reduce infections in military and disaster medicine with a new weapon: continuously active antimicrobial copper alloy surfaces

aa estellé, j. rutherford, mg schmidt

antimicrobial copper

reduce infections in military and disaster medicine with a new weapon: continuously active antimicrobial copper alloy surfaces

application: module s rapidly deployable emergency treatment unit (etu)

module s applied copper technology to their emergency medical treatment unit, etu a new life-saving, rapidly-deployable weapon that provides the ability to set-up life-saving medical treatments to help support a team of medical professionals in supporting the Ebola Grand Challenge Award, granted by usaid, the white house option innovation fund and the texas advanced technologyology business center, usa

reduce infections in military and disaster medicine with a new weapon: continuously active antimicrobial copper alloy surfaces

summary of technology and application: enormous costs are generated by healthcare-associated infections (hais) and antibiotic resistance (ar). the clinical and financial impact can be devastating. this is of particular concern for military patients who are frequently exposed to injuries, hospital-acquired infections, and multi-drug resistant organisms. copper alloys have subsequently demonstrated their potential as an alternative to silver and are reported to be effective in reducing bacterial and fungal biofilm formation, metallic copper as an antimicrobial surface. infections were reduced by more than 58% in icu rooms with copper surfaces and 58% reduction in hais (n=614, p=0.013)

patients treated in icu rooms with copper surfaces had significantly fewer infections (hais)

copper surfaces exhibit significantly fewer infections than stainless steel (26%

control rooms: 58% reduction in hais (p=0.013)

pathogens can survive on conventional surface materials for a long time

in addition to the laboratory studies referenced above, a large-scale epidemiological study utilizing culture and molecular techniques (n=1,000) on over 1,000 patients in the us, europe, and the middle east demonstrated that approximately 25% of patients were exposed to one or more infections. of these infections, 70% were nosocomial and 30% were acquired in the community.

pathogens can survive on conventional surface materials for a long time

furthermore, pathogens are developing resistance to antimicrobial treatments at an alarming rate. according to the world health organization (who) trust review on the potential impact of antimicrobial resistance, 10 million people per year could die from a lack of effective treatments in the future. global antibiotic usage has more than doubled in recent years, and conservatively, it has been estimated at $20 billion dollars to $40 billion dollars to constrain the level of antimicrobial resistance. this represents an interest rate of 5 to 10% of global health care costs. the challenge is the development of new antibiotics that are effective against these multidrug-resistant microorganisms.

pathogens can survive on conventional surface materials for a long time

efficacy against high threat pathogens and biofilm agents

in addition to the laboratory studies referenced above, a large-scale study utilizing culture and molecular techniques demonstrated that copper surfaces can rapidly inactivate highly pathogenic bacterial and fungal species (group 1) (staphylococcus aureus and b. botulinum, brucella melitensis, typhoid flexis, francisella tularisaemia, and vancomycin-resistant enterococcus (vre). all of these pathogens cause high levels of microbial burden and can cause severe health problems if they are not treated early.

efficacy against high threat pathogens and biofilm agents

efficiency data on surfaces suggest that copper alloy surfaces will produce the same results as been demonstrated in other studies with highly pathogenic bacteria of an infected person, with whom they are not restricted by the limitations of the biofilm structures that exist in medical equipment.

efficacy against high threat pathogens and biofilm agents

clinical trials and impact on infections

clinical trials and impact on infections

in copper, studies indicated that copper alloys were tested and approved by epa and included pathogens in various environmental locations. in the study conducted by the university of southampton, in a randomized controlled trial involving 200 patients, copper was tested against stainless steel as an experimental control. thus, clinical trials and impact on infections

clinical trials and impact on infections

as a business decision for military and disaster medicine copper can be derived from the southgate study. taking conservative estimates, the us army calculated that copper could increase the cost of outfitting the intervention rooms with copper surfaces and prevent infections, leading to $602,000 in savings.

clinical trials and impact on infections

in addition to the southgate study, other clinical studies have also reported the ability of copper alloys to reduce nosocomial microbial burden and infection. vin danzer and colleagues recently reported a 79% reduction in nosocomial infections for patients treated in icu rooms with copper surfaces and 50% simply by converting less than 10% of the touchable surfaces in icu rooms with copper, stainless steel served as the experimental control. thus, clinical trials and impact on infections

clinical trials and impact on infections

the microbial burden found on the components made from copper alloys is fully recyclable and typically contains an average of 24% copper by weight. the residual copper alloy substrate is a continuously active metal that can be compared to a public health and economic benefit in diverse care settings.

clinical trials and impact on infections

combating antibiotic resistance with copper surfaces

combating antibiotic resistance with copper surfaces

the microbial burden found on the components made from copper alloys is fully recyclable and typically contains an average of 24% copper by weight. the residual copper alloy substrate is a continuously active metal that can be compared to a public health and economic benefit in diverse care settings.

combating antibiotic resistance with copper surfaces

combating antibiotic resistance with copper surfaces

the microbial burden found on the components made from copper alloys is fully recyclable and typically contains an average of 24% copper by weight. the residual copper alloy substrate is a continuously active metal that can be compared to a public health and economic benefit in diverse care settings.

combating antibiotic resistance with copper surfaces

combating antibiotic resistance with copper surfaces

in southgate study, patient infection critical care unit. in infection control and hospital epidemiology. 34(5), 479–486.

combating antibiotic resistance with copper surfaces

combating antibiotic resistance with copper surfaces

the microbial burden found on the components made from copper alloys is fully recyclable and typically contains an average of 24% copper by weight. the residual copper alloy substrate is a continuously active metal that can be compared to a public health and economic benefit in diverse care settings.

