

Anesthesia and Infection Control

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Anesthesiologists are well versed in the aseptic nature of surgical procedures. Maintaining sterility of the operating field is in the DNA of every anesthesiologist. In this background, it is intriguing that Infection Control within Anesthesia Work Environment (AWE) garners little to no interest. To most anesthesiologists, Infection Control is changing breathing circuits in between cases, drawing new medications, administering antibiotics, wearing gloves while administering care and performing procedures with universal precautions. There are complex layers of reason for this unique situation.

1. The lack of training in Infection Control. The traditional training of anesthesiologists involves a three to four year residency program that provides exposure to different facets of anesthesiology. Most anesthesiologists are familiar with checklists and protocols for different problems during the peri-operative period. During training, most anesthesiologists get introduced to sterile surgical technique. However there is no formal training or education in Infection Control in the AWE.

2. "What the eye does not see and the mind does not know, doesn't exist- D.H Lawrence- English Poet." During the peri-operative process, an anesthesiologist frequently encounter problems in a patient- the symptoms and signs of these problems readily manifest. It is a reflex for anesthesiologists to handle these problems. However poor infection control processes do not manifest in any immediate issues for the anesthesiologists. In most cases, patients may be discharged from the hospital and most anesthesiologist may never have a

second encounter with the same patient.

3. The lack of resources or tools to improve Infection Control. AWE is contaminated with blood and biological matter from the patient. Clean and dirty equipments are frequently mixed. Clean areas are touched with contaminated gloved hands. Hand Hygiene as per WHO guidelines has been shown to be difficult to adhere during the peri-operative process.

4. The protocol to clean AWE primarily remains wiping the Anesthesia Machine and work surfaces with sanitizing wipes. There is little monitoring, training and validation of cleaning protocols. After a wipe down, there are no checks or validated assessment to ensure AWE is clean. It is important to differentiate between clean versus sterile environment. Sterile environment which is used for surgical environment denotes an absence of microorganism. Clean environment which is generally accepted for AWE means free of dirt, marks or stains to reduce the overall number of organisms[1]. Current Evidences demonstrate that Environmental Hygiene play an important role in development of infections during hospitalization. Patients placed in contaminated rooms or surroundings have a higher chance of acquiring an infection[2-6]. Several pathogens like Multidrug resistant Acinetobacter, Vancomycin Resistant Enterococci (VRE), pseudomonas are known to exist on surfaces of healthcare facilities or equipment for months[7-14]. Table 1 in an article published by Dancer in Clinical Microbiology Review in 2014 demonstrates this. Do these results translate to anesthesia environment? Loftus et al showed that pathogens on anesthesia

machine surfaces directly colonized stopcocks on intravenous sets of patients. In their series of studies they documented incidence of Vancomycin Resistant Enterococci (VRE) transmission via Anesthesia Environment at 32% and two thirds of stopcock contamination had the source from anesthesia environment[15]. In a continuous series of work Loftus et al have demonstrated the transmission of several pathogenic bacteria including MRSA and gram negative bacteria in the Anesthesia Work Environment. Their work has clearly mapped the epidemiology of pathogens in the AWE[16-19]. The evidence points to the need for increased awareness, education and introduction of new practical systems that will prevent contamination and colonization of Anesthesia Work Environment. It is important to recognize the role of the AWE as a reservoir and vector for pathogens potentially leading to infection during the Perioperative period. Hand hygiene is an important methodology to reduce Healthcare Acquired Infections (HAI). However, hand hygiene has been shown to impractical during delivery of Anesthesia and did not reduce contamination of AWE[20]. Anesthesia Hygiene, a company based out of Miami, Florida, USA, designs tools to protect and organize Anesthesia Work Environment to reduce contamination of the AWE. An independent study by Biddle et al quantified the reduction of contamination in the AWE[21]. A larger study will be needed to confirm if this translates into a reduction in perioperative surgical infections.

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Table 1: Nosocomial pathogens persistence on inanimate surfaces

Organism	Survival Time	Infectious Dose
Methicillin Resistant Staphylococcus Aureus	7 days- >7 months	4 CFU
Acinetobacter	3 days->5 months	250 CFU
Clostridium difficile	>5 months	5 spores
Vancomycin Resistant Enterococci	5 days- >4 months	<10 ³ CFU
Escherichia coli	2 hrs-16 months	10 ² -10 ⁵ CFU

**Figure 1:** Anaesthesia hygiene products

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