Antimicrobial Copper and...
Carbapenem-resistant Enterobacteriaceae (CRE)

Name of Study: Antimicrobial activity of copper surfaces against carbapenemase-producing contemporary Gram-negative clinical isolates

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Carbapenem-resistant Enterobacteriaceae (CRE) are often considered the most problematic hospital acquired infections (HAIs) worldwide. This study evaluated the antimicrobial activity of copper surfaces against 24 clinical isolates of carbapenemase producing bacteria— including, four isolates of *E. coli*, two isolates of *Enterobacter spp.*, eight isolates of *K. pneumonia*, five isolates of *P. aeruginosa*, and five isolates of *A. baumannii.*

Key findings:

- Copper alloys (Cu99% and Cu63%) provided a significant reduction in survival of carbapenemase-producing bacteria. On average, after 3 hours of exposure, the Cu99% alloy reduced all tested isolates of CRE by >99%, and a 77% reduction was observed on the Cu63% alloy compared to a 46% reduction on stainless steel, and a 49% reduction on plastic (PVC).
- The continuous killing of carbapenemase-producing bacteria on copper surfaces suggests that the use of copper alloys in high-contact surfaces in a hospital may help reduce the spread of "difficult-to-treat" HAIs, if coupled with optimal cleaning procedures and compliance with infection-control practices.

CRE Facts:

What is it?

- *Enterobacteriaceae* comprise a large family of gram negative bacteria. While the carbapenem class of antibiotics is used to combat many of these pathogens, CRE infections can occur when the bacteria begin to break down carbapenems into carbapenemase, making the antibiotics ineffective and the infection more lethal. CRE bacteria have become resistant to nearly all antibiotics.
- *Carbapenem-resistant Enterobacteriaceae*, also known as *carbapenemase-producing Enterobacteriaceae (CPE)*, kill patients at a rate much higher than other types of multidrug-resistant (MDR) infections, such as MRSA or *Clostridium difficile*.

How is it contracted?

- Information from the Centers for Disease Control and Prevention (CDC) suggests that CRE bacteria are most often spread from **person to person** contact or through **contact with contaminated surfaces.**

Where is it prevalent?

- CRE infections are most commonly seen in people in hospitals, nursing homes, and other healthcare settings. Patients whose care requires medical devices – such as breathing machines, urinary catheters or intravenous catheters – and patients who are taking long courses of certain antibiotics are most at risk for CRE infections.
- According to the CDC, CRE bacteria contribute to death in up to 50% of patients who become infected.

Copper Facts:

This study was performed because antimicrobial copper alloy surfaces have previously been shown to be effective against a range of bacteria, fungi, and viruses. A U.S. based study revealed that the use of copper surfaces in hospital rooms can reduce the number of healthcare-acquired infections by 58 percent. Six highly touched objects – bed rails, over-bed tables, chair arms, call button, computer accessories and IV poles – found in ICU rooms at three U.S. hospitals were retrofitted with copper touch surfaces for the study.

Brief synopsis of methodology:

Antimicrobial activity was examined by inoculating copper (Cu99%), brass (Cu63%), stainless steel (SS), and polyvinylchloride (PVC) coupons with 24 clinical isolates of multidrug resistant (MDR) bacteria from the Enterobacteriaceae family— including, four isolates of *E. coli*, two isolates of *Enterobacter spp.*, eight isolates of *K. pneumonia,* five isolates of *P. aeruginosa,* and five isolates of *A. baumannii.* The average number of surviving colony forming units per square centimeter (CFU/cm^2) over time was plotted for each group of isolates of the same species.

To download the full study, visit http://goo.gl/VuzIsh.

This is part of an ongoing series designed to educate the public about individual studies conducted with copper and explain its ability to inactivate or kill bacteria, viruses and fungi. To learn more about copper, visit www.antimicrobialcopper.com or www.copper.org.

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