Learning From Others:

A Case Report From the Anesthesia Incident Reporting System

Anesthesia Quality Institute
ANESTHESIA INCIDENT REPORTING SYSTEM (AIRS)

Review of unusual patient care experiences is a cornerstone of medical education. Each month, the AQI-AIRS Steering Committee abstracts a patient history submitted to the Anesthesia Incident Reporting System (AIRS) and authors a discussion of the safety and human factors challenges involved. Real-life case histories often include multiple clinical decisions, only some of which can be discussed in the space available. Absence of commentary should not be construed as agreement with the clinical decisions described. Feedback regarding this article can be sent by email to **r.dutton@asahq.org**. Report incidents or download the AIRS mobile app at **www.aqiairs.org**.

Case 2015-10: Poetry in Motion

"Never confuse motion with action." – Benjamin Franklin

Case Presentation

Case 1: *ERCP scheduled. Difficult intubation. Endotracheal tube came out during move from stretcher to ERCP table. Really difficult intubation the second time with more difficulty with mask ventilation. No documented sats below 90 at any time. Patient successfully reintubated but had a VF arrest 7 min post re-intubation.*

Case 2: *Methamphetamine-using morbidly obese female with coronary artery disease, hypertension, chronic obstructive pulmonary disease and a history of congestive heart failure scheduled for carotid angiogram and stent in interventional radiology. Difficult I.V. stick – multiple attempts without success until external jugular access was obtained. Without notifying anesthesiologist, radiologist turned fluoro machine lateral and I.V. was pulled out. Took another 30 minutes to re-obtain access. Pt with occasional ectopy but hemodynamically stable.*

Discussion

Movement is a constant theme in the O.R. and other locations where anesthesia is provided. Anesthesiologists move patients to and from the O.R., to and from the ICU, from stretchers to the O.R. table and back, and even during a case from supine to lateral to prone. In other instances, equipment such as the O.R. table, surgical robots and X-ray machines are moving around the patient. And every time this happens, there is a risk of dislodging a line or tube.

Every anesthesiologist has had his or her share of lost catheters and dislodged airway devices. These events are often not reported unless a significant complication occurs. As a result, we have no sense of the frequency of this complication or how often it results in significant patient harm. A literature search in preparation for this review found limited publication of injuries resulting from lost tubes or catheters. However, there are numerous articles describing methods for securing devices and keeping them safe, suggesting that dislodgement is actually a common problem.

Needham et al. examined the systemic factors leading to "line, tube and drain" incidents that were voluntarily reported in a retrospective study over a 12-month period in 18 intensive care units in the U.S.[1] They reported 114 incidents, of which >60 percent were considered to be preventable. They found several factors that contributed to these incidents, such as occurrence on a holiday (odds ratio [OR] 3.65), patient medical complexity (OR, 3.68) and age of 1-9 years (OR, 7.95). Of interest, occurrence in the O.R. carried an odds ratio of 3.50. One patient death was attributed to loss of a device, 56 percent of patients sustained some form of physical injury, and 23 percent had an increase in the anticipated hospital length of stay.

Patient/Management Staff Issues	116 (61%)
Staff Management	
Communication/liaison problems	18
Inappropriate staff escort	4
Lack of staff	6
Inadequate notification of arrival	5
Airway/Ventilation Management	
Malposition of artificial airway	10
Inadequate securing of airway	6
Unplanned reintubation	4
Accidental intubation	3
Portable ventilator incorrectly set up	2
Failure to check oxygen supply	2
Vascular Line Management	
Accidental dislodgment	9
Disconnection/loose connection	3
Inadequate securing	11
Monitor Use	
Inadequate monitoring	11
Alarm parameters not used/inadequate	3
Incorrect set up	2
Other	
Incorrect moving of patient	10
Incorrect stabilization of injured site	4
Staff back-lifting injury	4
Other	3

Table 1: Complications occurring during intrahospital transport. Adopted from: Beckmann U, Gillies DM, Berenholtz SM, et al. Incidents relating to the intra-hospital transfer of critically ill patients. An analysis of the reports submitted to the Australian Incident Monitoring Study in Intensive Care. *Intensive Care Med.* 2004; 30:1579-1585.

There are no data about the number of catheters (intravenous, arterial, central venous, epidural, continuous local anesthetic), drains, tubes (endotracheal tubes, urinary catheters, nasogastric tubes) and other indwelling devices inserted annually. In 2010, the CDC estimated that there were 51.4 million inpatient surgical procedures performed in the U.S.[2] Assuming the number of outpatient procedures is at least equal to the number of inpatient procedures, the number of surgical procedures exceeds 100 million cases annually. Finally, if we assume that each patient had at least two lines, drains or access devices per anesthetic, there are well over 200 million such devices in play. Estimating a dislodgement rate of 1 in a 1,000 cases, there would be at least 200,000 tubes or lines inadvertently lost each year – making this an important problem to consider.

There is an old adage that "the first shot is always the best shot," meaning that a procedure is simplest on the first approach. Whenever vascular access devices are inadvertently removed, replacing them is rarely as easy as it was during the initial attempt. Hematoma formation can obscure landmarks or make pulses difficult to palpate. Replacing surgical drains, epidural catheters or pain catheters is not only time-consuming, but may require reopening the surgical incision or repositioning a poorly cooperative or anesthetized patient.

