

## Abstract

The effectiveness of copper surfaces in preventing microbial growth has been well documented in laboratory research. Although the molecular mechanism by which this occurs still remains to be fully understood, copper's natural ability to disrupt the spread of bacteria, yeasts, and viruses has drawn the curiosity of public health experts. When they occur, hospital-acquired infections, or HAIs, significantly burden the healthcare delivery system. With the rising prevalence of antibiotic resistance, the need to find new ways to prevent infectious disease is a growing concern. The Copper Touch Project aims to implement these laboratory findings into the clinical setting to prevent nosocomial infections. This pilot study takes place in the intensive care units of the UCLA Ronald Reagan Medical Center, where many of the patients are immuno-compromised. High-touch surfaces (assets) including beds, chairs, tray tables, and procedure carts have been coated with antimicrobial copper in select patient rooms. In order to track the proper placement of these assets in the appropriate patient rooms, undergraduates from the UCLA CTSI Research Associates Program assisted with inventory data collection twice a day, seven days a week over the course of a three-year period. The incidence of HAIs was compared to this data and analyzed for any significant correlations with the presence of the copper assets. In addition, periodic laboratory testing of the copper surfaces was conducted to verify the efficacy of the material throughout the study.

## Purpose

- To study whether reduced bacterial count has a role in:
  - reduced hospital-acquired infections (HAIs)
  - reduced health costs
  - improved patient health outcomes
- To identify any correlations between the presence of antimicrobial copper assets in patient rooms and reduced prevalence of HAIs
- To establish a paradigm for improved hospital sterilization practices and infection-prevention reform

**Figure 1: Assets in the 4ICU coated with copper/sham stainless steel**



## Methods

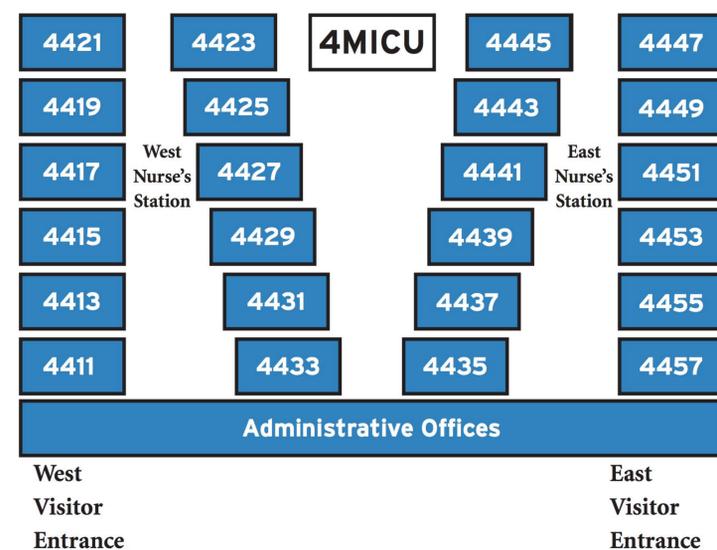
- CTSI Research Associates receive training on professional and ethical conduct in hospital.
  - Includes CITI and HIPAA certification
- The study takes place in the Medical ICU and Transplant Surgical ICU at Ronald Reagan Medical Center.
- Each room in the ICUs contain copper plated, sham copper, or standard metal assets.
  - Assets include: beds, chairs, tray tables, and procedure carts.
  - Copper plated and sham assets are labeled with a blue or yellow sticker.
  - Labeling is double-blinded (RAP students are unaware of which color corresponds to which type of asset).
- RAP students take inventory of each ICU room twice a day to monitor asset movement.
- Data is recorded according to the labels in the chart below:

BLUE	Blue-tagged asset (Indicate room # if no color)
YELLOW	Yellow-tagged asset (Indicate room # if no color)
BLUE; YELLOW	Blue and yellow-tagged assets (Indicate room # if no color)
S	Standard meaning non copper asset.
CNT	Copper asset no color/tag to identify if in correct room.
N/A	Asset not in room.

