

ANTIMICROBIAL SURFACES

LOWER INFECTION RATES THROUGH COPPER SURFACES

The medical community is waking up to the benefits of using antimicrobial copper surfaces in healthcare settings as an additional measure to prevent infection from spreading. Bryony Samuel of the Copper Alliance makes the business and clinical case

While hand hygiene, cleaning and disinfection remain the pillars of infection prevention, in a busy clinical environment it is almost impossible to wash hands and surfaces often enough. Upgrading selected touch surfaces to antimicrobial copper is a simple but effective measure, shown to reduce costly infections, freeing up beds and clinical resources and improving patient care. After a very short initial payback period, significant long-term savings are possible.

THE COST OF STANDARD SURFACES

Harmful pathogens can survive and multiply on standard clinical touch surfaces, creating reservoirs of infection that pose a risk to everyone using a healthcare facility – patients,

staff and visitors. Even regular disinfection cannot prevent recontamination between cleans. Combined with often sub-optimal compliance with hand washing regimen, these surfaces are a major challenge in preventing the spread of infection.

Healthcare-associated infections (HCAIs) are very common and have a huge cost, both financially and in terms of human lives and suffering. Approximately 20 per cent of intensive care unit patients in European hospitals contract an HCAI. In 2011, HCAIs affected 4.1 million

patients Europe-wide, requiring 16 million extra days in hospital for treatment, with direct clinical cost exceeding €7 billion. 37,000 deaths were recorded as being caused by an HCAI and 110,000 deaths had HCAIs as a contributory factor.

WHAT IS ANTIMICROBIAL COPPER?

Copper is inherently antimicrobial – with proven efficacy against bacteria such as MRSA and *C. difficile* and viruses such as Influenza A and Norovirus – killing pathogens that settle on its surface rapidly and continuously. It shares this benefit with many commonly-used copper alloys, such as brass and bronze, and this family of solid metals is collectively called ‘antimicrobial copper’.

Surfaces such as bed rails, IV poles, chair arms, door handles and taps that are made from antimicrobial copper – in combination with good hand hygiene and regular cleaning – help lower the spread of infection and make a strong contribution to improving patient safety.

CLINICAL EVIDENCE

Laboratory work proving antimicrobial copper's efficacy against many headline-making pathogens led to clinical trials around the world to explore its potential in real healthcare ▶

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◀ environments. These trials – including one at Selly Oak Hospital in Birmingham – have found that surfaces made from antimicrobial copper harbour >80 per cent fewer pathogens than non-copper equivalents.

In 2013, a multi-site US clinical trial – funded by the Department of Defense – demonstrated that replacing just six frequently touched surfaces around an intensive care unit patient reduced their risk of acquiring an HCAI by 58 per cent.

This resulted in healthcare watchdog organisations reviewing the considerable evidence base surrounding the characteristics and application of antimicrobial copper (more than 200 published papers) as an adjunct to existing infection control measures, flagging it as a key technology for healthcare decision-makers to consider in the coming year.

ECRI Institute – a world-leader in researching the best approaches to patient care – included antimicrobial copper in their 'Top 10 Hospital C-Suite Watch List 2014', targeting senior decision-makers within healthcare systems, providing them with summaries of emerging

technologies that can help improve capital planning efforts throughout the year.

Similarly, the Canadian Network for Environmental Scanning in Health (CNESH) – leaders in healthcare horizon scanning – features copper in their 'Top 10 New & Emerging Health Technology Watch List: 2014'.

In the UK, our 'epic3: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England' also includes copper, following a recent review of published research commissioned by the Department of Health. Studies reporting significant reductions in microbial burden of between 80 and 90 per cent on high-touch surfaces made from copper alloys are described under 'Emerging Technologies'.

THE BUSINESS CASE

The unique benefit offered by antimicrobial copper is its continuous nature. Once installed, a surface will reduce bioburden non-stop, in between cleans and without further intervention from staff. No special cleaning or training is needed, and antimicrobial

copper alloys such as brass, bronze and copper-nickel are known for being hard wearing and resilient, making them ideal for a long life in a challenging healthcare environment. Being solid, there is also no surface coating that could wear away and result in reduced efficiency over time. Any dents or scratches in an antimicrobial copper surface will still continuously kill pathogens.

The question, then, is one of economy: how much does it cost to augment existing infection control practices with antimicrobial copper, and what long-term financial benefits does it offer?

Health economics evaluations are typically applied to medication or surgery costs, but a unique study by York Health Economics Consortium (YHEC) – part of the University of York – investigated the economic benefits of antimicrobial copper as an engineering and design approach to infection control.

