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Major Article

Determining high touch areas in the operating room with levels of contamination

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Background: The Centers for Disease Control and Prevention put forth the recommendation to clean areas considered high touch more frequently than minimal touch surfaces. The operating room was not included in these recommendations. The purpose of this study was to determine the most frequently touched surfaces in the operating room and their level of contamination.

Methods: Phase 1 was a descriptive study to identify high touch areas in the operating room. In phase 2, high touch areas determined in phase 1 were cultured to determine if high touch areas observed were also highly contaminated and if they were more contaminated than a low touch surface.

Results: The 5 primary high touch surfaces in order were the anesthesia computer mouse, OR bed, nurse computer mouse, OR door, and anesthesia medical cart. Using the OR light as a control, this study demonstrated that a low touch area was less contaminated than the high touch areas with the exception of the OR bed.

Conclusions: Based on information and data collected in this study, it is recommended that an enhanced cleaning protocol be established based on the most frequently touched surfaces in the operating room.

Surgical patients are at risk for obtaining hospital-acquired infection because their first line of defense, the skin, is compromised. Monitoring body temperature, preparing skin preoperatively, and using appropriate antibiotic dosage, including timing of antibiotics, are all methods of preventing surgical site infections (SSIs). These interventions are part of the Joint Commission's surgical care improvement project[1] and part of their national patient safety goals.[2]

Recently, in the infection control community, the role of contaminated environmental surfaces, the role of contaminated equipment, the role of contaminated hands of health care workers, and their role in transmission of pathogens have been examined because of serious outbreaks in hospital settings and in operating rooms (ORs). Out of all reported health care–associated infections, 36% are SSIs. In addition, SSIs are attributable to 33.7% of health care–associated infection costs.[3]

In December 2010, the Hospital Infection Control Practices Advisory Committee and the Centers for Disease Control and Prevention (CDC) put forth the recommendation to clean areas considered high touch more frequently than minimal touch surfaces.[4] A tool kit was developed by this same work group, which recommended options for environmental surveillance using a list of high touch areas found in the typical hospital room. The OR was not included in these recommendations.

High touch surfaces were based on anecdotal experience, with the assumption that the immediate surfaces and areas (over bed table, bedrails, etc) in the patient's proximate vicinity would be most frequently touched by the patient and health care worker. Multiple studies have been conducted and articles written on environmental surveillance and measuring effective cleaning practices in hospital settings.[5-13] Only 1 study was found which used a quantitative approach to defining high touch surfaces in the hospital but did not include high touch surfaces in the OR.[5] A study by Jefferson et al[6] evaluated environmental cleaning practices in the

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OR using high touch surfaces identified in the Association of periOperative Registered Nurses' (AORN) guideline for environmental cleaning. These high touch surfaces were determined by the inherent risk for contaminating health care workers' hands in the OR.[7] No studies were found addressing the identification of high touch surfaces in the OR.

The OR is perceived as one of the cleanest areas in the hospital because sterile procedures are performed, but in fact, ORs may be one of the most contaminated areas in a hospital.[6,8,9] Gaps in cleaning can occur for multiple reasons. There are many different disciplines and even departments responsible for environmental decontamination. Staff involved in cleaning could include nursing staff, anesthesia technicians, environmental services, and contracted cleaning professionals. In addition, there are radiology personnel, perfusion personnel, and other disciplines who move their equipment from room to room and do their own cleaning. In essence, a room can be cleaned multiple times, in multiple ways, by multiple persons in a 24-hour period. The use of multiple staff to clean the OR environment may increase the chance that decontaminating a high touch area would be missed.

Attempts have been made to translate high touch areas in patient rooms to the OR setting.[6] Although many of these high touch areas are applicable to the OR setting, such as door handles, phones, and computer keyboards, there are additional surfaces unique to the OR not found in patient hospital rooms. Examples include electrical surgical units, bed straps, and anesthesia machines. Jefferson et al[6] and Munoz-Price et al[8] used surfaces identified in AORN's guidelines for environmental cleaning in their studies.[7] All of these surfaces are touched by multiple persons and can be contaminated with body fluids.

