Learning From Others:

A Case Report From the Anesthesia Incident Reporting System

Anesthesia Quality Institute
ANESTHESIA INCIDENT REPORTING SYSTEM (AIRS)

Detailed review of unusual cases is a cornerstone of anesthesiology education. Each month, the AQI-AIRS Steering Committee will abstract a case and provide a detailed discussion based on a submission to the national Anesthesia Incident Reporting System. Feedback regarding this item can be sent by email to ***r.dutton@asahq.org****. Report incidents to* ***www.aqiairs.org****.*

Case 2013-5: Cross-Contamination Abomination

An otherwise healthy 22-year-old woman presented for laparoscopic ovarian cystectomy. Upon induction with fentanyl, propofol and rocuronium, the anesthesia resident had some difficulty with mask ventilation and obtained an oral airway from the anesthesia tray. As he placed the oral airway into the patient's mouth, the attending anesthesiologist noticed what appeared to be dried blood on the device. Yikes! He asked the resident to stop, the contaminated oral airway was discarded and a clean oral airway obtained from the anesthesia cart.

This was the third case of the day, and the contaminated oral airway was placed on the anesthesia tray during a previous case for easy access if needed. Since the airway was unused, it was placed back with the clean supplies for use during a subsequent case. The team theorized that the oral airway must have come in contact with blood on the anesthesia tray during the previous case.

Discussion

Health care-associated infections (HAIs) are a significant cause of morbidity and mortality within medical facilities in the United States. The Centers for Disease Control and Prevention estimated the annual cost of treating HAIs in the United States at $28-45 billion.[1] The Study on the Efficacy of Nosocomial Infection Control showed an incidence of 4.5 HAIs for every 100 hospital admissions. HAIs are the most common complication of inpatient treatment and a top 10 cause of death in the United States. According to the U.S. Department of Health and Human Services, in 2002 HAIs accounted for approximately 1.7 million infections and 99,000 associated deaths in the United States.[1]

Until recently, the risk of causing nosocomial infections during anesthesia care was largely overlooked. However, recent studies have shown that anesthesia providers and the operating room anesthesia workstation can contribute to the risk of HAIs.[2-4] Cross-contamination between patients in the operating room is not uncommon,[4] and the intraoperative environment is a risk factor for the development of hospital-acquired infections.[5-7] High acuity of care as well as production pressure in the O.R. may contribute to suboptimal infection control measures that could lead to the development of hospital-acquired infections.[8]

In the operating room, pathogenic organisms can be transmitted to patients via contaminated drugs, equipment or personnel.[2] Infectious agents can be transmitted to any environmental surface within the O.R., including the anesthesia workstation. Thus, hand hygiene and operating room cleaning protocols are critical to prevent transmission of pathogens from environmental surfaces to patients. While institutions have policies for routine cleaning of operating rooms and equipment between surgical cases, it may be difficult to remove all potentially infectious agents. For example, Phillips demonstrated occult blood on 13 percent of laryngoscope blades and 40 percent of laryngoscope handles that were cleaned by their facility protocol, which included soaking in a solution of sodium carbonate and sodium tripolyphosphate, mechanical washing and sterilization with a steam autoclave.[9] Policies often focus cleaning on visibly dirty surfaces (table and floor) and ignore many "high touch" objects at high risk for contamination, such as cabinet handles, computer keyboards and telephones.

Loftus and colleagues showed that contamination of the anesthesia work area increases significantly at the end of the case. They also showed that transmission of organisms, including vancomycin-resistant enterococcus, to intravenous stopcock sets occurs in approximately 30 percent of cases.[2,3] Contaminated intravenous tubing and stopcocks are associated with a trend toward increased nosocomial infection rates and with a significant increase in mortality.[2,3] Provider hands may serve as a source of contamination to I.V. tubing and stopcocks and, therefore, hand hygiene is an important strategy to reduce contamination. However, a more common source of contamination is the anesthesia

work area. Contamination occurs early and is unrelated to case duration, urgency or the patient's ASA Physical Status.[2] This was demonstrated in a recent simulation study.[10]

Anesthesia-related procedures represent a special risk for bacterial transmission. Interventions aimed at decreasing the incidence of HAIs have focused on central venous catheter insertion techniques and maintenance protocols. However, peripheral catheters were found in one study to be responsible for 3.9-8.4 percent of hospital-acquired bacteremia,[11] representing an additional area for improvement.[12]

Effective approaches to improvement in intraoperative infection control involve multimodal programs that improve environmental decontamination as well as preventive measures targeting both patient decolonization and provider hand hygiene in parallel.[2] The ASA safety-CME program "Infection Control for Anesthesia Professionals" (available in the online ASA Education Center **education.asahq.org**) covers many of the basics. The ASA Task Force on Infection Control has published an extensive guideline on this topic, which can be found in the Practice Parameters section of the ASA website.[13] Anesthesiologists should maintain separate clean and dirty workspaces to facilitate environmental decontamination between cases. A common approach is to designate the anesthesia machine as "dirty" and use this area, close to the patient's head, for airway equipment and used syringes. This leaves the back table as "clean" space, where clean supplies and medications can be set up, and where nothing should be touched with dirty hands or gloves. Once taken from this clean space, materials such as partially used medication syringes should not be returned. Any reusable item that comes in contact with the patient either directly or indirectly should be placed in the dirty workspace and disposed of (or cleaned if not disposable) after the case.

The entire dirty workspace, including the anesthesia machine, knobs, drawer pulls and any keyboards, must be sanitized between cases, even in high-turnover rooms. Cleaning of any surface likely to come into contact with dirty equipment or the provider's hands is also recommended. This includes such frequently overlooked items as the I.V. poles, the O.R. bed control and the tube tree used to support ventilator tubing. Equipment that has remained in the clean workspace, distant from all anesthesia procedures, can be used in subsequent cases. Even in the clean workspace, however, best practice is to have as little clutter as possible. Medications and supplies for future cases should be prepared after disinfection of hands and kept stored in drawers or cabinets, with less risk for accidental contamination.

Additional techniques have been proposed to reduce cross-contamination and nosocomial infections secondary to anesthesia providers in the operating room. These include novel alcohol-based sanitizer devices,[14] multiple intravenous check valves to prevent retrograde bacterial contamination,[15] and placement of alcohol-based sanitizer and sterilizing wipes within reach of the operating room anesthesia workstation to facilitate their use. Numerous studies have shown that improved hand hygiene plays a critical role in decreasing the incidence of nosocomial infections.[16] In fact, some institutions affix alcohol-based cleaning solutions directly to the anesthesia carts and/or anesthesia machines to facilitate their use.

In conclusion, the case under discussion carried significant potential for cross-contamination between patients. The scientific literature demonstrates that anesthesia-related cross-contamination has the potential to be a significant source of health care-associated infections that could increase patient mortality. Implementing workflow changes to improve infection control should reduce the incidence of cross-contamination and thus improve patient safety.

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References

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