In the 15 minute section, the nurse will document "Not applicable (N/A)"

e. The nurse will document on *Product ID Tag Form* the time the first transfusion is started (same time on all forms) and the time the last transfusion is completed (same time on all forms) or the time of transfer to the next treatment area indicating which transfusion product is still infusing during transport.

16. Fluids should be between 38-40 degrees C.
17. Monitor levels of fluid in the water reservoir – use sterile water for filling.
18. Monitor caution sensors for proper tubing placement between 1 and 2 and at 3 and 4.
19. Five different hanging hooks for various sizes of bags in the pressure chamber.
20. Document intake and output.

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