SYNOPSIS

KEY POINT SUMMARY

OBJECTIVES

This study aims to determine whether replacing non-biocidal linens with linens infused with biocidal copper oxide would reduce instances of HAI in a long-term care ward.

Reduction of healthcare-associated infections in a long-term care brain injury ward by replacing regular linens with biocidal copper oxide-impregnated linens

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Key Concepts/Context

Due to its antibacterial, antiviral, and fungicidal properties, copper has been widely used for centuries as a biocide. Microorganisms resistant to copper are extremely rare. Recently, methods have been developed for embedding copper oxide particles into textile products, thereby giving them antimicrobial and anti-mite properties, and in some cases, advanced wound-healing abilities. Consumer products featuring copper oxide such as sheets, diapers, and pillowcases have been proven completely safe to humans through numerous studies, with no adverse health reactions on record. The use of copper oxide textiles in hospital materials such as robes, pajamas, sheets, and pillowcases may therefore reduce the spread of healthcare-associated infections (HAIs) within the hospital environment.

Methods

The study was conducted in a 35-bed Head Injury Ward holding long-term care patients with severe head injuries. All of these patients were confined to beds and wheelchairs, and were entirely dependent upon medical personnel for daily needs. 90% of these patients had already received seasonal influenza immunization. Data concerning each patient's personal background, medical condition, prognosis, treatment, and healing progress were collected during December 2010-June 2011 (Period A) and December 2011-June 2012 (Period B). The groups hospitalized during these two periods had similar characteristics and underwent similar treatments unrelated to HAI. Potentially confounding variables such as age, gender, mobility, presence of sores, and differing treatments were negated by using ANCOVA analyses.

During Period A, normal non-biocidal linens were used in the ward, while during Period B, all bedsheets, patient shirts and pants, pillowcases, patient gowns and robes, underpads, and towels were replaced with copper oxide-impregnated products. These copper-infused products were differentiated from regular textiles by color. Textiles were handled and washed in the exact same manner during both periods, and the same infection control procedures were followed during both periods. Medical personnel were unaware of what parameters were being monitored for this study—all of their activities remained unchanged and the only visible difference to them between the two periods was a change in textile colors.

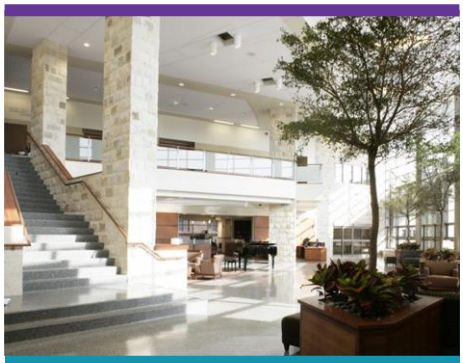
For microbiology testing, 40 normal bedsheets and 40 copper oxide-infused sheets were swabbed between six to seven hours after being used by patients and analyzed using standard microbiology assays.

Findings

Comparing Period B to Period A, there was a 24% decrease in HAI events and a 47% decrease in the number of days patients exhibited signs of fever. Additionally, there was a 23% reduction in events where patients received antibiotics, and the amount of days involving antibiotic administration decreased by 32.8%. During Period B, there were significant decreases in gastrointestinal and eye infections, while no blood or mouth infections were recorded at all. Bacterial loads found on the copper oxide impregnated sheets were reduced by approximately 50%-46%. The results indeed indicate that HAI rates can be reduced by replacing normal textile products with copper oxide-imbued products.

Design Implications

Considering the apparent effectiveness and durability (studies have shown that the efficacy of copper oxide remains unaffected after 100 laundry cycles and years of use), healthcare designers might consider replacing many textiles used within the hospital with copper oxide-impregnated textiles. Sheets, pillowcases, robes, gowns, towels, pads, and any other textile product that comes into contact with both patients and caregivers could be infused with copper oxide to reduce the spread of infection, potentially save money, and potentially reduce waste generated through frequent disposal of normal, more easily-contaminated textiles. Color coordination could be used to differentiate between normal textiles and copper oxide-infused textiles.



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Limitations

Only one head trauma ward was observed during the course of this study. Since the study replaced several normal textile products with copper oxide products to maximize the effect of the copper oxide, no attention was given to which product in particular might have contributed the most to HAI reduction. While the two time periods chosen for this study eliminated seasonal variations and therefore provided a more accurate comparison, the study is limited in how it does not investigate the efficacy of these copper oxide textiles during other seasons where temperatures and other environmental conditions might affect results.

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AIA Academy of Architecture for Health of the American Institute of Architects

ASHE American Society for Healthcare Engineering, A personal membership group of the American Hospital Association

AAHF Academy of Architecture for Health Foundation

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