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Hand Hygiene and Skin-Care Issues in Infection Prevention

Antimicrobial Facility Plumbing
and Hardware is Put to the Test


SANIGUARD
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THE POWER OF SILVER

Antimicrobial Facility Plumbing and Hardware is Put to the Test

By Barbara H. Hornaday, MA

As a small rural hospital in Eastern Washington, Columbia Basin Hospital (CBH) is among many facilities receiving patients with methicillin-resistant *Staphylococcus aureus* (MRSA) infections, and its staff is concerned about controlling its spread. Hospitals are searching for ways to decrease the spread of microbes in addition to the traditional wisdom that good handwashing is the first line of defense. From norovirus to *Clostridium difficile* and MRSA, if there are new and more efficacious ways to protect patients from these hazardous microbes, CBH wants to be on the front lines of defense.

CBH's goals are to reduce the proliferation of disease-causing pathogens on commonly touched surfaces in the hospital, which in turn can help reduce the incidence of hospital-acquired infections (HAIs). With the advent of the Centers for Medicare and Medicaid Services (CMS) ruling on "never events" — and the non-reimbursement for hospital-acquired illnesses starting in October, CBH has been actively seeking ways to reduce the incidence of infections, to reduce exposure to never events and non-reimbursement scenarios, and to improve patient outcomes. It is obviously a way to keep costs under control, which is an important consideration for CBH.

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CBH tested a number of hardware products to determine which could help the facility in its infection-prevention efforts. Included in the testing were plumbing and hardware products utilizing a baked-on, powder-coat finish containing an antimicrobial agent, as well as plastic products that have had the antimicrobial agent compounded into the polymer during processing. In both cases the antimicrobial agent employs silver ion technology for the active reduction of microbes on the surface.

The product manufacturer claims include a 99.9 percent efficacy against a range of microorganisms for the lifetime of the products. The manufacturer's literature assures that microbes will not survive on the surfaces of the plumbing and hardware to which the antimicrobial agent SANIGUARD has been applied. The lifetime duration was not quantified by the manufacturer; because of the limited time to evaluate at the facility, and that this would not be a longitudinal study, the "lifetime" claim was not tested.

The manufacturer supplied samples for the test from its production and these were assumed to be representative random product samples that have not undergone any special preparation in anticipation of the tests to be performed.

The Testing Process

Nineteen different pieces of hardware designed for hospital use, ranging from handheld showers to toilet flush handles, were tested.

Initial cultures were conducted on the 19 pieces of existing non-treated hardware. The cultures were obtained with Remel BactiSwab. The documentation of existing microbial activity on the test items was obtained by swabbing multiple sites on each piece of hardware that was in service at the facility.

Testing on the SANIGUARD-treated equipment was conducted over two months. The equipment tested were faucet handles, faucet laminar flow devices, Quik-Wash faucet controls, a kitchen pre-rinse handle and grip, lavatory p-traps, kitchen drains, urinal flush handles, door push plates, grab bars, a hand shower, and an ice scoop. In developing and executing these tests, CBH believes the cultures taken from the hospital have a basis in reality that cannot be found in a laboratory setting. As a guide to reality, as well as an academic test, CBH believes in dealing with objects in their natural environment, with their exposure to microbes from the many sources in a facility; as well as the routine cleaning processes of that facility. Laboratory conditions would not have the variety of exposures to microbes, nor the established cleaning process.

CBH followed proper scientific standards within its capability. Every object had a control specimen, all cultures were obtained by the same process, and the transports of the specimen were all within the standards for optimum growth/survival. The culture media were transported to a local laboratory for actual plating, incubation and reading, a process that eliminated the possibility of any conflict of interest in obtaining the results.

The antimicrobial plumbing and hardware was unpacked and cultured utilizing a generous swabbing on each item before installing them at the site of the original hardware. Both sets of culture swabs were delivered to a lab site within the local community. The cultures were kept at optimum temperature before and after inoculation and during transport. Transport and viability of samples was only at risk of damage if the temperature was outside the range of 40 degrees Fahrenheit to 77 degrees F. The temperature was maintained within this range.

The culture results from the existing hardware demonstrated growth on nine of the cultures. After the incubation period of 48 hours, all growth was identified as environmental flora, and none harmful to humans. Concurrently, the cultures taken from the newly received SANIGUARD-treated hardware were also being incubated. These cultures would represent any microbial load acquired during normal shipping and handling. The growth of non-

harmful microbes was identified on two of the products; they had only one colony of bacteria on one surface, and one-plus environmental flora on the second. These were not unexpected results, as the SANIGUARD product does not claim to produce instant death of organisms; rather it is a cumulative effect of extended duration. The active antimicrobial agent is an inorganic silver ion technology that is claimed to inhibit the growth of microbes by disrupting the wall of the cells, interfering with cell metabolism and by preventing cellular reproduction, thus leading to their demise.

The first follow-up culture on the newly installed SANIGUARD-treated plumbing and hardware demonstrated growth on three items. These cultures were obtained approximately three to four weeks after the initial installation.

