

## Reducing Perioperative Infection Is as Simple as Washing Your Hands

ANESTHESIOLOGISTS have long focused on patient safety, particularly in airway management, neurologic injury, and cardiac outcomes. More recently, anesthesiologists have begun to recognize their role in infection prevention as well. Healthcare-associated infections (HAIs) increase morbidity and mortality, pain, cost, and duration of stay. The Centers for Disease Control and Prevention and the Centers for Medicare and Medicaid Services have made prevention of HCAI a priority for the first decade of the 21st century.<sup>1</sup> Anesthesia providers play a central role in several key process measures, including timely and appropriate administration of prophylactic antibiotics and maintenance of core normothermia. In this issue of ANESTHESIOLOGY, Koff *et al.*<sup>2</sup> add another clear target: hand hygiene.

Remarkably, Ignaz Semmelweis demonstrated the effectiveness of hand hygiene for reducing postpartum maternal mortality (from 15% to 2% at his institution) in 1847, 30 yr before Pasteur identified streptococcus.<sup>3</sup> Despite our current knowledge of germ theory, hand hygiene remains a neglected component of infection control. Numerous studies have demonstrated that greater adherence to hand hygiene guidelines results in decreased microbial transmission and decreased HAIs, yet audits consistently demonstrate low rates among providers.<sup>4</sup>

Although anesthesia providers generally have the lowest rate of adherence,<sup>4</sup> the feasibility of improving hand hygiene frequency and the impact of this on HCAI has not been previously investigated. Koff *et al.*,<sup>2</sup> in an elegant before-and-after study, quantify the extremely low rate of hand hygiene decontamination episodes (HHDEs) among anesthesia providers at their institution: 0.15–0.38 per hour. Introduction of a point-of-care alcohol-based hand hygiene device that records use as well as prompting providers to perform HHDE every 6 min resulted in a marked increase (to 7–8 per hour) in HHDEs. This was associated with reduced contamination of the anesthesia work area, fewer cases of contamination of the patient's intravenous stopcock (from 32% to 8%), and a dramatic reduction in HAIs (from 17% to 4%).

This Editorial View accompanies the following article: Koff MD, Loftus RW, Burchman CC, Schwartzman JD, Read ME, Henry ES, Beach ML: Reduction in intraoperative bacterial contamination of peripheral intravenous tubing through the use of a novel device. ANESTHESIOLOGY 2009; 110:978–85.

Why do anesthesia providers have such a low rate of adherence to hand hygiene guidelines, and what can we do about it? Protocols and policies at most hospitals require HHDE before and after all patient contact and specifically before and after each procedure. Some obstacles are present throughout the hospital: Frequent HHDEs may dry the skin (of note, lotion-containing alcohol-based gels are less drying than soap and water), gloves are mistakenly believed to be a substitute for HHDE, hand hygiene was not emphasized in training, and providers have not developed the habit.

Other obstacles are more specific to perioperative providers. Hospital-based hand hygiene education efforts rarely target the operating room (OR). There already is a tremendous focus on aseptic techniques in the OR, but it centers around personnel who are scrubbed in, and not on those (anesthesia providers, circulating nurses, and other staff) who are present but not part of the sterile field. The OR environment is also challenging for hand hygiene. Access is limited: Sinks are located outside the room and gel alcohol products are often relatively inaccessible. Particularly at the start and end of a case, the anesthesia provider is focused on performing multiple complex tasks safely and efficiently, thus relegating hand hygiene to a lower priority. The study by Koff *et al.*<sup>2</sup> suggests that finding ways around these obstacles is not only feasible, but also vital to improving patient outcomes.

Parallels to the OR environment may be found in the intensive care unit. Based on audits, hand hygiene is indicated during intensive care unit patient care approximately 20 times per hour.<sup>4</sup> Direct observation suggests that this number may be higher for anesthesia providers, particularly at the start and end of cases. Proper hand hygiene before central line placement is one of the most effective means of preventing central line infection.<sup>4,5</sup> Focusing on hand hygiene in the OR seems to be similarly imperative.

Anesthesia providers face challenges meeting Centers for Disease Control and Prevention guidelines for hand hygiene in the OR. Koff *et al.*<sup>2</sup> demonstrate both that it is vitally important that we adhere to good hand hygiene practice—not doing so is associated with active harm to the patient—and that making HHDE more convenient and providing real-time reminders has a beneficial effect on both the behavior and the outcome. Certainly, some aspects of the study can be criticized. The study was not randomized; using a before-and-after model, control data were collected in the first month of the study, and intervention data were collected in the second. This was a reasonable study design, however, because the focus on hand hygiene in the treatment group would be ex-

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pected to increase HHDE in the control group as well. The control portion of the study was performed at a teaching hospital in July. It has previously been demonstrated that HCAI rates are higher in teaching hospitals in July,<sup>6</sup> so the baseline rates may be artifactually elevated. Finally, no data were collected on the number of times it was appropriate to perform hand hygiene based on Centers for Disease Control and Prevention guidelines, so it remains unknown whether the actual number of HHDEs in the intervention group (7–8 per hour) was ideal. Although there are no studies quantifying the expected rate of hand hygiene by anesthesia providers during a case, the intensive care unit literature would suggest that even in the intervention group, the HHDE rate is below optimal,<sup>4</sup> as would the fact that 8% of stopcocks became contaminated even in the intervention group. There are, of course, other routes of stopcock contamination, most notably contamination from inadequate aseptic technique in handling the stopcocks and syringes used to give medications. Nonetheless, despite these few design issues, the conclusion is inescapable: Poor hand hygiene by anesthesia providers contributes to HCAI, and we need to correct the problem.

There is no doubt that adherence to hand hygiene guidelines is more difficult in the OR. Simply stating that therefore adequate hand hygiene is impossible, however, is not reasonable. The successful implementation of hand hygiene adherence at the study institution demonstrates that it is possible, and the study results highlight the efficacy of this practice in reducing HCAs.

The article by Koff *et al.*<sup>2</sup> is important because it reminds us that germs are not just a theory. Ignaz Semmelweis was reviled and ridiculed for his findings, and antiseptic hand washes to prevent puerperal sepsis were abandoned by official order when he moved to another institution (maternal mortality immediately reverted to 15%). His scientific writing and social skills were partly to blame; equally to blame, however, was physicians' reluctance to believe that they could be an agent of

anything harmful to patients.<sup>3</sup> More than 160 yr later, we still fail as a specialty to give germs the respect they deserve. An example of the resistance to change in practice is elegantly provided in the current study: 50% of stopcock contamination in the treatment group was associated with either anesthesia provider refusal to wear the personal hand-decontamination device or significant deviation from aseptic practice. We can only hope that the authors of the current study have a fate different from that of Semmelweis: that they are celebrated for this study and its impact on patient outcome. Given the striking results, we must support further research to confirm the impact and quantify the optimal rates of HHDE. We should not miss the opportunity as a profession to advocate for increased hand hygiene in the OR and support ongoing practitioner education in reducing HCAI. With these efforts, we can change clinical practice and reduce preventable complications in surgical patients.

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