



KEY POINT SUMMARY

OBJECTIVES

The objective of this study was to test if copper alloy surfaces were effective in restricting the contamination of surfaces in PICUs as compared to non-copper alloy surfaces.

Copper surfaces are associated with significantly lower concentrations of bacteria on selected surfaces within a pediatric intensive care unit

Schmidt, M. G., von Dessauer, B., Benavente, C., Benadof, D., Cifuentes, P., Elgueta, A., ... & Navarrete, M. S. 2016 | *American Journal of Infection Control*. Volume 44, Issue 2, Pages 203-209

Key Concepts/Context

Hospital-acquired infections (HAIs) plague hospitals around the world. The authors note that patients in ICUs, particularly those in pediatric and neonatal ICUs, are more susceptible to contract an infection from the clinical environment because of factors like the patient's illness and the use of invasive medical devices, etc. They cite different studies which show that various infection control measures like hand hygiene compliance, use of ultraviolet light, and hydrogen peroxide vapors have been helpful, but not entirely effective. The authors allude to the antimicrobial characteristic of copper alloys (U.S. Environmental Protection Agency-registered copper) and a previous study conducted by them in adult ICUs, where they found that copper surfaces had fewer bacterial counts compared to other surfaces, and that copper surfaces had led to a significantly lower rate of HAI incidence in those ICUs. This study examined two pediatric ICUs (PICUs) in a hospital in Santiago, Chile, to demonstrate if the same conclusions about copper surfaces could be drawn in the pediatric context. The study showed that copper surfaces had a much lower bacterial count than standard surfaces.

Methods

This study was carried out in two high-acuity pediatric units in a tertiary care facility – eight rooms each in a PICU and a pediatric intermediate care unit (PIMCU). Half of the rooms had copper surfaces, the other half did not; patients were assigned sequentially to the rooms. The PICU had six two-bed rooms and two single-bed rooms, while the PIMCU had one four-bed room, five three-bed rooms, and two single-bed rooms. The items that were surfaced with copper alloy were bed rails, bed rail levers, intravenous poles, faucet handles, and the healthcare work station.



DESIGN IMPLICATIONS

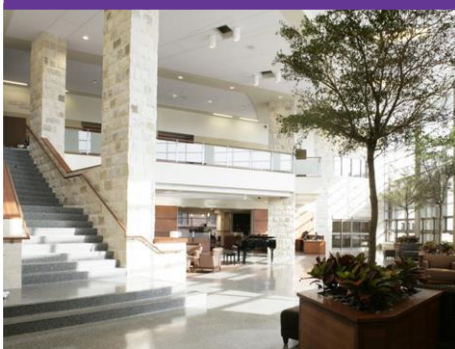
The authors strongly recommend the use of copper surfaces in multi-bed pediatric settings, especially for bed rails, faucet handles, intravenous poles, workstations, and nurses' pads.

Samples were collected from the rooms on alternate weeks – 734 samples in the pre-intervention and 1,230 samples during the intervention phases over a period of 12 months. Data was analyzed statistically (Mann-Whitney test, Wilcoxon 2-sample test, and Kruskal-Wallis test).

Findings

The study yielded the following findings:

- The samples from pre-intervention samples taken from the PICU and PIMCU rooms revealed that the bed rails, faucet handles, intravenous poles, workstations, and nurses' pads had similar counts of colony-forming pathogens as in the study on adult ICUs.
- During the intervention period, 1,320 objects (668 – copper and 652 – either polypropylene or stainless steel) were sampled from both ICUs. Mean bed occupancy in the PICU was 70% and in the PMICU was 43% during the study period.
- The average colony forming unit (CFU) per 100 square cm (for all sampled objects) was 1,381 on the standard surfaces as opposed to 172 on the copper surfaces.
- Occupied beds and cradles had higher bacterial concentrations than the unoccupied ones:
 - Occupied beds with
 - Standard rails: 1451 CFU/cm²
 - Copper-surfaced: 43 CFU/cm²
 - Unoccupied beds with
 - Standard rails: 766 CFU/cm²
 - Copper-surfaced: 26 CFU/cm²
 - Occupied cradles
 - Standard: 1806 CFU/cm²
 - Copper: 97 CFU/cm²
 - Unoccupied standard cradles
 - Standard: 979 CFU/cm²
 - Copper: 289 CFU/cm²



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- The bacterial count per cm² for the copper surfaces in all of the above findings was much lower than the 500 CFU/cm² - the risk threshold for acquiring HAI.
- A surge of patients was experienced in two months during the study period. This led to non-copper objects being moved into the rooms with copper-surfaced objects, thus increasing the bacterial concentration in the patient care space. Yet the copper surfaces always revealed a bacterial count of less than 500 CFU/cm².

Limitations

The authors do not identify any limitations to their study. However, given that this study was not a blinded one, they suggest there may have been bias in the allocation of beds to patients and in the assignment of beds to staff.

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