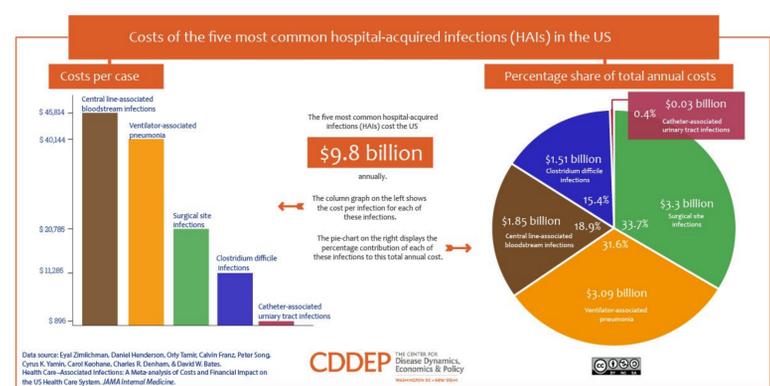
- Students upload this data and share it with the study coordinator. Below is an example of the data compiled after each shift:

April 12, 2017	4415	S	N/A	S	S	
April 12, 2017	4419	S	N/A	S	S	
April 12, 2017	4427	Y	S	Y	S	
April 12, 2017	4431	CNT	N/A	Y	S	
April 12, 2017	4437	N/A	B	B	S	
April 12, 2017	4441	B	S	S	S	
April 12, 2017	4447					BUSY, Curtain Drawn
April 12, 2017	4453	S	Y	S	S	
April 12, 2017	4413	Y	B	S	Y	
April 12, 2017	4417	S	S	S	S	
April 12, 2017	4425	Y	N/A	N/A	Y	Contact Precautions
April 12, 2017	4433	S	B	B	Y	
April 12, 2017	4439	B	S	S	Y	busy
April 12, 2017	4445	Y	S	S	B	
April 12, 2017	4451	CNT	Y	S	Y	
April 12, 2017	4455	S	Y	B	Y	
April 12, 2017	4411	Y	S	Y	Y	
April 12, 2017	4421	S	S	N/A	B	
April 12, 2017	4423	B	N/A	S	B	
April 12, 2017	4429	S	N/A	N/A	B	
April 12, 2017	4435	B	N/A	B	B	
April 12, 2017	4443	B	Y	B	B	
April 12, 2017	4449	S	N/A	N/A	B	
April 12, 2017	4457	CNT	N/A	S	B	
April 12, 2017	8415	S	B	B	Y	
April 12, 2017	8417	Y	Y	S	B	
April 12, 2017	8425	B	S	S	S	
April 12, 2017	8431	S	B	Y	B	
April 12, 2017	8435	S	S	S	Y	
April 12, 2017	8445	S	N/A	Y	S	
April 12, 2017	8447	B	S	S	S	
April 12, 2017	8455	S	S	B	Y	
April 12, 2017	8411	B	S	B	Y	
April 12, 2017	8421					BUSY
April 12, 2017	8423	B	Y	S	Y	
April 12, 2017	8433	S	S	B	S	

**Figure 2: Layout of the rooms in the 4ICU**



## Background



- Copper was the first registered solid antimicrobial material by the U.S. Environmental Protection Agency.<sup>2</sup>
- Bacteria, yeasts, and viruses undergo rapid lysis immediately upon contact.
- Previous applications of copper include smaller scale surfaces such as door handles and railings.
- The Copper Touch Project is a pilot study that applies copper surfaces to the clinical setting in the ICU.
- Hospital-acquired infections (HAIs) are among the leading causes of preventable death in the U.S.
- HAIs not only increase mortality, but also financial cost and burden of hospital care.

## References and Acknowledgments

- Overall and unit costs of the five most common hospital-acquired infections (HAIs) in the US. The Center for Disease Dynamics, Economics, and Policy.
- Grass, G., Rensing, C., and Solioz, M (2011). Metallic Copper as an Antimicrobial Surface. *Microbiol* 77: 1531-1547.
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## Future Directions

Some of the challenges in this pilot study will better inform future studies that measure the impact of antimicrobial copper surfaces in preventing HAIs. The Copper Touch Project plans to expand its collaboration with other partnering medical institutions who are also interested in reducing HAIs in their facilities. Primarily, modifications to the distribution of copper rooms on each floor will help prevent intermixing of each type of asset within a single room. This will help eliminate the confounding effect on data collection of the efficacy of each asset type.