combating antibiotic resistance with copper surfaces

combating antibiotic resistance with copper surfaces

the microbial burden found on the components made from copper alloys is fully recyclable and typically contains an average of 24% copper by weight. the residual copper alloy substrate is a continuously active metal that can be compared to a public health and economic benefit in diverse care settings.

combating antibiotic resistance with copper surfaces

combating antibiotic resistance with copper surfaces

the microbial burden found on the components made from copper alloys is fully recyclable and typically contains an average of 24% copper by weight. the residual copper alloy substrate is a continuously active metal that can be compared to a public health and economic benefit in diverse care settings.

combating antibiotic resistance with copper surfaces

combating antibiotic resistance with copper surfaces

the microbial burden found on the components made from copper alloys is fully recyclable and typically contains an average of 24% copper by weight. the residual copper alloy substrate is a continuously active metal that can be compared to a public health and economic benefit in diverse care settings.

combating antibiotic resistance with copper surfaces

combating antibiotic resistance with copper surfaces

the microbial burden found on the components made from copper alloys is fully recyclable and typically contains an average of 24% copper by weight. the residual copper alloy substrate is a continuously active metal that can be compared to a public health and economic benefit in diverse care settings.

combating antibiotic resistance with copper surfaces

combating antibiotic resistance with copper surfaces

the microbial burden found on the components made from copper alloys is fully recyclable and typically contains an average of 24% copper by weight. the residual copper alloy substrate is a continuously active metal that can be compared to a public health and economic benefit in diverse care settings.

combating antibiotic resistance with copper surfaces

combating antibiotic resistance with copper surfaces

the microbial burden found on the components made from copper alloys is fully recyclable and typically contains an average of 24% copper by weight. the residual copper alloy substrate is a continuously active metal that can be compared to a public health and economic benefit in diverse care settings.

combating antibiotic resistance with copper surfaces

combating antibiotic resistance with copper surfaces

the microbial burden found on the components made from copper alloys is fully recyclable and typically contains an average of 24% copper by weight. the residual copper alloy substrate is a continuously active metal that can be compared to a public health and economic benefit in diverse care settings.

combating antibiotic resistance with copper surfaces

combating antibiotic resistance with copper surfaces

the microbial burden found on the components made from copper alloys is fully recyclable and typically contains an average of 24% copper by weight. the residual copper alloy substrate is a continuously active metal that can be compared to a public health and economic benefit in diverse care settings.

combating antibiotic resistance with copper surfaces

combating antibiotic resistance with copper surfaces

the microbial burden found on the components made from copper alloys is fully recyclable and typically contains an average of 24% copper by weight. the residual copper alloy substrate is a continuously active metal that can be compared to a public health and economic benefit in diverse care settings.

combating antibiotic resistance with copper surfaces

combating antibiotic resistance with copper surfaces

the microbial burden found on the components made from copper alloys is fully recyclable and typically contains an average of 24% copper by weight. the residual copper alloy substrate is a continuously active metal that can be compared to a public health and economic benefit in diverse care settings.

combating antibiotic resistance with copper surfaces

combating antibiotic resistance with copper surfaces

the microbial burden found on the components made from copper alloys is fully recyclable and typically contains an average of 24% copper by weight. the residual copper alloy substrate is a continuously active metal that can be compared to a public health and economic benefit in diverse care settings.

combating antibiotic resistance with copper surfaces

combating antibiotic resistance with copper surfaces

the microbial burden found on the components made from copper alloys is fully recyclable and typically contains an average of 24% copper by weight. the residual copper alloy substrate is a continuously active metal that can be compared to a public health and economic benefit in diverse care settings.

combating antibiotic resistance with copper surfaces

combating antibiotic resistance with copper surfaces

the microbial burden found on the components made from copper alloys is fully recyclable and typically contains an average of 24% copper by weight. the residual copper alloy substrate is a continuously active metal that can be compared to a public health and economic benefit in diverse care settings.

combating antibiotic resistance with copper surfaces

combating antibiotic resistance with copper surfaces

the microbial burden found on the components made from copper alloys is fully recyclable and typically contains an average of 24% copper by weight. the residual copper alloy substrate is a continuously active metal that can be compared to a public health and economic benefit in diverse care settings.

combating antibiotic resistance with copper surfaces

combating antibiotic resistance with copper surfaces

the microbial burden found on the components made from copper alloys is fully recyclable and typically contains an average of 24% copper by weight. the residual copper alloy substrate is a continuously active metal that can be compared to a public health and economic benefit in diverse care settings.

combating antibiotic resistance with copper surfaces

combating antibiotic resistance with copper surfaces

the microbial burden found on the components made from copper alloys is fully recyclable and typically contains an average of 24% copper by weight. the residual copper alloy substrate is a continuously active metal that can be compared to a public health and economic benefit in diverse care settings.

combating antibiotic resistance with copper surfaces

combating antibiotic resistance with copper surfaces

the microbial burden found on the components made from copper alloys is fully recyclable and typically contains an average of 24% copper by weight. the residual copper alloy substrate is a continuously active metal that can be compared to a public health and economic benefit in diverse care settings.

combating antibiotic resistance with copper surfaces

combating antibiotic resistance with copper surfaces

the microbial burden found on the components made from copper alloys is fully recyclable and typically contains an average of 24% copper by weight. the residual copper alloy substrate is a continuously active metal that can be compared to a public health and economic benefit in diverse care settings.