In the past, it has been difficult to directly link infections to the OR, but it is often suspected that the OR is the site of infection origination. It is even more difficult to track where cross contamination occurred. Cultures can be obtained and are appropriate when the risk warrants the cost. The Hospital Infection Control Practices Advisory Committee environmental surveillance work group suggests that obtaining cultures can be limiting in some institutions, and the turnaround time is lengthy. A contaminated surface could infect multiple patients before culture results are received because one OR can have multiple cases each day.[10] In addition, there is lack of consensus as to what defines contamination.[11] Aerobic colony counts (ACCs) of <2.5-5 colony forming units (CFU)/cm^2 on high touch sites have been tested as a microbiologic benchmark and <1 CFU/cm^2 when finding a potential pathogen, but these proposed benchmarks have not been standardized for hospital use.[12] In performing a procedure in an OR on an immunocompromised patient who is at risk for infection, it could take only 1 CFU/cm^2 for a surgical patient to acquire a serious infection.

Additional agencies use microbiologic standards by looking at indicator organisms. Dancer describes coagulase-positive staphylococci as an organism that provides a reliable indicator of environmental hygiene.[12]

To further explore the issue of high touch surfaces in ORs, a study was conducted at an academic medical center, a leading tertiary care and referral center which is magnet designated. Perioperative services at this institution consist of an inpatient unit with 18 suites and a hospital-based day surgery unit with 8 OR suites. There are designated nursing and technical staff in each area with surgeons performing surgery in both areas. More than 19,000 surgical procedures were performed in 2013. The purpose of this research project was to determine high touch areas in the OR and to uncover levels of contamination of these high touch areas at the end of a surgical case. This is significant because high touch areas could provide an opportunity for cross contamination if not cleaned and disinfected appropriately between patients. It is our intention to use the information from this study to develop a cleaning protocol addressing high touch areas in the OR.

Our research questions included the following: (1) What are the high touch areas in the OR?; (2) What is the contamination rate of the high touch areas?; and (3) Are the most frequently touched areas also the most contaminated?

MATERIALS AND METHODS

There were 2 phases in this study. In Phase 1 a descriptive study was conducted in inpatient and outpatient ORs to identify high touch areas. In Phase 2, high touch areas determined in phase 1 were cultured before the first case of the day (after assumed terminal cleaning had occurred at the end of the previous day) and at the end of the procedure after the patient left the OR and before environmental cleaning occurred. The cultures were quantified by ACCs per centimeter squared and used to determine if high touch areas observed were also highly contaminated.

Phase 1

Procedure for observing high touch surfaces

Twenty-one procedures, 3 from each of the 7 specialty services listed in Table 1 were observed in both inpatient ORs and outpatient ORs for a total of 43 procedures. Equal numbers of each procedure from each service line were assessed to improve generalizability. Touches were number of times a surface was touched by the unsterile hands of the surgical team from the time the patient entered the OR until the time the patient left the OR. The steps are as follows:

1. A list of observed surfaces was determined by preliminary observations of 4 procedures, occurring in both inpatient and outpatient ORs. Cases were excluded if they were scheduled outside the range of 3 hours to allow for consistency of observations.
2. On completion of the observations, the number of times a surface was touched was tallied.
3. The top 5 high touch surfaces were determined by the number of times the surgical team touched the identified surface.

Table 1
Observations and cultures by service line

Service line	No. of observations	No. of cultures
Inpatient		
Cardio thoracic	3	48
General surgery	3	48
Gynecology	3	36
Neurology	3	36
Spine	3	36
Total joints	3	36
Urology	3	36
Total inpatient	21	276
Outpatient		
Ear, nose, and throat	3	48
Gynecology	3	36
General surgery	3	36
Hand-foot	3	36
Orthopedic, sports medicine	3	48
Ophthalmology	3	36
Urology	4	36
Total outpatient	22	276
Total	43	552