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Letter to the Editor

New SHEA expert guidance for infection prevention in the anesthesia work area needs improvement

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To the Editor—The recent SHEA Expert Guidance article[1] addresses the following questions: "Should injection ports used by anesthesia providers in the OR be covered with isopropyl alcohol-containing caps? Should injection ports—without alcohol-containing caps—used by anesthesia providers in the OR be scrubbed with alcohol before each use?" SHEA recommends that intravenous "ports may be disinfected either by scrubbing the port with a sterile alcohol-based disinfectant before each use immediately prior to each use or using sterile isopropyl alcohol containing caps that cover ports continuously . . . [*and that*] . . . Ports should be properly disinfected prior to each individual drug injection . . . " Yet this will not provide effective disinfection of the internal surface of open-lumen stopcocks.[2] When the internal surface is contaminated, neither an alcohol pad nor a cap with alcohol-impregnated pads is effective.[2] Disinfectable, needleless, closed connectors are effectively disinfected with either treatment.[2] It is very difficult to stop contamination of open-lumen stopcocks,[2] whereas closed ports can be disinfected.[3] SHEA further recommends that "Stopcocks should have closed injection ports installed to convert them into "closed ports," or they should be covered with sterile caps." Unfortunately, this recommendation indicates an infection control equivalence to using either closed injection ports or sterile caps. The recommendation to use a sterile cap does not reduce the infectious risks of open-lumen stopcocks used commonly in anesthesia practices nationwide. Open-lumen stopcocks traditionally use sterile caps, but it is well documented that during use the cap and the stopcock's internal lumen can become contaminated by bacteria, in up to 32% of cases, and these occurrences are associated with increased patient morbidity and mortality.[3–5] Even if a new sterile cap is placed on a stopcock after each access (which is not addressed by SHEA), the cap and internal lumen can still become contaminated due to inadvertent contact with a contaminated hand, glove or other surface during cap placement. The risks are clear: "A common route to intravascular device–related bloodstream infections is bacterial contamination of the injection port, which leads to hub colonization, intraluminal migration, and distal seeding of the bloodstream."[2] The rate of catheter-related bloodstream infections (CRBSIs) is lower with central venous catheters using disinfectable needle-free connectors than with open-lumen stopcocks (0.7 vs 5.0 per 1,000 catheter days).[6] Mahida et al[7] reported that 9% of cases had bacterial contamination in intravenous extension lines connected to open-lumen stopcocks. The 2011 Centers for Disease Control and Prevention (CDC) Guidelines for the Prevention of Intravascular Catheter-Related Infections state the following: "In general, closed catheter access systems are associated with fewer CRBSIs than open systems and should be used preferentially."[8] Whereas SHEA[1] cites a prospective, randomized study[5] where open-lumen stopcocks disinfected with an alcohol containing scrub device had significantly reduced rates of bacterial contamination compared to standard caps on open stopcocks (32% vs 41%), SHEA emphasizes that "the rate of contamination was high in both groups." Closed-port access devices (including stopcocks) are widely available. Why does SHEA fail to recommend against the continued use of open-lumen stopcocks in the practice of anesthesia?

The SHEA did not make recommendations for management of anesthesia breathing circuits and reservoir bags after each patient.[1] Yet SHEA states that "To reduce the bioburden of organisms and the risk of transmitting these organisms to patients, the facility should clean and disinfect high-touch surfaces on the anesthesia machine and anesthesia work area between OR uses . . . " and "The potential for clinically significant microbial cross transmission in the intraoperative environment poses a threat to patient safety."[1] A study that simulated operating room anesthetic induction and intubation found that a wide range of surfaces and devices, including the reservoir bag and anesthesia circuit (externally), were contaminated in 100% of scenarios.[9] The CDC recommends cleaning, followed by high-level disinfection or sterilization for the circuit and bag after each patient although disposal of the entire breathing circuit is commonly done in the United States.[10] Outside the United States, circuits and bags are often reused for multiple patients, replacing only the breathing filter between patients.[10] Several companies have US Food and Drug Administration (FDA) clearance to market breathing circuits and bags in the United States for multiple patient use by replacing only the breathing filter for each new patient. Numerous studies confirm that heat and moisture microbial filters protect the inside of breathing circuits from microbial contamination but surprisingly most studies did not examine outer surface contamination.[10] A recent study from Europe and Japan examined the outside surfaces of reservoir bags and circuits and found "high microbial numbers" on the bags and to a lesser extent on the circuits, with an "increasing proportion of pathogenic organisms over time" in spite of disinfectant application to the circuits and bags after each patient.[10] They cited a risk of contamination of staff and horizontal transmission via hands, with a possible risk for cross-infection.[10] Although they recommended disinfection of the outer surface of bags and circuits after each patient, their own study showed that the tubing and bags were not reliably disinfected.[10] This study also

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excluded certain patients due to "safety concerns" (eg, bloodstream or respiratory infections, immunosuppression, others).[10] What are the potential risks to subsequent patients from external device microbial contamination, including bloodborne pathogens? How frequently do other anesthesia departments that reuse bags and circuits disinfect them, what disinfection method is used, and what patients, if any, are excluded from having anesthesia with a reused circuit? Clearly, the FDA clearance did not consider external circuit contamination and cross contamination to subsequent patients. Why did SHEA not address this important issue?

