Innovative new methods of combating Hospital Acquired Infections are now being released

New Weapons Against HAIs

By Nasim Delavari
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Given the prevalence of hospital-acquired infections (HAIs) in the United States, several companies are making efforts to develop technologies to reduce the occurrence of HAIs.

In a multistate point-prevalence survey of health care-associated infections published in 2014, it was estimated there were about 648,000 patients with 721,800 health care-associated infections in U.S. acute care hospitals in 2011. Pneumonia ranked as the most commonly reported infection while *Clostridium difficile* was the most commonly reported pathogen.

Consequently, several companies have launched product lines to combat microbial growth and infection in hospitals, such as antimicrobial paints, curtains, and linens. At this time, research on the inhibition or reduction of bacteria and/or fungi while using these products is unclear, since many are relatively new to the market. However, it will be interesting to see if research shows these products are effective as they become more widely used.

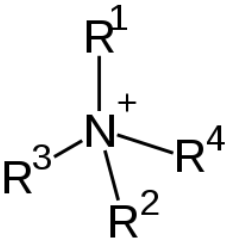
One new development to combat HAIs is Sherwin-Williams' Microban® technology, aimed to provide antimicrobial protection through a protective coating. By engineering Microban® technology into coatings and product finishers,

Sherwin-Williams claims that wood, plastics, electronics, medical equipment, and metal office furniture can be shielded against the spread of microorganisms. Microban® technology alters the molecular structure of the coating, thereby providing a continuous protection which inhibits the growth of unwanted bacteria.

More recently, Sherwin-Williams plans to launch Paint Shield™, their microbiocidal paint line in over 500 colors. Paint Shield™ is the first EPA-registered paint claimed to kill bacteria after two hours of contact with the painted surfaced. Interestingly, Paint Shield™ claims to tackle some of the more difficult to treat bacteria, such as *Staphylococcus aureus* (including MRSA), *E.coli*, *Enterobacter aerogenes*, and *E. faecalis* (including VRE).

EPA efficacy testing demonstrates Paint Shield™ can last up to four years, provided the integrity of the surface is maintained. Paint Shield™ reportedly kills greater than 99.9% of the organisms listed above and continues its microbicidal activity at 90% for up to four years.

The active ingredient used in Paint Shield™ is a quaternary ammonium compound called alkyl dimethyl benzyl ammonium chloride. The team of over 350 chemists at Sherwin-Williams' Breen Technology Center discovered a way to stabilize this compound in paint without compromising its integrity or that of the paint .



While this technology sounds cutting-edge, a lot of consumers and scientists are skeptical about the long-term benefits of Paint Shield™. For those prudent buyers, Sherwin-Williams offers several technical documents on their website regarding Paint Shield™ products. The Safety Data Sheets (SDS) for Paint Shield™ products state it is considered hazardous by OSHA standards and is classified as a Category 2 substance for carcinogenicity.

There are no studies providing information on the health risks or benefits in using Paint Shield™, since this is a very new product. Perhaps in a few years,the market will gain a better understanding of this technology.

Antimicrobial paint is not the only item on the market developed with the intention to reduce infections. Bio Technics Ltd in Scotland developed their Endurocide™ line in 2005, offering the world's first antimicrobial and sporicidal hospital curtains.

With claims against the hardiest of bugs, such as *C. difficile* spores, MRSA, VRE, ESBL *E.coli*, and more, these curtains are made of 100% recyclable polypropylene and, when soiled, can be disposed of as standard hospital waste. However, their mechanism of action differs from that of antimicrobial paints.

Endurocide® antimicrobial and sporicidal disposable curtains are made of fabrics containing a biostatic polymer layer: meaning when pathogens land on the fabric, they are trapped

within the polymer and cannot replicate. The activity of the curtain begins once pathogens are trapped and the Endurocide® Sporicidal Curtain Liquid kills spores and bacteria by damaging DNA and inhibiting cellular replication.

A similar type of technology is used in antimicrobial linens. Research shows bed linens and similar fabrics and textiles have the ability to harbor bacteria such as *S. aureus*, *P. aeruginosa*, and *E. faecium*, but these bacteria may survive standard washing. Thus, cells may remain leading to the presence of opportunistic pathogens.

Researchers based at the Polytechnical University of Catalunia in Barcelona, Spain are developing a technology to make sanitary fabric aseptic, using zinc nanoparticles. When present in fabric and tossed around in the vibrations and water of a washing machine, the zinc nanoparticles "explode," allowing them to become attached to the textile. Furthermore, the use of zinc nanoparticles, in addition to enzymes and biopolymers, allows the nanoparticles to bind to fabric causing them to resist degradation in high temperature laundry cycles.

However, some scientists doubt the efficacy of such technology and have expressed concern regarding the implication of wide-spread resistance mechanisms. Just as bacteria gain resistance to antibiotics, they may evolve mechanisms to bypass the microbicidal activities of antimicrobial textiles. Therefore, researchers developing this technology intend for it to be used only in a hospital setting.

While these new technologies are novel in their ambition to tackle the prevalence of HAIs, it may be a while before their efficacy is determined. In the meantime, the World Health Organization (WHO) suggests hands are the most common vehicle for transmission and "hand hygiene" is the single most effective means of preventing HAIs by reducing the risk of transmission between patients and personnel.

In fact, hand hygiene has been evaluated in the context of reducing the transmission of multiple-drug resistance organisms (MDROs) such as MRSA, VRE, ESBL, and CRE. For example, one study showed when hand hygiene compliance by medical staff increased by 30%, there was a 24% reduction in patient risk of acquiring MRSA.

Other studies show similar trends in hand hygiene compliance and its ability to reduce patient risk for acquiring MRSA and other infections by MDRO like CRE. It is interesting to note that, even with improvements in technology, something as simple as washing your hands can have a tremendous effect on patient health.

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