ANTIMICROBIAL COPPER-INFUSED PATIENT GOWNS AND LINENS BACKED BY MULTIPLE OUTCOMES-BASED, PEER-REVIEWED STUDIES
The patient environment is a known source of pathogen transmission.

- Healthcare laundries deliver hygienically clean linens to hospitals.
- Textiles are an excellent substrate for microbial proliferation. Due to large surface area, retention of oxygen, moisture and temperature conditions present between the skin and textiles.
- Patients shed pathogens directly onto the textiles they use. Bacterial shedding is greater in patients than in healthy individuals.
- Linens are most frequently touched and contaminated surfaces in the room.
- The patient environment is a known source of HAIs.
- Cupron provides an extra layer of protection by targeting the areas closest to the patient.
- The use of copper gowns and bed linens lowers bioburden and infection rates.

**THE MOST TOUCHED AND MOST CONTAMINATED SURFACES IN A HOSPITAL ROOM**

- **Most MRSA - Contaminated**
- **Most C Difficile Contaminated**
- **Most Touched**

This study of Cupron’s medical textiles alone validates their effectiveness in preventing hospital acquired infections in a real world clinical setting, along with a robust infection prevention protocol.

~Jacque Butler
Director of Infection Control and Prevention at Sentara Healthcare

Why Add Cupron Medical Textiles to Your Infection Prevention Protocols?

The Only Medical Textiles That:

- Use a broad spectrum, EPA registered antimicrobial
- Require no changes to hospital or laundry operations
- Are clinically validated to reduce C. diff & MRSA rates in 5 peer reviewed studies

Innovation and Patient Safety

- This study of Cupron’s medical textiles alone validates their effectiveness in preventing hospital acquired infections in a real world clinical setting, along with a robust infection prevention protocol.

Jacque Butler
Director of Infection Control and Prevention at Sentara Healthcare

Safe

- In use for over 2 million patient days with no adverse events
- Copper has been used as an antimicrobial in cultures around the world for centuries

Effective

- Organisms cannot become resistant
- Complementary to existing infection prevention protocols

Clinically Proven

- 5 Peer reviewed and published studies demonstrate 20-40% reductions in C. diff & MDRO rates

Continuously Active

- Copper works passively and requires no additional effort by staff
- Implementation is easy
Methods: Rates of HAI caused by C. difficile and Multi Drug Resistant Organisms (MDROs) in 6 Sentara Healthcare hospitals with similar patient demographics (total of 1,019 beds) were compared over three parallel periods (90, 180 and 240 days) before and after replacing all the linens in inpatient rooms with copper infused biocidal linens.

Results: During assessment periods 1 (90 days), 2 (180 days) and 3 (240 days), in comparison to baseline periods 1, 2 and 3, there were 61.19% (p=0.0116), 41.09% (p=0.027), and 42.93% (p=0.0096) reductions in the HAI per 10,000 patient hospitalization days caused by C. difficile, respectively; and 59.8% (p=0.0014), 39.91% (p=0.0145), and 37.19% (p=0.0108) in the reduction of HAI per 1,000 PD caused by C. difficile and MDROs combined.

Discussion: The deployment of biocidal linens across six hospitals resulted in large and statistically significant drops in both C. difficile infections and combined C. difficile and MDRO infections during all three time periods. Study published in the Journal of Hospital Infection in 2018.

Sentara Leigh Hospital vs. Control Hospitals
Copper Patient Gowns, Linens, Hard & Soft Surfaces

**Methods:** In 2015, Sentara designed this study to address the potential confounders in the Sentara Leigh 2014 study (patient characteristics, new building, and DNV MIR certification). Sentara expanded the deployment of copper-infused patient gowns, linens and hard surfaces from half to all inpatient rooms at Sentara Leigh Hospital, and added two control facilities Sentara Princess Anne Hospital (new build, now referred to as Facility 2) and Sentara Virginia Beach Hospital (also DNV-MIR certified, now referred to as Facility 3) to the analysis. The infection rate trends for each of the three facilities were compared between the Baseline Period and the Assessment Period.