The study compared expenditure on copper and standard components with improvements in patient outcomes (fewer infections, shorter stays, cost savings) and other tangible benefits drawn from the US clinical trial. This investigation allowed the derivation of a spreadsheet-based model using the best current published information, which was presented at the WHO International Conference on Prevention and Infection Control in Geneva last year.

Using UK data, and a conservative infection rate reduction of 20 per cent (where the US ▶

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◀ trial reported a 58 per cent reduction), the model considers a planned refurbishment or new build. It predicts that the cost of replacing the six key touch surfaces in a 20-bed ICU with antimicrobial copper equivalents will be recouped in less than two months, based on fewer infections and the resulting shorter lengths of stay. It also calculates a positive impact on bed days and quality-adjusted life years offered by antimicrobial copper.

Dr Matthew Taylor, YHEC's Director and one of the model's authors, explains: "After the initial two months, ongoing cost savings will accrue from the reduction in blocked beds and better-directed staff resources."

PRODUCT SPECIFICATIONS

Beyond practical considerations, copper alloys also provide a palette of attractive colours from the yellow of brasses to the dark browns of bronzes and silver/white shades of nickel silvers. Alloys with higher copper content kill organisms faster but, as a general rule, alloys with >60 per cent copper have sufficient efficacy for a clinical environment. Consequently, there are hundreds of antimicrobial copper products on the market – in different alloys and designs – so, how do you get started with selecting and installing the most beneficial antimicrobial copper surfaces

for a particular healthcare environment? Support with procuring efficacious products is offered in the form of an industry stewardship scheme. The Antimicrobial Copper brand and Cu+ mark are used by leading manufacturers of hospital equipment, furniture and fittings to indicate that their products are made from antimicrobial copper in a stewardship scheme established by the Copper Alliance, a global network of non-profit organisations.

The use of the Antimicrobial Copper brand and Cu+ mark by an organisation indicates they have been granted permission to do so based upon adherence to strict usage rules. These rules guide that organisation's understanding of the underlying technology and the way they promote, advise on and deploy it in line with existing research, regulatory and legislative requirements.

WHO SHOULD BE INVOLVED?

Installations have already taken place in more than 25 countries, and in these hospitals the importance of taking a multi-disciplinary approach has become clear.

Finance managers can download the YHEC model, enter their own data and see how the cost of an installation – paid out of the estates or capital budget – is more than outweighed by the significant clinical savings earned against a care budget.

The infection control team can review the scientific evidence and liaise with nursing staff to identify touch surface items of particular concern for different clinical areas. Surfaces in closest proximity to patients are typically the most contaminated.

Estates managers can be reassured that products are available from a wide range of companies in the UK and overseas. They are affordable, durable, proven to work and compatible with standard cleaning and disinfecting agents. Managers can be confident that products certified as Cu+ approved are backed by an international stewardship scheme.

HOW CAN I FIND OUT MORE?

Download and explore the business case on our website, direct the infection control team to the Scientific References section and visit the Product Directory to browse Cu+ approved items currently on the market.

Antimicrobial copper surfaces are completely safe to use, and it is important to note they are a supplement to, not a substitute for, standard infection control practices. Users should continue to follow all current infection control practices, including those related to cleaning and disinfection of environmental surfaces. ■

FURTHER INFORMATION

www.antimicrobialcopper.org

Year results model

A worked example of a planned refurbishment of a 20-bed ICU, changing six near-patient items to copper, showing payback of <2 months and 360 bed days freed per year. This results in a cost per infection averted of £102. The model calculates additional benefits including bed days freed and Quality-Adjusted Life Years. To download the model visit <http://tinyurl.com/mmgp3xq> or email info@copperalliance.org.uk.

	Copper	Baseline	Incremental
Total cost (excluding cost of infections)*	£105,000	£74,400	£30,600
Number of infections	1,200	1,500	300
Cost per infection averted (excluding cost of infections)			£102.00
Total QALYS gained			107.40
Cost per QALY			£284.92
Cost of infections*	£7,200,000	£9,000,000	-£1,800,000
Total cost of intervention	£7,305,000	£9,074,400	-£1,769,400
Cost per infection averted			Dominant [‡]

*These are direct costs to the hospital (no GP costs or societal costs have been included in the model).

‡ Dominant means that antimicrobial copper is both the cheaper and the more effective option.

Number of bed days saved per year	360
Cost per bed day saved per year	£86.00

The number of bed days saved per year is 360, which would allow an increased capacity in the ICU of 63 beds with a typical length of stay of 5.7 days.

Return on investment	<2 months
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The cost of the copper upgrade is £105,000 compared to £74,000 for installation of non-copper items. There were 1,200 infections in the copper group over the period and 1,600 in the baseline. This results in a cost per infection averted of £102.00.