

Catheter Hub and Tubing Connections

Question:

Our policy and procedure states that all IV tubing should be attached to the catheter hub with a direct hub-to-hub luer-locked connection. Would it be safer to use a needleless system to connect all continuous and intermittent IV tubing to the catheter hub?

Answer:

All tubing connections must be connected securely in order to prevent accidental disconnection. The primary concerns are two-fold when the catheter hub is disconnected from the tubing or injection cap - air emboli and exsanguination, or blood loss, from a large lumen catheter. By including the statement about "luer-locked connection," your policy meets the national standard of practice from the Intravenous Nurses Society. Your question brings up some points about using needleless systems that we should consider. We have seen an increasing use of needleless connection systems, which has significantly decreased the number of needlestick injuries from these types of connections. They are designed for intermittent connection of tubing to the catheter hub. After checking with several manufacturers, I can find no manufacturer that has any statements supporting or prohibiting the use of needleless systems for connecting continuously infusing fluids. FDA policy will not permit labeling of stand-alone needleless systems to include use beyond 24 hours. When the needleless system is an integral part of an IV tubing, its use is determined by the standards for that tubing. I don't think that a blanket statement can be made endorsing or prohibiting the use of needleless systems for continuous infusions. Let's look at each of the primary considerations:

1. Connections on peripheral versus central venous catheters;
2. The patient's location - hospital, home, clinic, skilled nursing facility; and
3. The design of the needleless system.

The greatest patient risk from accidental disconnection will come from a central venous catheter. The lumen is larger and the catheter tip location is subject to changes in intrathoracic pressure. However, peripheral catheters should be luer-locked to the tubing also.

In the hospital setting, tubing is usually connected to the catheter hub and the continuous infusion is begun. The only time a disconnection would be needed is for a routine tubing change every 48 to 72 hours. Safe practices include clamping the catheter temporarily, placing the patient in a supine position and asking him to perform a Valsalva maneuver while the tubing is quickly switched. In an alternative setting, you may want to allow the patient some freedom to disconnect his continuous infusion for short periods, such as bathing. If this is the case, a needleless system could make this easier and safer for your patient or their caregiver to disconnect the tubing.

You also must consider the design of the needleless system. Is this a prepierced injection cap that accommodates a blunt cannula? If so, how is the blunt cannula secured to the injection cap? Is it a threaded lock or does it require taping? Taping can result in the blunt cannula moving in and out of the injection cap, thus introducing microorganisms into the line. Is there a possibility that the cannula can bend or break inside the catheter hub? Many systems have a mechanism for luer-locking the male end of the tubing directly into the needleless system, and a blunt cannula is not required. Either way, the connection is luer-locked.

Another consideration is the fluid pathway through the internal lumen of the needleless system. Does the fluid flow through a straight channel in the center or does it have to flow around the plunger/piston mechanism inside the needleless system? What information can the manufacturer provide about the ability of the plunger/piston mechanism to function in the presence of highly viscose fluids, such as dextrose, albumin, or lipids? Does the manufacturer have information about extended activation of the internal mechanism?

My personal preference would be to make a direct luer-locked connection between the male end of the tubing and the hub of the catheter for continuous infusions. This method eliminates the expense of having one or more additional pieces of equipment (the needleless injection cap and the blunt cannula if required) while providing the safety of a luer-locked connection. However, as we have discussed this may not be practical in all situations.

Each connection in all lines should be routinely checked for security. How many times have you found luer-lock connections not being used on IV tubing? Training programs may be needed to emphasize the importance of this connection. You also must ensure that there is a good fit between the catheter hub and the IV tubing.

Many nurses feel that there is added security when central venous catheters are connected to IV tubing by using a needleless system. If there is an accidental disconnection, there is still a cap that prevents air from entering or blood from escaping. However, it all still comes down to how well the catheter hub is connected to tubing or needleless system. If the connection is not secure, the needleless system could come loose just as easily as the tubing directly connected. While improving technology is important for patient care, it can never replace nursing knowledge, skill, and attention to detail.

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