APIC Abstract # 2-20

Microbiologic Evaluation of a Silver Antimicrobial Disinfectant Spray

Maureen P Spencer, RN,M.Ed, CIC, Susan Cohen, MT,(ASCP)SM and John McAllister,
New England Baptist Hospital, Boston, Ma. 02120

Poster Presentation at the 34th Annual APIC Educational Conference and International Meeting, San Jose, California

ABSTRACT:

Background: Environmental contamination by MRSA, VRE and other pathogens is a problem in healthcare settings. Certain areas can be potential sources for environmental contamination due to the volume of patient encounters. There is often insufficient time for staff to clean surfaces and bathrooms frequently. A new silver disinfectant was recently marketed at a local infection control meeting. It is odorless, colorless, and non-corrosive and requires no protective equipment. It claims to be effective against bacteria, such as MRSA and VRE, viruses and fungi and kill 99.99% of harmful microbes for a full 24 hours after sprayed onto a non-porous surface. A microbiologic challenge using Staph aureus and E.coli was performed to document the effectiveness of the product.

Project Methods: A 4 oz sample of product was obtained and a microbiologic study was prepared. The study design included a 0.5 McFarland broth solution of Staph aureus and E.coli, a template for organism and silver spray application and blood agar contact plates. An empty patient room was used for the study and six areas were marked. It included the rooms four corners and two controls in the middle. 1) On the left side of the room each organism was swabbed in the center of a marked floor tile and allowed to dry. 2) On the right side of the room the silver spray was applied to the center of a marked floor tile and allowed to dry. 3) The silver spray was then applied directly onto the organisms and allowed to dry. 4) The organisms were then applied directly onto the silver sprayed tiles and allowed to dry. Contact plates were used over the six areas: 2 plates for controls, 2 plates for the organisms/silver, 2 plates for the silver/organisms. The room was sealed off and all were repeated at 24 hours. After culturing, the room was thoroughly cleaned with a phenolic disinfectant. Five room samples were obtained over a four-week period totaling 30 contact plates.

Results: Samples from all five controls of Staph aureus and E.coli were too numerous to count (TNTC) in the samples obtained immediately after they dried. Results of the contact plates obtained immediately after application showed: 5 samples in the organisms/silver group - no growth; 5 samples in the silver/organisms group - no growth. Repeat cultures obtained at 24 hours: three samples continued to be no growth and two samples had 1 colony in the silver/organism group.

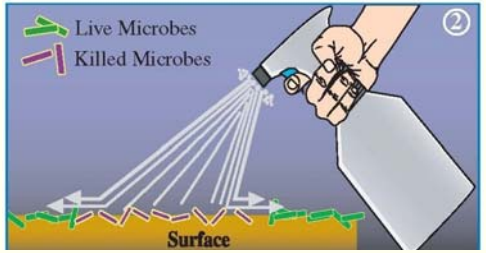
Conclusions: A new silver disinfectant was studied and results demonstrated that organisms were killed immediately upon contact and the action sustained over a 24-hour period. The product can be used on objects such as chairs, stretchers, toilet seats, telephones, bed tables, computer keyboards, gym surfaces, radiology equipment and other areas that may become contaminated during heavy patient volume and get cleaned infrequently. Other advantages could be decreased exposure to and use of chemical disinfectants and increase protection in areas underserved by housekeeping.

Information About Silver

Silver is a naturally occurring element proven effective in fighting a wide range of microbes. It is also environmentally friendly, with no toxic effects on people, animals or plants. It has long been known for its antimicrobial properties and has many benefits over other antimicrobials that are alcohol-, chlorine-, or ammonium-based. Throughout history it has been used to purify drinking water, treat medical conditions and prevent the spread of disease. Our early settlers would often throw silver dollars into their wells or water barrels in order to kill bacteria and keep the water potable. During plagues in Europe, wealthy families gave their children silver spoons to suck on, hence the saying "Born with a silver spoon in his mouth."

