



KEY POINT SUMMARY

OBJECTIVES

The objective of this study was to:

Evaluate hospital floors in the context of being possible sources for pathogens associated with HAIs

To specifically examine three flooring types – tiled carpet, non-tiled carpet, and vinyl for presence of HAI pathogens

DESIGN IMPLICATIONS

Designers may consider using tiled carpet where carpet as a flooring material is being considered.

Detecting potential pathogens on hospital surfaces: An assessment of carpet tile flooring in the hospital patient environment

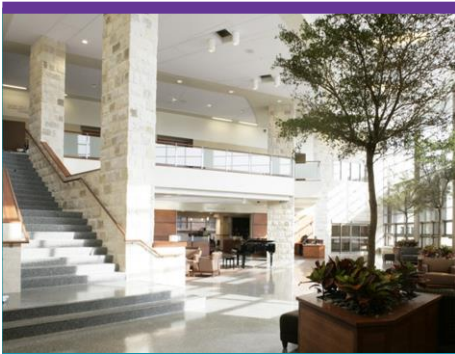
Harris, D.D., Pacheco, A., & Lindner, A.S. 2010 | *Indoor Built Environment*. Volume 19, Issue 2, Pages 239-249

Key Concepts/Context

Several studies demonstrate a connection between the hospital environment and hospital-acquired infections (HAIs). The bacterial pathogens more frequently associated with HAIs include *Clostridium difficile* (*C. difficile*), *Staphylococcus aureus* (MRSA), and Vancomycin-resistant enterococci (VRE). Of these, literature indicates that *C. difficile* can survive for up to five months on hospital floors and is difficult to remove, MRSA survives for up to nine weeks on materials commonly found in hospital environments, and VRE are common in many U.S. hospitals. In this research, hospital floors were examined as a source for pathogens in the medical patient unit of a Midwestern community hospital in the U.S. Further, three types of hospital floors were examined for presence of these organisms. The study found the hospital floors, irrespective of type, to be rife with bacteria, but none of these were identified as the common HAI pathogens.

Methods

For this study, modular tiled carpet was affixed in a section of the study hospital. The hospital's original flooring comprised of non-tiled carpet and vinyl – these were the controls for comparing with the intervention – tiled carpet. Once every four weeks, surface swab samples were collected from each floor type. Random samples were collected from the corridor in a patient unit for the vinyl flooring, from the elevator vestibule, and from two heavy-traffic areas around the nurses' station. For the tiled carpet, a sample site was the intersection of four carpet tiles – swab samples were collected from the surface, edge and back of three tiles. On each visit, samples were collected from six different locations – nine samples per group of four tiles amounting to 54 swab samples per visit. Other surfaces were also swabbed for samples on two occasions – the sole of a nurse's shoe, elevator floor, and the wheels



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of a patient bed, medical monitor, and laundry cart. All swab samples were analyzed using a genetic method – denaturing gradient gel electrophoresis (DGGE), which allows for a quick revelation of microbial communities. The rDNA sequences in these samples were compared with information in the National Center for Biotechnology Information Gen Bank database.

Findings

The study yielded the following findings:

- The control surfaces had a higher propensity to conceal bacteria – the vinyl and non-tiled carpet samples displayed more microbial pathogens than the tiled carpet’s surface, edge, or backing.
- Comparison of only surface samples revealed that vinyl floors had a less diverse presence of pathogens.
- Bacterial diversity was found to be higher in samples swabbed from the edges of the tiled carpet, except in one instance (the last sample collected), when the surface of the tiled carpet revealed a higher diversity than the edge. The diversity of pathogens on the carpet backing decreased over time during the study period.
- There was much variability in pathogens in adjacently placed four-tile carpet samples’ sites.
- There was no change in bacterial diversity in the samples removed from the elevator vestibule and the non-tiled carpet surfaces over the study period.
- In the samples taken from the vinyl floors, the bacterial diversity decreased from the start of the study period through the end.
- The non-tiled carpet displayed the highest bacterial diversity compared to the tiled carpet and the vinyl floor samples during the entire study period.

The analysis of the samples revealed that pathogens found on the hospital floors were not the common HAI pathogens, but the components of the pathogens suggest that the potential for organisms cannot be ruled out in entirety.

Limitations

The small sample size of the study was identified by the authors as a limitation of the study.

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