

## SENTINEL EVENT ALERT RELEASED REGARDING TUBING MISCONNECTIONS *by Dave Gourley RRT*



In early April, the Joint Commission released Sentinel Event # 36 regarding tubing misconnections. Entitled "Tubing Misconnections – a persistent and potentially deadly occurrence", the Sentinel Event Alert urges healthcare organizations to focus on how tubes and catheters are connected to patients. JCAHO reports that errors have occurred with tubing and catheter misconnections, leading to deadly consequences. These errors have been reported to the FDA, Emergency Care Research Institute (ECRI), the Institute of Safe Medication Practices, and the United States Pharmacopeia. JCAHO claims that these errors are an under-reported problem in health care.

Dennis S. O'Leary, MD, President of the Joint Commission, states "The basic lesson from the reported cases of tubing and catheter misconnection error is that if it can happen, it will happen. Thankfully, most tubing misconnections are caught before the patient is injured, but these errors pose a real threat to patient safety that can be overcome through heightened vigilance and a systematic approach to avoiding misconnections."

Numerous types of tubes and catheters have been involved in these misconnections, and therefore should be a serious concern for all respiratory therapists. The cases have included central venous catheters, peripheral IV catheters, NG tubes, peritoneal dialysis catheters, tracheostomy cuff inflation tubes, and automatic blood pressure tubes. Errors involving catheters and tubings include: Capnography sampling tubes being connected to an intravenous catheter and oxygen tubing being connected to a needleless IV port.

There have been nine cases; seven adults and two infants, involving tubing misconnections. Eight of these cases resulted in the

patient's death and one resulted in permanent loss of function. The causes of these errors include luer connectors since they enable dissimilar tubes or catheters to be connected. Using tubings or catheters for uses other than those intended is another problem. Lastly, positioning dissimilar tubes close to one another in the clinical setting has led to incidents. Contributing factors include movement of the patient from one setting or service to another and fatigue associated with working consecutive shifts.

JCAHO notes that warning signs of a possible misconnection include having to force tubes together or having to use adaptors. The Alert recommends that organizations institute the following measures to reduce tubing misconnections:

1. Do not purchase non-intravenous equipment with connectors that can physically mate with female luer IV line connectors.
2. Conduct acceptance testing and risk assessment on new tubing and catheter purchases to identify the potential for misconnections so appropriate measures can be taken.
3. Always trace a tube or catheter from the patient to the point of origin before connecting a device or infusion.
4. Recheck connections and trace all patient tubes and catheters to their sources upon the patient's arrival to a new setting or service as part of the hand-off process.

Standardize this "line reconciliation" process. *cont'd on pg 72*



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*Reflections on Neonatal... Continued from page 38*

when the pulse oximeter said the saturations were within the safe range, the PaO<sub>2</sub> was not, and 40% of the time when the pulse oximeter said the saturation was outside the safe range, the PaO<sub>2</sub> was in the safe range. Pretty crummy performance if you ask me. Of course the manufacturer challenged my research skills, saying I must have done something wrong, since they were sure the oximeter performed better than that. They owned the data, which never got published.

The problems with alarms continued. Clinical studies of the validity of pulse oximeter alarms yielded disturbing data. Studies in neonates and pediatrics showed that; 1) 44-63% of all critical care alarms were caused by pulse oximeters, 2) 94% of oximeter alarms were considered non-significant and 3) 71% were false.

Lest I be accused of all doom and gloom regarding neonatal pulse oximetry, I have good news. Technological advancements in signal processing have significantly improved the performance of some brands of oximeters.

However, the more important question about continuous pulse oximetry is whether it makes any difference. Does it affect processes and thereby outcomes? Just because the monitor performs well, does not necessarily mean it can be proven that it is beneficial to patients. I am happy to announce, that when superior pulse oximetry technology is combined with well standardized processes, the result is improved outcomes. Durbin and colleagues showed that more reliable oximetry reduces the frequency of arterial blood gas analyses and hastens oxygen weaning after cardiac surgery. And in one of the most interesting studies ever done on the impact of properly applied advanced oximetry technology, Chow et al showed that the introduction of superior pulse oximetry technology into an NICU, when combined with a rigorous oxygen management protocol, resulted in significant reductions in rates of retinopathy of prematurity.

Thus, we have happily progressed significantly since the introduction of pulse oximetry in the NICU. The technology is much better, and we are finally beginning to learn how to use it.

*Sentinel Event Alert... Cont'd from page 42*

5. Route tubes and catheters having different purposes in different, standardized directions (e.g., IV lines routed toward the head; enteric lines toward the feet). This is especially important in the care of neonates.
6. Inform non-clinical staff, patients and families that they must get help from staff whenever there is a real or perceived need to connect or disconnect devices or infusions.
7. For certain high-risk catheters (e.g., epidural, intrathecal, arterial), label the catheter and do not use catheters that have injection ports.
8. Never use a standard luer syringe for oral medications or enteric feedings.
9. Emphasize the risk of tubing misconnections in orientation and training curricula.
10. Identify and manage conditions and practices that may contribute to health care worker fatigue, and take appropriate action.

This Sentinel Event Alert is the latest alert in the Sentinel Event Alert series JCAHO began in February 1998. Healthcare organizations must implement the recommendations in the Sentinel Event Alert or reasonable alternatives to remain in compliance with JCAHO standards. For more information regarding this alert and previous alerts, visit [www.jcpatientsafety.org](http://www.jcpatientsafety.org).

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