**Results:** In the Assessment Period as compared to the Baseline Period, Sentara Leigh saw a 28% reduction of *C. difficile* and MDRO infections. In contrast, in Facilities 2 and 3 there were 103% and 48% increases, respectively. When analyzing the *C. difficile* infections at Sentara Leigh there was a 25% reduction. In contrast, at Facilities 2 and 3, there were 27% and 47% increases, respectively.

**Discussion:** This study addressed the potential confounders of the 2014 study. The copper facility experienced reduced rates in the primary endpoints while the two control facilities saw rate increases. As a result of these findings, Sentara approved the business case to expand the deployment of Cupron’s patient gowns and bed linens, as well as Cupron Enhanced EOS copper-infused bed rail covers and overbed tables, to all inpatient rooms across the Sentara Healthcare system (12 hospitals and 2,522 beds). This study was published in the International Journal of Infection Control in 2018.

**Sentara Leigh Hospital:**
Copper Patient Gowns, Linens, Hard & Soft Surfaces

**Methods:** Study with a control group, assessing reduction of HAIs due to Multi Drug Resistant Organisms (MDROs) and *C. difficile* in the acute care units of Sentara Leigh Hospital in Norfolk, Virginia. One tower was outfitted with copper-infused patient gowns, linens and hard surfaces, and the other tower had regular patient gowns, linens and hard surfaces.

**Results:** The study was conducted over a 25.5-month time period that included a 3.5-month washout period. HAI rates obtained from the copper-containing new hospital wing (14,479 patient-days) and the unmodified hospital wing (19,177 patient days) were compared with those from the baseline period (46,391 patient days). The new wing had 78% (P=.023) fewer HAIs due to MDROs or *C. difficile*, 83% (P=.048) fewer cases of *C. difficile* infection, and 68% (P=.252) fewer infections due to MDROs relative to the baseline period. No changes in rates of HAI were observed in the unmodified hospital wing.

**Discussion:** The reductions in the primary endpoints were large and statistically significant, however the study had potential confounders including differences in patient characteristics, new construction, and the potential impact of DNV-MIR certification. In 2015 the entire hospital was converted to copper patient gowns, bed linens and hard surfaces and a second, expanded study was conducted to address the potential confounders in this study. This study was published in the American Journal of Infection Control in 2016.

American Journal of Infection Control, 44 (12), 1565–71
Herzog Hospital: Copper Patient Gowns and Linens

**Methods:** A 7-month, crossover, double-blind controlled trial including all patients in 2 separate wards in Herzog Hospital, a geriatric-psychiatric hospital in Jerusalem, Israel. For 3 months (period 1), one ward received copper infused textiles and the other received regular textiles. After a 1-month washout period of using regular textiles, for 3 months (period 2) the ward that received the treated textiles received the control textiles and vice versa. The trial personnel were blinded to which were treated or control textiles. There were no differences in infection control measures during the study.

**Results:** A 29.3% relative reduction in physician prescribed Antibiotic Treatment Initiation Events (ATIEs) when using Cupron textiles (P=.002). Furthermore, there was 55.5% decrease in the number of fever days in the patients in the wards that used the treated textiles (P < .0001). Consequently, there were 23.0% and 27.5% reductions in days of antibiotic treatment and daily defined dose (DDD administered in the treated versus control wards (P<.0001)).

**Discussion:** This linens-only, double-blind, crossover-controlled study was the second to demonstrate that surrounding patients with copper-infused textiles results in statistically significant reductions in HAI indicators. This led Cupron to seek to replicate the results in additional settings, and to conduct larger trials in US hospitals using NHSN-based definitions.

Reuth Hospital: Copper Patient Gowns and Linens

**Methods:** The study was conducted in the Head Injury Ward (35 beds) of Reuth Rehabilitation Hospital in Tel Aviv, Israel, a multidisciplinary rehabilitative care hospital. The data was gathered during two 6-month parallel periods: period A, December 2010 to June 2011, and period B, December 2011 to June 2012.

