

# Business Case for the use of Antimicrobial Copper Touch Surfaces to Reduce Infectious Bacteria in Healthcare Environments

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## Significant Burden of Healthcare-Acquired Infections

Despite best efforts that promote good hand hygiene practices, isolation protocols and cleaning of healthcare surfaces<sup>1, 2</sup>, infections acquired during hospital stays are the most common complication of hospital care, and one of the most serious patient safety concerns. An estimated 1.7 million healthcare-acquired infections (HAIs) occur each year, leading to about 100,000 deaths.<sup>3</sup> Nationally, annual direct hospital costs of HAIs are estimated to be as high \$45 billion.<sup>4</sup>

At a typical 420 bed hospital, it is projected that treatment costs for healthcare-acquired infections will be \$36 million annually.<sup>5</sup> With CMS instituting policies to limit hospital reimbursement for HAIs<sup>6</sup> (and private insurance providers expected to follow suit), the negative impact to a hospital's operating budget can be significant.

This outline describes how introduction of new Antimicrobial Copper metallic touch surfaces will aid in the reduction in the levels of infectious bacteria throughout hospitals, while also helping them comply with federal mandates for improved patient safety. It will additionally make the "business case" that hospitals can potentially save tens of millions of dollars in healthcare costs associated with the treatment of unintended patient infections.

## Benefits of Using Antimicrobial Copper Touch Surfaces

The plastic, stainless steel, coated metal and wood surfaces that hospitals use for healthcare equipment and furnishings harbor potentially dangerous bacteria for days, if not weeks. However, touch surfaces made from copper-based metals (copper alloys) have an inherent ability to kill harmful bacteria<sup>7</sup> within two hours or less. Antimicrobial Copper touch surfaces can offer considerable benefits by reducing patient exposure to these pathogens in healthcare environments. This is especially

beneficial to patients acutely vulnerable to infection—such as in cancer centers, neonatal units, Medical ICUs and among the elderly.

By keeping bacterial levels low, healthcare designs that use Antimicrobial Copper touch surfaces can also generate cost savings to hospitals—including paybacks of less than a year.<sup>8</sup> Additionally, the copper alloy components are durable and can last for decades.

## Copper's Effectiveness Based on Lab tests, EPA registration and Clinical Trials

This level of real savings is based on both laboratory research<sup>7</sup> and a four year clinical trial.<sup>9,10</sup> Laboratory tests, conducted for EPA Registration<sup>7</sup> show Antimicrobial Copper alloys kill 99.9% of infectious bacteria within two hours or less; and keep bacteria levels low after repeated contamination. A clinical trial<sup>9,10</sup> introduced Antimicrobial Copper touch surfaces into several hospital critical care units. These surfaces performed on a round-the-clock basis to lower the bacterial contamination by an average reduction of 83% compared to the existing healthcare surfaces.<sup>9</sup>

## Calculating the "Cost/Benefit" of Antimicrobial Copper Touch Surfaces

A case for outfitting hospital rooms with Antimicrobial Copper surfaces can be readily justified based on intangible benefits of reduced infection rates alone. This includes such "avoidance costs" of long term morbidity and associated pain and suffering to patients that develop HAIs; potential mortality; and the impact that infections and death have on family members (including lost wages).

A business case (including a relatively short ROI) can be made for installing Antimicrobial Copper touch surfaces based on the cost to manage hospital-acquired infections compared to the cost to outfit hospital rooms with copper, as detailed below.



## Cost of Infection:

**Incidence of HAIs.** On average, five percent of hospital patients develop an HAI.<sup>11</sup> Twice this number develops infections in intensive care units.

**Direct Costs to Treat HAIs.** As shown in the table below, a patient acquiring an infection during hospital care stays in the hospital, on average, nearly five times as long as patients that do not develop infections. Their hospital charges are \$43,000 higher; and they are 600% more likely to die in the hospital than patients that do not acquire infections.<sup>12</sup>

	Average LOS (Length of Stay)	% In-Hospital Mortality	Average Charge
Without HAIs	5.2 days	1.5%	\$9,377
With HAIs	24.4 days	9.0%	\$52,096

Agency for Healthcare Research and Quality August 2010. *Adult Hospital Stays with Infections due to Medical Care.*<sup>12</sup>

For a 420 bed hospital, with a 5% HAI incidence, AHA hospital data,<sup>13</sup> and AHRQ estimates on added cost to treat patients with infections due to medical care,<sup>12</sup> projected costs to treat HAIs calculate to \$36 million per year.<sup>5</sup>

## Cost of Intervention (with Antimicrobial Copper surfaces):

**Cost to outfit hospital room.** High-touch healthcare surfaces include bed rails, IV poles, tables, chairs, keyboards, mice and other data input devices, door levers, cabinet hardware, light switches, grab bars, hand rails, countertops, sinks, faucets, linen hampers and more. Based on an estimated cost to convert primary touch points on these components (at \$7,700 - \$15,000 per room). The total cost to outfit a 420 bed hospital with Antimicrobial Copper surfaces would be between \$3 to 6 million.<sup>8</sup>

**Expected Reduction in infections.** Our business case model assumes that Antimicrobial Copper surfaces on all of the items mentioned above will reduce infectious bacteria by more than 83% and will cut total infection rates by 20%. This is a conservative estimate based on published data from a clinical trial which found that the strategic placement of copper surfaces in the Intensive Care Unit reduced HAIs by 58%.<sup>10</sup>

**Potential savings to Hospital.** A 20% reduction in infections would translate to an annual cost savings of \$7.2 million.<sup>14</sup> Based on an initial, **one-time cost** of \$3 to 6 million, outfitting **all** single-patient rooms in a 420 bed hospital with Antimicrobial Copper touch surfaces would yield a payback in less than one year.

