Near-patient Antimicrobial Copper Touch Surfaces for Infection Control

The Business Case

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Introduction

While hand hygiene and environmental disinfection are two key pillars of infection control, additional measures are needed to combat the ever present threat of healthcare-associated infections (HCAIs). Interventions that improve patient outcomes will also reduce the associated number of additional patient-bed days, the cost of care and the use of antibiotics.

The pathogens that cause HCAIs can survive in the environment for days, even months, providing reservoirs of infectious agents on frequently touched surfaces. Durable and effective antimicrobial copper surfaces offer an engineering solution which can serve as an additional line of defence against the pathogens that cause HCAIs. Copper-containing touch surfaces have been shown to significantly and continuously reduce bioburden by >90% in clinical trials in Chile, the UK and the US. The link between reduced bioburden on frequently touched surfaces and reduced infection rates has been shown in a Department of Defense-funded study in the US. In that study, replacing just six key touch surfaces in single room ICUs with copper-containing items led to a 58% reduction in infections. As the evidence behind copper has grown, installations are taking place around the world, predominantly in clinical settings where the most vulnerable patients are treated: ICUs, Cystic Fibrosis, Paediatric and Neonatal units. These installations have yielded data on the cost of antimicrobial copper components to establish a dataset of deployment costs.

Cost-benefit Model

International Copper Association, Ltd has commissioned York Health Economics Consortium, a global leader in healthcare-associated modelling, to develop a fully referenced cost-benefit model for hospital managers to illustrate the economic rationale of an antimicrobial copper intervention. Their model is based on the cost of implementing a copper touch surface installation and the balancing cost savings resulting from reduced infection rates. This document details a worked example using actual screenshots from the software. A paper is currently being prepared by YHEC to explain, in detail, the rationale of the model.

Data

The valuation of the total economic cost of HCAIs is difficult to calculate accurately and there is a dearth of comparable data in the public domain. This model uses referenced data to provide estimates of return on investment for installing a set of copper components as part of a new build or planned refurbishment. The model is populated with established datasets for UK rates and costs of HCAIs, cost of copper components and similar components without antimicrobial efficacy, but also allows users to enter their own, local data for customised calculations.

Worked Example: Intensive Care Unit, UK

Parameter	Value	Note
Number of beds	20	Single room configuration.
Number of patients per annum	1,200	Based on an average stay of 6 days (Edbrooke 2011).
Infection rate (all HCAIs)	25%	27.1% in Cairns 2010. 23.4% in English National Point Prevalence Survey on Healthcare, Health Protection Agency (2012).
Cost per HCAI	£6,000	Negrini (2006) reported the average cost per patient-day over 75 UK ICUs was $1,512 (£1,000) and an HCAI results in an additional 6 days. While the model allows for costs of subsequent outpatient and GP visits to be taken into account, these are not considered here.
Items to be upgraded to copper (or antimicrobial copper alloy)	6 critical items: IV drip pole Bed rails Computer input device Nurse call button Over-bed table Visitor chair	Schmidt MG, Copper Touch Surface Initiative. Microbiology and Immunology, Medical University of South Carolina, Charleston, USA, BMC Proceedings 2011, 5(Suppl 6):O53 (Oral presentation delivered at 1st International Conference on Prevention and Infection Control, June 29-July 2, 2011, Geneva, Switzerland). Sustained Reduction of Microbial Burden on Common Hospital Surfaces through Introduction of Copper, Michael G Schmidt *et al*, Journal of Clinical Microbiology, July 2012, Vol 50, No 7. This study was conducted in single-room ICUs. Other key touch surface replacements are also available - such as door handles, push plates, taps - that comply with current hospital regulatory requirements, and have been identified as high risk touch surfaces in other clinical areas.
Cost of intervention	£30,600	This is the cost difference between copper and standard, non-antimicrobial components, using early market prices. As this example is based on a new build or planned renovation, installation costs would be similar and have therefore not been considered.
Reduction in HCAIs post intervention	20%	Copper Surfaces Reduce the Rate of Healthcare-Acquired Infections in the Intensive Care Unit, Cassandra D Salgado *et al*, Infection Control and Hospital Epidemiology, May 2013, Vol 34, No 5. This study demonstrated a 58% reduction in infections in ICU rooms equipped with copper. The example below uses a conservative figure of 20%.

5 Year Results

Using the above inputs, the model yields a return on investment of less than two months. The cost of copper components is £105,000 compared to £74,400 for standard items. There were 1,200 infections in the copper group and 1,500 in the baseline. 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 www.antimicrobialcopper.com/uk/why-antimicrobial-copper/the-business-case.aspx 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	**£85.00**

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**

The cost of the copper upgrade is £105,000 compared to £74,400 for installation of non-copper items. There were 1,200 infections in the copper group over the period and 1,500 in the baseline. This results in a cost per infection averted of £102.00.