References

1. Munoz-Price LS, Bowdle A, Johnston BL, *et al.* Infection prevention in the operating room anesthesia work area. *Infect Control Hosp Epidemiol* 2019;40:1–17.
2. Holroyd JL, *et al.* Universal intravenous access cleaning device fails to sterilize stopcocks. *Anesth Analg* 2014;118:333–343.
3. Loftus RW, Patel HM, Huysman BC, *et al.* Prevention of intravenous bacterial injection from health care provider hands: the importance of catheter design and handling. *Anesth Analg* 2012;115:1109–1119.
4. Loftus RW, Koff MD, Burchman CC, *et al.* Transmission of pathogenic bacterial organisms in the anesthesia work area. *Anesthesiology* 2008;109:399–407.
5. Loftus RW, Brindeiro BS, Kispert DP, *et al.* Reduction in intraoperative bacterial contamination of peripheral intravenous tubing through the use of a passive catheter care system. *Anesth Analg* 2012;115:1315–1323.
6. Yébenes JC, Vidaur L, Serra-Prat M, *et al.* Prevention of catheter-related bloodstream infection in critically ill patients using a disinfectable, needle-free connector: a randomized controlled trial. *Am J Infect Control* 2004;32:291–295.
7. Mahida N, Levi K, Kearns A, Snape S, Moppett I. Investigating the impact of clinical anaesthetic practice on bacterial contamination of intravenous fluids and drugs. *J Hosp Infect* 2015;90:70–74.
8. Guidelines for the prevention of intravascular catheter-related infections 2011. Centers for Disease Control and Prevention website. https://www.cdc.gov/infectioncontrol/guidelines/pdf/bsi/bsi-guidelines-H.pdf. Published 2011. Accessed February 21, 2019.
9. Birnbach DJ, Rosen LF, Fitzpatrick M, Carling P, Munoz-Price LS. The use of a novel technology to study dynamics of pathogen transmission in the operating room. *Anesth Analg* 2015;120:844–847.
10. Hübner NO, Daeschlein G, Lehmann C, *et al.* Microbiological safety and cost-effectiveness of weekly breathing circuit changes in combination with heat moisture exchange filters: a prospective longitudinal clinical survey. *GMS Krankenhaushyg Interdiszip* 2011;6(1):Doc15. doi: 10.3205/dgkh000172.

Transmission routes of the virus causing viral hemorrhagic fever: Extreme precautions are prudent but high-quality evidence must be gathered

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To the Editor—Moon et al[1] reported that airborne precautions might be needed when dealing with fatal cases of severe fever with thrombocytopenia syndrome (SFTS). For diseases with high fatality rates that lack specific and effective treatment, it is prudent to take a more extreme prevention strategy than that based on the documented transmission route.[2] One example in which this strategy is applied is Ebola virus disease, for which extreme precautions are taken.[3] Given that SFTS virus (SFTSV) is a viral hemorrhagic fever virus that causes severe disease with a high fatality rate, we apply the same strategy to SFTS. Airborne precautions are recommended when healthcare providers conduct aerosol-generating procedures such as endotracheal intubation on a patient suspected of having SFTSV.

The transmission route of the disease treated under this prevention strategy should also be carefully examined during each outbreak. To date, airborne transmission of naturally occurring hemorrhagic fever viruses has not been documented.[2] The patient in the Moon et al article was a doctor wearing only a fluid-shield mask and gloves who performed endotracheal intubation on an SFTS patient and was infected with SFTS thereafter. Respiratory droplets are thought to be generated during endotracheal intubation, and protection of the eyes, nose, and mouth is recommended during the procedure in accordance with standard precautions.[2] Because the doctor in the article did not protect his eyes, it was possible that he acquired SFTSV through droplet contact with his eyes during the intubation procedure. However, this observation does not provide any evidence that SFTSV infects people through airborne transmission.

It is crucial to improve the level of precautions taken in acute-care settings in SFTS-endemic areas to prevent SFTSV transmission because most of the nosocomial transmissions of SFTSV are thought to occur before the diagnosis of the patient (infector) is confirmed as SFTS by the laboratory.[4–9] Standard precautions should be the norm for clinicians when they treat patients suspected of having SFTS. Between April 2013, when SFTS was designated as a notifiable disease in Japan, and December 2018, ~400 cases have been reported in Japan.[10] SFTS occurred sporadically in most patients, who were thought to have been infected with SFTSV through a tick bite during outdoor activities or by direct contact with a sick animal. To date, no case of healthcare-associated infection has been reported in Japan. However, we

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