Based on these estimates of expenditures to treat HAIs over the next decade, the cumulative cost could exceed the cost to construct a new 420 bed hospital! If CMS and others stop reimbursements for HAIs, then installing Antimicrobial Copper surfaces could **save** a hospital an estimated \$66 million in operating expenses over the 10 year period.

## References:

- 1 *Guideline for Disinfection and Sterilization in Healthcare Facilities*, 2008 William A. Rutala, Ph.D., M.P.H.1,2, David J. Weber, M.D., M.P.H.1,2, and the Healthcare Infection Control Practices Advisory Committee (HICPAC)
- 2 Siegel JD, Rhinehart E, Jackson M, Chiarello L, and the Healthcare Infection Control Practices Advisory Committee, 2007 *Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings*, June 2007
- 3 2010 *National Healthcare Quality Report (NHQR)* U.S. Department of Health and Human Services Agency for Healthcare Research and Quality AHRQ Publication No. 11-0004 March 2011 (Klevens R.M., Edwards J.R., Richards C.L., Horan T.C., Gaynes R.P., Pollock D.A., Cardo D.M. "Estimating Health Care-Associated Infections and Deaths in U.S. Hospitals, 2002." *Public Health Reports*. 2007; 122: 160-6.)
- 4 *The Direct Medical costs of Healthcare-Associated Infections in U.S. Hospitals and the Benefits of Prevention* Author – R. Douglas Scott II, Economist Division of Healthcare Quality Promotion National Center for Preparedness, Detection, and Control of Infectious Diseases Coordinating Center for Infectious Diseases Centers for Disease Control and Prevention March 2009
- 5 Calculation of \$36 million is based on 420 bed hospital; 40 patient stays per bed (see footnote 13: admissions/# of staffed beds); 5% infection rate (see footnote 6); Cost of infection @ \$43,000 (see footnote 12).
- 6 McHugh M., Martin T.C., Orwat J., Van Dyke K., *Medicare's Policy to Limit Payment for Hospital-Acquired Conditions: The Impact on Safety Net Providers*, *Journal of Health Care for the Poor and Underserved* - Volume 22, Number 2, May 2011, pp. 638-647, The Johns Hopkins University Press
- 7 EPA registration: <http://www.epa.gov/pesticides/factsheets/copper-alloy-products.htm> Laboratory testing shows that, when cleaned regularly, Antimicrobial Copper kills greater than 99.9% of the following bacteria within 2 hours of exposure: MRSA, Vancomycin-Resistant *Enterococcus faecalis* (VRE), *Staphylococcus aureus*, *Enterobacter aerogenes*, *Pseudomonas aeruginosa*, and *E. coli* O157:H7.
- 8 Payback based on \$3 to 6 million one-time initial cost (calculations based on work with healthcare equipment and furnishings suppliers' development of products with touch surfaces of hospital-grade Antimicrobial Copper alloys) and estimated \$7.2 annual cost reduction in HAIs.
- 9 Schmidt M.G., Attaway H.H., Sharpe P.A., John J., Sepkowitz K.A., Morgan A., Fairley S.E., Singh S., Steed L.L., Cantej J.R., Freeman K.D., Michels H.T., Salgado C.D., *Sustained Reduction of Microbial Burden on Common Hospital Surfaces Through Introduction of Copper*, *Journal of Clinical Microbiology*, 2012 50(7):2217
- 10 Salgado C., Sepkowitz K.A., John J., Cantej J., Attaway H., Freeman K., Sharpe P.A., Michels H.T., and Schmidt M.G. *Copper Surfaces Reduce the Rate of Hospital Acquired Infections in the Intensive Care Unit*, *Infection Control and Hospital Epidemiology*, 2013 Vol. 34, No 5, Special Topic Issue: The Role of the Environment in Infection Prevention, pp.479-486
- 11 Grohskopf LA, Sinkowitz-Cochran RL, Garrett DO, et al. A national point-prevalence survey of pediatric intensive care unit-acquired infections in the United States. *J Pediatr* 2002;140:432-438
- 12 Hospital stays with infections due to medical care were 19.2 days longer and the cost was nearly \$43,000 greater than stays without infections. *Healthcare Cost and Utilization Project*. Agency for Healthcare research and Quality. Statistical Brief#94, August 2010 Jennifer Lucado, M.P.H., Kathryn Paez, Ph.D., M.B.A., R.N., Roxanne Andrews, Ph.D., and Claudia Steiner, M.D., M.P.H.
- 13 American Hospital Association Data, 2009 (latest) Number of Registered Hospitals (5,795) Number of Staffed Beds (944,277), Total Admissions in all U.S. Registered Hospitals: (37, 479,709) Note: Total admissions/number of staffed beds = 40 admissions/bed.
- 14 Annual savings based on 20% reduction in infections and calculation in footnote 5.

\* Laboratory testing shows that, when cleaned regularly, antimicrobial copper surfaces kill greater than 99.9% of the following bacteria within 2 hours of exposure: Methicillin-resistant *Staphylococcus aureus* (MRSA), Vancomycin-resistant *enterococcus faecalis* (VRE), *Staphylococcus aureus*, *Enterobacter aerogenes*, *Pseudomonas aeruginosa*, and *E. coli* O157:H7. Antimicrobial copper surfaces are a supplement to and not a substitute for standard infection control practices. Like other antimicrobial products, they have been shown to reduce microbial contamination, but do not necessarily prevent cross contamination; users must continue to follow all current infection control practices.