Tubing for Blood Pressure Monitoring Devices Should Not Connect to IV Ports

Matthew Grissinger, RPh, FASCP

Mr. Grissinger is Director of Error Reporting Programs at the Institute for Safe Medication Practices in Huntingdon Valley, PA (www.ismp.org).

PROBLEM: A hospitalized patient whose arm was connected to a portable blood pressure (BP) monitoring device was transported to the radiology department for magnetic resonance imaging (MRI). A length of tubing that led from the monitor’s BP cuff inflator had a male Luer connector. This connector fit into a female connector on a shorter length of white tubing that was integrated with a Critikon disposable BP cuff (Figure 1). The tubing and cuff were disconnected before the MRI procedure, because the Luer connector on the monitor’s tubing was metal.

After the test, a radiology employee reconnected the tubing and transported the patient back to his room. Upon arrival, a family member immediately noticed that the tubing from the monitor was attached incorrectly to a needle-less Y-injection port on the patient’s intravenous (IV) line! A nurse was contacted, and she quickly disconnected the tubing.

Normally, the device cycles at preset intervals, inflating the cuff with more than 500 mL of air at pressures up to 300 mm Hg. If no resistance is met with an inflated cuff, two additional cycles quickly occur. Thus, more than 1,500 mL of air might have entered the patient’s vascular system. Fortunately, this did not happen, as the machine had not yet cycled to take a BP reading. However, another patient was not as lucky. In that case, he died as a result of an air embolism after a nurse mistakenly connected the monitor tubing to his IV line.

Poor lighting did not contribute to either mistake, but another reported case shows how similar-appearing tubing could play a role.1 A nurse accidentally connected the BP monitor tubing to a white needle-less IV port. Propofol (Diprivan Injectable Emulsion, AstraZeneca), which is white and opaque, had been infusing through the patient’s IV line. Thus, the IV tubing and port with propofol looked very similar to the white length of tubing and the connector on the BP cuff.

Patient tampering can also lead to problems. In one case reported to the Food and Drug Administration (FDA), an agitated patient died when he removed the tubing from his BP cuff and attached it to his IV line. These inadvertent connections are more likely to occur at the Y-site of needle-less IV tubing, because no manipulation of the tubing is necessary. However, it is also possible to connect monitor tubing to any other tubing with a Luer connector.

The FDA and manufacturers have been aware for some time that Luer connections are sometimes used to connect monitors to disposable BP cuffs and that patient deaths have occurred with inadvertent connections to IV systems. Because of the risk of air embolism, manufacturers previously issued warning letters,2 and many biomedical engineering departments alerted clinical managers to the problem. Some manufacturers also provide warning labels for the monitors and tubing. Others plan to require dedicated tubing with non-Luer connectors. However, as long as disposable BP cuffs are available with female Luer connectors, tubing from the monitor can be inadvertently connected to an IV line.

Although this hazard might be a rare occurrence, the possibility exists at many hospitals. Indeed, newer monitors may have a proprietary non-Luer connection at the monitor end, but either the proprietary connector or a Luer connector can be used with the BP cuff. Some hospitals that have monitors from different manufacturers may use cuffs with Luer connectors and replace proprietary monitor tubing to make all connections compatible.

One hospital provided the Institute for Safe Medication Practices (ISMP) with BP monitor tubing with a male Luer connector and a disposable cuff with a female Luer connector, both without warning labels. In following up with several other hospitals, we also learned that most clinical staff members were unaware of the problem even though their patients were exposed to this hazard.

SAFE PRACTICE RECOMMENDATION: The ISMP contacted the FDA’s Center for Devices and Radiological Health; ECRI Institute in Plymouth Meeting, Pennsylvania; and several manufacturers. All agreed that requiring non-Luer connections would best solve this problem. Until this recommendation becomes a standard, some steps can be taken to avoid errors:

- A plan should be developed to replace all BP monitoring equipment to ensure compatibility with Luer connections (i.e., hospitals should not buy non-IV equipment with connectors that can

Figure 1  The IV tubing and port with propofol (bottom) look similar to the white length of tubing (top) and to the connector on the blood pressure cuff (left).
physically mate with female Luer IV line connectors).

• To protect patients, staff members should place BP cuffs on the patient’s arm that is not the IV site.
• The IV catheters should be removed as soon as they are no longer needed.

Labels on equipment and staff awareness may be helpful, but these measures are unlikely to have a sustained effect.

For more information on other safeguards for various connectors, see the July 2006 issue of P&T, page 357.

REFERENCES

The reports described in this column were received through the USP–ISMP Medication Errors Reporting Program (MERP). Errors, close calls, or hazardous conditions may be reported on the ISMP (www.ismp.org) or the USP (www.usp.org) Web site or communicated directly to ISMP by calling 1-800-FAIL-SAFE or via e-mail at ismp-info@ismp.org.