**Results:** In vivo bioburden: 50% reduction in Gram positive bacteria (p=0.005), and 46% reduction in Gram-negative bacteria (p=0.047), on the sheets after 6-7 hours of use.

Infection outcomes: There was a 24% reduction in standardized HAI events in period B as compared to period A (p = 0.046).

There was a decrease in the number of fever days (47%; p = 0.0085). In accordance, there was a 23% reduction in the number of events in which patients received antibiotics (p = 0.052). Moreover, the total days of antibiotic administration during period B was 32.8% lower than in period A (p < 0.0001).

**Discussion:** This pilot trial was the first to show that copper infused linens could reduce bioburden levels and infection rates in a patient care environment. This led Cupron to seek to replicate the results in additional settings, and to conduct larger trials in US hospitals using NHSN-based definitions.
Because bed linens and patient gowns are the most touched and contaminated surfaces in the patient room, and due to their role as reservoirs and vectors for pathogens, your healthcare laundry provider can serve an important role in your patient safety initiatives.

Cupron works with several laundry providers every day and we recommend bringing them into the discussion early.

**Why are Cupron textiles a different color?**
The fibers in Cupron Medical Textiles are permanently embedded with copper during manufacturing. The unique color is caused by the copper content in the fabric and provides a strong visual indicator as to which linens are antimicrobial and which are not.

**Do Cupron textiles need to be laundered differently? Is there a special wash formula?**
Cupron Medical Textiles do not need to be processed differently, but to aid the laundry sorting process at the plant we recommend using separate colored bags for soiled white and Cupron linens. Cupron can be laundered in either batch or tunnel washers with normal industrial detergents and bleaches including peracetic acid, hydrogen peroxide, and chlorine. Cupron provides recommended wash instructions; the only change is that fabric softener should not be used.

**How long do they last?**
Cupron’s linens are more durable than regular white linens. As a result, our largest laundry partner gets >80% more servings from Cupron than regular white linens.

**Longer linen life is positive, but do the linens retain their efficacy?**
Unlike laundry additives or topically applied antimicrobials, Cupron’s antimicrobial copper does not wash off or wear off over time due to the embedded nature of the technology. Antimicrobial testing shows that Cupron Medical Textiles retain 99.9% efficacy during the life of the product.
What is your safety record?
Cupron Medical Textiles have been in use for over 2 million patient days without any reported adverse events due to copper.

What about copper allergies?
Because copper is an element that is found in many foods and multivitamins, true copper allergies are extremely rare. Many people who believe they have a copper allergy have had reactions to copper alloys containing nickel, which Cupron linens do not. There are two rare conditions related to copper metabolism, Wilson’s disease and Menkes syndrome, and these are flagged on admission.

Do you make privacy curtains?
Not at this time. Although studies show curtains are contaminated, our focus is on the textiles closest to the patient as these are the most touched and contaminated surfaces in the room.

Do you have someone who can speak with my laundry provider?
Cupron can provide references to answer any questions.

"Cupron linens have little impact on our daily production process. Providing Cupron linens is a way we support our customers, it’s important to be their partner in infection prevention."

~Charles Berge
President & General Manager,
Shared Hospital Services
Knit Fitted Sheet
SKU: 70004
Weight Dry in ounces: 24 oz.
Weight Dry in pounds: 1.5 lbs.
Width: 36”
Length: 84”
Drop: 14”
Fabric Blend:
55% cotton/45% Cupron Polyester

Flat Sheet
SKU: 70003
Weight Dry in ounces: 19 oz.
Weight Dry in pounds: 1.20 lbs.
Width: 66”
Length: 109”
Fabric Blend:
55% cotton/45% Cupron Polyester