The Product

The product used in this evaluation is EPA registered and contains silver dihydrogen citrate (SDC), an electrolytically generated source of stabilized ionic silver. SDC kills microorganisms by two modes of action: 1) the silver ion deactivates structural and metabolic membrane proteins leading to microbial death; 2) the microbes view SDC as a food source, allowing the silver ion to enter the microbe. Once inside the organism, the silver ion denatures the DNA, which halts the microbe's ability to replicate and leads to its death. This dual action makes SDC highly and quickly effective against a broad spectrum of microbes. SDC is non-toxic, non-caustic, colorless, odorless, tasteless and does not produce toxic fumes. While SDC is highly toxic to bacteria, fungus and virus it is non-toxic to humans and animals. Based on the EPA toxicity categorization of antimicrobial products that ranges from Category I (high toxicity) down to Category IV, the product we used is rated in the lowest toxicity category, IV. Most traditional disinfectants fall into Categories I and II and may be harmful to humans over time.



Methods:

A 4 oz sample of product was obtained and a microbiologic study was prepared. The study design included a 0.5 McFarland broth solution of Staph aureus and E.coli, a template for organism and silver spray application and blood agar contact plates. An empty patient room was used for the study and six areas were marked. It included the rooms four corners and two controls in the middle.

Contact plate from left side of room where organisms were applied first, then silver spray.

Contact plate from right side of room where silver was applied first, then organisms.

Control plates were obtained from the center of the room where the broth was applied to assure viable microbial growth.

Control plates with growth

Results:

Silver Disinfectant Contact Plate Results	12/07-07/2007	12/13-14/2007	12/20-21/2007	01/03-04/2007	01/10-11/2007
Staph aureus/Silver immediately/24 hrs	NG/NG	NG/NG	NG/NG	NG/NG	NG/1 col
E.coli/Silver immediately/24 hrs	NG/NG	NG/NG	NG/NG	NG/NG	NG/1 col
Silver/Staph aureus immediately/24 hrs	NG/NG	NG/NG	NG/1 col	NG/NG	NG/NG
Silver/E.coli immediately/24 hrs	NG/1 col	NG/NG	NG/NG	NG/1 col	NG/2 col
Staph aureus control immediately/24 hrs	TNTC/18 col	TNTC/39 col	TNTC/30 col	TNTC/30 col	TNTC/10 col
E.coli control immediately/24 hrs	TNTC/18 col	TNTC/17 col	TNTC/NG	TNTC/NG	TNTC/4 col
Definitions:					
NG - No Growth					
TNTC - Too Numerous To Count					
Immediately - Contact plates obtained immediately after application					
24 hrs - Contact plates obtained at 24 hours					

Conclusions:

An antimicrobial compound comprised of naturally occurring silver ions has been proven effective against a broad range of microorganisms.Our study showed that this new silver disinfectant killed E.Coli and Staph aureus immediately upon contact and the action sustained over a 24-hour period.

The product can be used on objects such as chairs, stretchers, toilet seats, telephones, bed tables, computer keyboards, gym surfaces, radiology equipment and other areas that may become contaminated during heavy patient volume and get cleaned infrequently. Other advantages could be decreased exposure to and use of chemical disinfectants and increase protection in areas underserved by housekeeping. We are using this spray in the presurgical unit, radiology suite, ambulatory care unit, recovery room and in public bathrooms.

References:

1. Persistent silver disinfectant for the environmental control of pathogenic bacteria. Brady M, Lisay C, Yurkovetskiy A, Sawan S. Am J Infect Control. 2003 Jun;31(4):208-14

2. Rutala WA, Gergen MF, Weber DJ. Evaluation of a New Surface germicide (Surfacine) with antimicrobial persistence. Poster Presented at: APIC 27th Annual Educational conference and International Meeting, June 23, 2000. Minneapolis, Minn.

Maureen Spencer may be contacted by email mpspence@nebh.org or call 617 754-5332