SYNOPSIS

# KEY POINT SUMMARY

OBJECTIVES

The objective of the study was to understand the impact of the movement of patients, equipment, materials, and staff, as well as door openings on microbial loads at different locations in the OR.

## The Influence of Traffic, Area Location, and Other Factors on Operating Room Microbial Load

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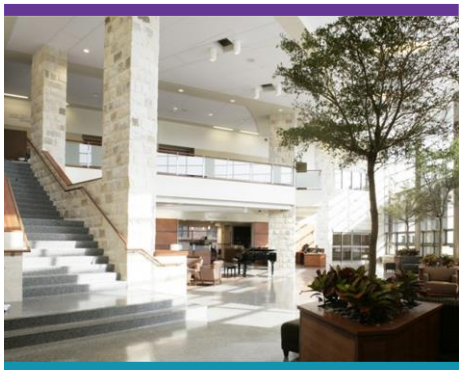
### Key Concepts/Context

Traffic movement in hospitals causes disturbances and helps spread microbiota. Operating rooms (OR) can have surgical site infections (SSI) that are dangerous and can result in complications for patients. The OR team is potentially a major contributor to contamination because of its contact with other areas of the hospital. This study was conducted at four separate pediatric and orthopedic ORs at a 600-bed academic hospital to understand the effect of movement on microbial loads.

### Methods

Videotaped surgical procedures in the OR were first analyzed to determine the areas of the highest and lowest traffic. A total of 27 surgical procedures were recorded and they all had similar traffic flows. To measure the microbial loads in colony-forming units (CFU), air samplers and settle plates were placed in representative locations during 21 selected procedures. The procedures had a good range of OR practices for orthopedic and pediatric surgeries. Samples were then collected twice during the same year, in March and September of 2016. In addition, temperature, humidity, number of door openings, physical movement, and the number of people were measured for each procedure in the OR. The collected samples of the settle plates were incubated at 35°C for 48 hours for bacterial counts and 26°C for five to seven days for fungal counts. The resulting CFUs were counted and the measurements were adjusted to show the results in CFU/$m^2$/hour. Finally, the data collected was analyzed using hierarchical regression with separate models for bacteria and fungi.



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## Findings

All bacteria samples collected were higher in September than in March due to a more extreme humidity range, while fungi had some higher measurements in March. Average microbial load for the air sampler measures was lower for the orthopedic procedures since the arthroplasty surgical teams wear special attire with more protection against contamination. Furthermore, they restricted access to the OR from the outer corridor during procedures. On the contrary, average settle plate measures were higher for the orthopedic procedures for the March and September samples. The major findings of the study were that the OR areas of higher traffic had a higher microbial load than areas of lower traffic. Ironically, the number of doors in the OR did not affect the microbial load while the proximity did. Finally, the more people present in the OR the higher the bacterial count recorded.

## Limitations

The study sample was limited to only 21 procedures in four ORs, yielding inconclusive results. In addition, the sampling procedures were flawed since two types of air samplers were used and some living particles became inactive upon contact with the samplers.

## Design Implications

Certain areas and items in the OR contribute to the spread of bacteria and could be controlled by design. The traffic was higher near doors, telephones, computer work stations, and storage cabinets. Those items should be placed away from the surgical field of operations on the floor plan. Other possible design solutions are to place the nurses that move frequently at a nurse station away from the patients and to have a dedicated door for the anesthesia team. The authors suggested further research to understand the design parameters impacting staff movement and workflow.