Thermal Blanket
SKU: 70010
Weight Dry in ounces: 40 oz.
Weight Dry in pounds: 2.5 lbs.
Width: 66”
Length: 90”
Fabric Blend:
55% cotton/45% Cupron Polyester

Pillowcase
SKU: 70002
Weight Dry in ounces: 3.5 oz.
Weight Dry in pounds: 0.22 lbs.
Width: 20”
Length: 30.5”
Fabric Blend:
55% cotton/45% Cupron Polyester

Draw Sheet
SKU: 70022
Weight Dry in ounces: 10.90 oz.
Weight Dry in pounds: .68 lbs.
Width: 54”
Length: 78”
Fabric Blend:
55% cotton/45% Cupron Polyester
Bright Red Stitching differentiates it from flat sheet

Pull Blanket
SKU: 70009
Weight Dry in ounces: 28 oz.
Weight Dry in pounds: 1.75 lbs.
Width: 70”
Length: 90”
Fabric Blend:
55% cotton/45% Cupron Polyester

Bath Towel
SKU: 70005
Weight Dry in ounces: 1.3 oz.
Weight Dry in pounds: .08 lbs.
Width: 12”
Length: 12”
Fabric Blend:
55% cotton/45% Cupron Polyester

Washcloth
SKU: 70005
Weight Dry in ounces: 1.3 oz.
Weight Dry in pounds: .08 lbs.
Width: 12”
Length: 12”
Fabric Blend:
55% cotton/45% Cupron Polyester

Patient Gown
SKU: 70007
Weight Dry in ounces: 14.24 oz.
Weight Dry in pounds: .89 lbs.
Width: 65.5” Sweep
Length: 48.75” Center Back
Fabric Blend:
55% cotton/45% Cupron Polyester

10X Patient Gown
SKU: 70008
Weight Dry in ounces: 22.4 oz.
Weight Dry in pounds: 1.40 lbs.
Width: 110” Sweep
Length: 51” Center Back
Fabric Blend:
55% cotton/45% Cupron Polyester
Different color ties denote size

Bath Blanket
SKU: 70009
Weight Dry in ounces: 28 oz.
Weight Dry in pounds: 1.75 lbs.
Width: 70”
Length: 90”
Fabric Blend:
55% cotton/45% Cupron Polyester

ICU sheet for larger dimension beds such as the Hillrom Progressa
SKU: 70024
Weight in ounces: 33.2
Weight in pounds: 2.08
Width: 36”
Drop: 16”
Fabric Blend: 70%Cotton/30% Cupron polyester
Full elastic neon contrast hem for easy identification
About Implementing Cupron in Your Facility

Deploying Cupron doesn’t require any process changes at the facility level, and Cupron provides support before, during, and after deployment.

TO FACILITATE BOTH PATIENT AND STAFF UNDERSTANDING OF THE CHANGE, WE PROVIDE:

- Implementation Playbook for each department: EVS, Radiology, Nursing
- Support for marketing to create in-room signage and patient communications
- On-site staff education sessions by Cupron Clinical Team

Once deployed, the textiles work continuously in the background, complementing all your existing Infection Prevention protocols.

ABOUT CUPRON

Cupron, Inc. is a copper-based antimicrobial technology company that harnesses the unique properties of copper for healthcare, consumer, industrial, and military applications. Cupron embeds various copper formulations in select polymers that enable finished products to deliver the desired impact. Our patented and proprietary embedded copper technologies have earned multiple, unique public health claims from the US Environmental Protection Agency (EPA). Cupron’s technologies are used by companies such as Under Armor, Kimberly Clark, Carhartt, and many others globally.

INNOVATION AND PATIENT SAFETY

“...this is a safe and innovative technology that could be introduced into the environment of care that can dramatically impact the outcomes for patients. Patients really love this not only because it’s soft, but they see the extra efforts that we’re going through to make sure that they’re going to have a good experience during their hospitalization with us.”

~Dr. Richard Milani
Chief Clinical Transformation Officer, Ochsner Health System

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