Cardiac Shunts and Venting of IV Tubing to Reduce Air Embolism Risk:

If a patient has a communication of the blood flow between the right and left side of the heart, any entry of intravenous air will pose a risk. Defects can be congenital or acquired. A Patent Foramen Ovale (PFO) or Atrial Septal Defect (ASD) are communications between the right and left atria. A Ventricular Septal Defect is a communication between the right and left ventricle. Complex congenital cardiac anomalies can also cause communications.

Blood that travels through a communication within the heart (or shunt) will flow from the area of high pressure to low pressure. If heart pressures are normal this will usually be from left (oxygenated) to right (deoxygenated). Oxygenated blood will mix with deoxygenated blood on the right, and travel to the lung. This is a non-cyanotic defect.

If the right heart pressures become higher than the left (or the defect is very large), blood can flow from right to left. This can cause hypoxemia (or a cyanotic defect) as deoxygenated blood bypasses the lung and enters the left heart directly.

Right heart failure increases the risk for right to left heart shunting. Transient elevations in right heart or pulmonary artery pressures can cause intermittent shunting with desaturation or cyanosis. Examples of causes for intermittent right to left shunt include coughing, suctioning, breath holding or childbirth. In children with cyanotic cardiac defects, hypoxemia worsens with suckling or crying, whereas, crying will improve often improve oxygenation if the cyanosis is due to respiratory issues (e.g. pneumonia).

While shunting of desoxygenated blood with hypoxemia is one important problem for patients with an intracardiac shunt, the entry of air into the blood stream poses another.

If air enters the circulation and crosses directly to the left side of the heart, the air can travel to the brain (causing a stroke) or other organs/tissues (infarction). Coughing, suctioning or childbirth places the patient at increased risk.

HOW TO FILTER FOR AIR

Patients who have a cardiac shunt should have air filters added to all IVs. This can be achieved as follows:

Air Traps for <u>NON-blood</u> products:

Use an infusion pump for the administration of IV fluid (to provide initial air detection/prevention)

***Note about Propofol:** Lipid including Propofol require a .5 micron filter or higher. Propofol will plug a 0.2 micron filter. The only way we can administer propofol and provide air venting is to administer via the infusion pump using a set that has NO Y injection ports between the air detector of the infusion pump and the patient`s site.

- Add an inline 0.2 micron filter between the patient's IV site and the distal end of the IV tubing
- Or, use TPN tubing (the set that does not have any injection ports below the filter). ***Note this is currently a back order item***
- Or, use a Level 1 Hotline fluid warmer circuit with an L 10 gas vent added to the circuit. These are on the Respiratory Therapy cart in OBCU (OR also keeps them). HMMS Item #55367.

Figure 1: L 10 Gas Vent for use with Level 1 Hotline

- *There should be **no injection ports between the filter and the patient's IV site**.*
- *The Level 1 Hotline L10 Gas Vent*

<u>Administration of Blood Products</u> (recommend to setup Level 1 hotline at admission):

- Blood tubing is required for all blood products. Standard blood tubing filters DO NOT eliminate air
- Administer blood products through a Level 1 Hotline fluid warmer. Use standard blood filter tubing (for blood product filtering) with a Level 1 – LP 10 inline air vent added (for evacuation of air). The blood filter must be connected proximal to (above) the air vent.
- For rapid administration of blood products, the Level 1 Rapid Infuser has a blood and air vent filter included.

Note: the L-10 inline vent is identified as containing Latex, however, the latex is only on the outside of the device and does not come in contact with the fluid pathway.

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