The quantity of growth was a rare-to-moderate number of environmental organisms. Two out of three of the pieces of hardware returned a "no growth" result, despite having been contaminated at the outset. The third product, a hand shower, demonstrated different microbes from the initial culture.

The second follow-up demonstrated four products with growth of microbes, two "rare" environmental organisms and one with one-plus environmental organisms. Two were converted from "no growth" to organisms present. The other two continued growth of organisms from the last culture, although only one-plus in quantity.

CBH also submitted a special test to a community laboratory as an additional measure. This testing was conducted under a laboratory setting and approximated, as closely as possible, the Japanese Industrial Standard for Antimicrobial Products (JISAP). Four steel coupons were placed in a Petri dish and inoculated with MRSA in a broth mixture. A slipcover was carefully placed over the inoculums and it was assured that no broth seeped from under the slipcover. In a separate Petri dish, four steel coupons treated with SANIGUARD were inoculated with MRSA in a broth mixture.

The plates were then covered with lids and placed in the incubator for 24 hours and 48 hours. Both plates grew MRSA but the plate with the SANIGUARD-treated steel coupons had a lower colony count than the untreated. This simple test reinforces that SANIGUARD is effective in reducing the number of organisms present on a cumulative basis, just as the manufacturer claims.

The specific data is as follows:

Item:	Door pull/push plate		
Existing	From Shipping	1st f/up	2nd f/up
No growth	No growth	Rare env gram neg rod	

Item:	Faucet Handle		
Existing	From Shipping	1st f/up	2nd f/up
No growth	No growth	No growth	No growth

Item:	Faucet Handle		
Existing	From Shipping	1st f/up	2nd f/up
1+ env flora	No growth	No growth	Rare env coag neg staph

Item:	Flush Handle, ER Dirty Utility		
Existing	From Shipping	1st f/up	2nd f/up
No growth	Rare bacillus	No growth	No growth

Item:	Paddle Handle for Faucet FM Dirty Utility		
Existing	From Shipping	1st f/up	2nd f/up
No growth	No growth	No growth	No growth

Item:	Paddle Handle for Faucet SW Dirty Utility		
Existing	From Shipping	1st f/up	2nd f/up
No growth	No growth	No growth	No growth

Item:	Flush Handle, SW Dirty Utility		
Existing	From Shipping	1st f/up	2nd f/up
No growth	No growth	No growth	No growth

Item:	Kitchen Pre Rinse		
Existing	From Shipping	1st f/up	2nd f/up
3+ Bacillus Species	1 col Coag neg Staph	No growth	Rare env gram neg rod

Item:	Quik-Wash B		
Existing	From Shipping	1st f/up	2nd f/up
4+ env mixed gram neg rod	No growth	No growth	No growth

Item:	Quik-Wash K		
Existing	From Shipping	1st f/up	2nd f/up
No growth	No growth	No growth	No growth

Item:	Kitchen Drain		
Existing	From Shipping	1st f/up	2nd f/up
1+ env gram pos flora	No growth	No growth	

Item:	Ice Scoop		
Existing	From Shipping	1st f/up	2nd f/up
1+ gram pos flora	No growth	No growth	

Item:	Faucet Laminar Flow Device #1		
Existing	From Shipping	1st f/up	2nd f/up
2+ env mixed gram neg rods	No growth	No growth	No growth

Item:	Faucet Laminar Flow Device #2		
Existing	From Shipping	1st f/up	2nd f/up
3+ env gram neg rods	No growth	Mod env flora	No growth

Item:	Faucet Laminar Flow Device #3		
Existing	From Shipping	1st f/up	2nd f/up
1 col Coliform gram neg rod	No growth	No growth	No growth

Item:	Faucet Laminar Flow Device #4		
Existing	From Shipping	1st f/up	2nd f/up
2+ env mixed gram neg rod	No growth	No growth	No growth

Item:	Faucet Laminar Flow Device #5		
Existing	From Shipping	1st f/up	2nd f/up
No growth	No growth	Mod env Flora	1+ env Flora

Item:	Shower Handle		
Existing	From Shipping	1st f/up	2nd f/up
No growth	1+ env gram neg rod	Rare env Flora	1+ env mixed flora

Item:	Grab Bar		
Existing	From Shipping	1st f/up	2nd f/up
None Existing	No growth	No growth	No growth

It should be noted there are slight variations of wording in the manner of reporting actual growth; this is related to a variety of microbiology staff interpreting the results. While some do not specify environmental, any human pathogens were agreed to be reported more specifically.

Conclusion:

The manufacturer's claims of antimicrobial efficacy on the powder-coated metal and the infused plastic were substantiated. The lifetime persistence is an unknown; however, it is assumed that because the release of the silver ion agent is related to moisture in the air, that standard cleaning protocols will not disturb the continued performance. However, no longitudinal study was undertaken and the claims of 'lifetime' were not investigated, nor substantiated by this study. CBH will adopt the use of these products based on these test results.

Note: The data referenced in this technical memo is provided to substantiate the efficacy of the antimicrobial compound. SANIGUARD does not protect users from foodborne bacteria or contaminated water. **ICT** Barbara H. Hornaday, MA, works in infection control at Columbia Basin Hospital in Washington state.

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