Inadvertent extubation or loss of a supraglottic airway device can result in laryngospasm, negative pressure pulmonary edema, severe desaturation or hemodynamic instability. If the intubation was initially difficult, reintubation is often much more difficult. There are, again, no data on the rate or incidence of this complication in the O.R. There are a number of articles in the literature that have examined the rate of unplanned extubations in ICUs and some strategies to detect and prevent them; in the O.R. setting, detection is not usually the problem, but prevention may be even more important.

The ICU literature also offers some insight into complications that may occur during intra-hospital transport of patients. Studies have reported that complications can occur in up to 70 percent of transports.[3,4] Beckman et al. conducted an analysis of incidents that were reported to the Australian Incident Monitoring Study in Intensive Care.[5] Their findings were divided into two categories, equipment-related incidents (39 percent) and patient/staff management issues (61 percent), which are broken down in the table to the left. Roughly a quarter of the incidents involve loss or damage of devices. They recommended that hospitals and professional societies develop standard protocols for intra-hospital transport as well as continuous monitoring of incidents.

The American College of Critical Care Medicine published guidelines for the inter- and intra-hospital transport of critically ill patients in 2004,[6] and the Australian and New Zealand College of Anaesthetists created "Guidelines for Transport of Critically Ill Patients" in 2013, available at **www.anzca.edu.au/resources/professional-documents**. However, neither

Continued on page 38

Continued from page 37

document includes specific recommendations regarding the handling and security of tubes and catheters during transport. In a very recent publication, Brunsveld-Reinders et al. performed a comprehensive literature search of published guidelines and checklists regarding transport.[7] They found 11 guidelines and five checklists, and of the five checklists, four of the five listed a mandatory check of all lines and tubes; however, the checklists do not specifically mention increased vigilance or measures to prevent accidental dislodgement during patient movement or changes in patient position.

"Inadvertent extubation or loss of a supraglottic airway device can result in laryngospasm, negative pressure pulmonary edema, severe desaturation or hemodynamic instability. If the intubation was initially difficult, reintubation is often much more difficult."

The insertion, handling and security of devices are a way of life for anesthesia professionals. Despite the paucity of data, though, there probably isn't a day that goes by in any hospital where a device is not accidently dislodged. One can only surmise what the contributing factors may be, and the ICU literature offers some insight as well. Production pressure, multi-tasking, patient complexity, multiplicity of lines in a given patient, difficulty in moving a patient due to a number of factors (obesity, contractures, etc.), changing patient position to anything other than supine and working in unfamiliar environments (interventional radiology, MRI, GI lab, CT) can all contribute to this complication.

So is there a solution? Unfortunately, there are no published guidelines or recommendations for the physician anesthesiologist. Some may recommend a checklist that can be used each time a patient is physically moved, but others may feel we already have too many checklists. From a patient safety perspective, asking practitioners to be more vigilant has never proven to be a reliable process and is a recipe for failure. From the technology standpoint, we can argue for smaller infusion pumps that can be mounted on the bed rather than on separate poles. Perhaps it is time for us to create and establish standard protocols with regards to devices. For example, many anesthesiologists routinely disconnect the patient's airway device from the anesthesia circuit prior to moving a patient. Or we could envision a scenario where we would ensure that each connection is secured in some fashion and visually monitored during patient movement. Another tactic would be to ask the question, "What device can I least afford to lose?" Examples would be vascular access of any type that was difficult to place, a difficult airway, an epidural catheter or postop pain catheter. This pattern of thought would enable mindful prioritization during any patient movement. Other approaches, based on engineering, might include better fixation systems to keep devices in place, or perhaps even the opposite: breakaway connectors that allow the patient end of a device to remain in place even as the line itself is disconnected.

References:

1. Needham DM, Sinopoli DJ, Thompson DA et al. A system factors analysis of "line, tube and drain" incidents in the intensive care unit. *Crit Care Med.* 2005;33(8):1701-1707.
2. Centers for Disease Control and Prevention. Fast Stats---Inpatient surgery. http://www.cdc.gov/nchs/fastats/inpatient-surgery.htm. Accessed July 2, 2015.
3. Waydhas C. Intrahospital transport of critically ill patients. *Crit Care Med.* 3:R83-9, 1999.
4. Lovell MA, Mudaliar MY, Klineberg PL. Intrahospital transport of critically ill patients: complications and difficulties. *Anaesth Intensive Care.* 29:400-405, 2001.
5. Beckmann U, Gillies DM, Berenholtz SM et al. Incidents relating to the intra-hospital transfer of critically ill patients. An analysis of the reports submitted to the Australian Incident Monitoring Study in Intensive Care. *Intensive Care Med.* 30:1579-1585, 2004.
6. Warren J, Fromm RE, Orr RA et al. Guidelines for the inter- and intrahospital transport of critically ill patients. *Crit Care Med.* 32:256-262, 2004.
7. Brusveld-Reinders AH, Arbous MS, Kuiper SG, de Jonge E. A comprehensive method to develop a checklist to increase safety of intra-hospital transport of critically ill patients. *Critical Care.* 19:214-224, 2015.