SYNOPSIS

KEY POINT SUMMARY

OBJECTIVES

The objectives of the study were to collect samples to identify the types of microorganisms at a new hospital and their location in patient rooms and nursing stations to understand their interaction and movement.

Colonization and Succession of Hospital-Associated Microbiota

Lax, S., Smith, D., Sangwan, N., Handley, K., Larsen, P., Richardson, M., Taylor, S., Landon, E., Alverdy, J., Siegel, J., Stephens, B., Knight, R., Gilbert, J. A., 2017 | *Science Translational Medicine*. Volume 9, Issue 391, Pages 1-11

Key Concepts/Context

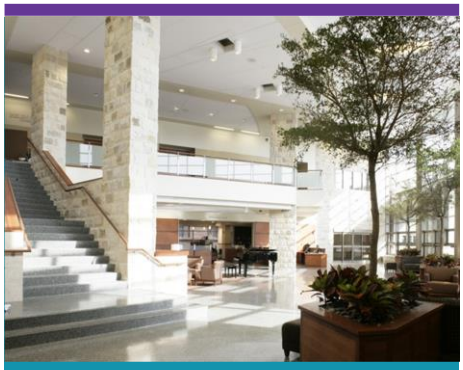
Hospitals are clean environments despite having many microorganisms that inhabit their spaces and impact the health of patients and staff. A strong link has been established between microbial communities obtained from human skin and from the indoor environment. These microorganisms greatly impact patient recovery and increase health-associated infections (HAI). This study mapped microbial movement between hospital surfaces, air, water, and patients and staff.

Methods

The study analyzed samples over a 14-month period starting two months prior to the new hospital opening. Samples were collected from 10 patient rooms and two nursing stations at two levels of the hospital. On each level, one patient room was selected for daily sample collection while other spaces were sampled weekly. The samples were collected from the skin of patients and staff as well as other surfaces. In addition, the temperature, humidity, light levels, and CO2 concentrations were monitored continuously. Infrared doorway beam breaks were installed to monitor traffic into and out of the spaces. The samples collected using pre-moistened sterile swabs by trained technicians were immediately frozen and sent to the lab for microorganism concentration testing. The results were put in a matrix to show the level of microbes on the skin and other surfaces of the selected spaces.

Findings

After the new hospital became operational increased levels of microorganisms like Corynebacterium, *Staphylococcus*, and Streptococcus were found on the floors, on the surfaces of the nursing stations, and on bedrails. There was a decrease in other types from the pre-opening samples without any given explanations by the authors. Skin samples were the most diverse while surface samples with more outdoor



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interaction were the least diverse. In patient rooms the higher temperatures and light levels contributed to microbial dissimilarity between skin and surfaces while higher humidity correlated with similarity. The findings were placed in matrices without drawing conclusions or discussing their impact on the hospital environment.

Limitations

The study was focused on the analysis of the microorganisms without showing how their movement could be reduced. It did not investigate hospital-acquired infections and the existence of the microbial communities found. Also missing were the cleaning protocols, materials used and sampled, occupancy level, patient-staff ratio, and several other organizational factors that could affect microbial growth, retention, and transmission.

Design Implications

No direct connection was found between the study findings and the design of hospital spaces in either patient rooms or nursing stations. However, the authors point out the surfaces of higher microorganism concentration (like the floors, faucet handles, and bedrails). By being aware of the surfaces that might create additional risk for infection transmission, designers can better consider the best material characteristics for the project in coordination with the owner's cleaning regimens and other operational protocols.