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CLINICAL SUMMARY

SURFACE CONTAMINATION IN OPERATING ROOMS: A RISK FOR TRANSMISSION OF PATHOGENS?

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BACKGROUND

The authors summarize that surgical site inflections (SSIs) affect 2-5% of all surgical inpatient admissions. SSIs negatively impact morbidity, patient outcomes and total healthcare costs for the perioperative patient population. The following root cause analysis is described:

Effects of surgical site infections: → **Increased perioperative morbidity** → **Poor surgical outcomes** → **Increased healthcare cost**

Possible Surface Contamination Sites

Operating room sites identified as a potential source of contamination

There is burgeoning recognition of the significance of surface contamination in the transmission of hospital-acquired infections. Surfaces such as walls, tables, floors, and equipment in an Operating room (O.R.) environment have shown to be associated as a potential reservoir for pathogens. Such pathogens can spread to the hands of healthcare workers (HCWs) and subsequently to patients, causing SSIs and other outbreaks of infection.

OBJECTIVES AND METHODS

This article outlines a PubMed search conducted to identify medical literature pertaining to the investigation of surface contamination in O.R and its potential contribution to the spread of infections. The authors limited the search to studies published between 1990 and 2013 and specifically focused on papers that discussed the topic of surface contamination and its association with infection transmission within the O.R. A review of the selected studies provided information on the sources of infection in O.R., such as the contamination and the transmission of pathogens between patients, staff, and the O.R. environment.

Study Search Objectives

Possible Surface Contamination Sites

- Sources of infection in the O.R.
- Contamination of the inanimate environment in the O.R.
- Transmission of pathogens between patient, staff and the inanimate environment in the O.R.

RESULTS

Although there are few studies examining the impact of surface contamination in operating rooms, the available evidence suggests that pathogens can still contaminate the inanimate environment of the O.R. even after routine environmental cleaning. Opportunistic pathogens, found in the skin of patients or staff, cause more than half of the infections after Classification 1: clean surgery. In such surgery, studies have shown a correlation between the number of bacteria colonizing the skin and the likelihood of wound contamination. Another source of infection in the O.R. is contaminated air. In one study, airborne bacteria accounted for 98% of the bacteria found in incisions during orthopedic joint surgery performed in a conventionally ventilated O.R. Reduction in the airborne bacteria by using ultra-clean air in the O.R. resulted in a reduction in wound contamination in orthopedic implant surgery. Lastly, another source of contamination is the hands of HCWs after contact with contaminated equipment or surfaces. In one study, only 17% of anesthesia providers reported to have performed hand hygiene before anesthesia, whereas 64% and 69% performed hand hygiene after administering anesthesia or before lunch. Lastly, the direct link between contamination of environmental surfaces in the O.R. can lead to contamination of the hands of O.R. staff, implicated in surgical infection outbreaks.

Additionally, contamination of environmental surfaces in O.R. has been implicated in hospital outbreaks outside the surgical arena. For example, a Dutch study reported an outbreak of Multidrug-resistant (MDR) Klebsiella pneumonia in an intensive care unit (ICU) associated with the use of contaminated O.R. roller boards. Testing of the roller boards revealed contamination with the MDR strain used to move patients from the bed to the operating table and vice-versa. The authors concluded that the inanimate environment within the O.R. played a key role in the transmission of the MDR strain to the ICU patients during the outbreak.

Sources of Contamination on Inanimate Surfaces

1. Patient or staff skin
2. Contaminated O.R. air
3. Hands of HCW

CONCLUSION

Contaminated surfaces in the O.R. contributes to the transmission of pathogens. In the present paper the authors suggest more research on better understanding the impact of contaminated surfaces on pathogen transmission and to identify effective environmental interventions. Considering the severe implications of SSIs, it is crucial to pay extra attention to the proper disinfection and cleaning of the inanimate environment in O.R., in addition to establish infection control measures to minimize the prevalence of SSIs. The study authors provide recommendations and interventions to improve the thoroughness of cleaning and the decontamination of surfaces. The first recommendation is to utilize a regular microbiological analysis of surface hygiene, such as Adenosine Triphosphate (ATP) Assays, to assess the thoroughness of cleaning. The second recommendation is to provide feedback of cleaning procedures and performance to promote awareness and standardization. The final recommendation is two-fold: to implement hand and environmental hygiene protocols; and to provide educational campaigns.

Improved cleaning ↑ Use of ATP assay | Feedback on cleaning procedure and performance | Environment hygiene and educational campaign ↓ **Reduce contamination**

APPLICATION FOR PRACTICE

Contaminated surfaces in the O.R. contribute to the potential transmission of pathogens, even after environmental cleaning. Risks are present including the patients skin, contaminated air, hands of HCWs and other inanimate surfaces in the environment. Take a proactive approach to O.R. room turnover to reduce these risks.

1. Consider the use of disposable turnover kits including those with additional antimicrobial properties
2. Conduct a review of current O.R. turnover practices, consider testing surface contamination using ATP methods and consider using ATP methods to provide objective feedback on cleaning effectiveness
3. Review and reinforce best practices including a hand hygiene with ongoing education and staff training

Note: This clinical summary is written by clinicians at Ansell Healthcare Products LLC. Please refer to the actual study for full text information.

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