Silver Sol Improves Hospital Associated Wound Care In Long Term, High Risk Hospital Patients Who Have Pressure Sores Including MRSA: A Review and Study of Wound Care Treatments in Long Stay, High Risk Hospitals.

By

Gordon Pedersen Ph.D.

Abstract

Silver Sol is a nutritional supplement that has anti-bacterial, antiviral and anti fungal properties (US Patent #7135195). Silver Sol has unique mechanisms of action that promote wound healing by preventing infection and promoting stem cell release and activation (Nexus, 2008).

The purpose of this study is to review the results of nursing homes using Silver Sol for pressure sores infected with MRSA. This study reviews wound care data provided from nursing homes in several states including Wisconsin which used Silver Sol on pressure sores infected with MRSA, and compared them to the national average. The percent of long stay, high-risk patients who have pressure sores were recorded and compared to the national average on a monthly basis.

Results from the nursing homes using Silver Sol gel, report a significant reduction in the occurrence of pressure wounds as compared to the national average. This 40% reduction in the occurrance of wounds includes MRSA infections, arterial, diabetic, injury, pressure sores, skin tears, surgical wounds, and venous wounds.

Literature Review

Methicillin resistant staphylococcus aureus (MRSA) is approaching pandemic levels and there is an immediate need for a substance like silver sol in controlling this potentially fatal disease. MRSA is a resistant variation of the common bacterium staphylococcus aureus. It is resistant to a significant group of antibiotics called the beta lactase, which include penicillins and cephalosporins (2). The organism is often sub-categorized as community associated MRSA (CA-MRSA) or health care associated MRSA (HA-MRSA). CA-MRSA cases were first reported in the late 1980's. Recently HA-MRSA has plagued the medical professionals and patients that work or live in hospitals. It is estimated that as much as 60% of Hospital nurses carry MRSA in their noses and on their skin (2). The CA-MRSApredominantly afflicts athletes, prisoners, nurses, soldiers, Native Americans, Native Alaskans, and children in inner cities (Wikipedia, 2008). MRSA could be considered to be a modern day plague because it has evolved the ability to survive treatment with most antibiotics including methycillin, dicloxocillin, nafcillin and oxacillin.

Hospitals have a special need for help in patients with open wounds that use invasive devices, or have a weakened immune system. These patients are at greater risk, which is also seen in the hospital employees who do not follow meticulous hygiene and proper sanitizing procedures. They may self-infect or transfer the contagion to patients or visitors. A study reported form the Association for Professionals in Infection Control and Epidemiology (2008), concluded that the poor hygiene habits remain the principle barrier to a significant reduction in the spread of MRSA. They also indicate that this hospital risk is exponentially great when you combine the propensity for the general public to spread this superbug in public restrooms, restaurants, airplanes, nurseries, schools, athletic events and in the home.

MRSA is progressing toward pandemic proportions. The Centers for Disease Control and Prevention (CDC), estimated that the number of MRSA infections doubled nationwide, from 127,000 in 1999, to 278,000 in 2005, while at the same time deaths increased from 11,000 to more than 17,000 (2). According to the Journal of the American Medical Association (JAMA Oct, 2007), MRSA was responsible for 94,360 serious infections and associated with 18,650 hospital–stay related deaths in the United States in 2005. The statistics suggest that MRSA infections are responsible for more deaths in the U.S. each year than AIDS (3).

MRSA is growing out of control and the statistics suggest grave outcomes, but the level of seriousness is arguably misunderstood due to the fact that a study performed in San Francisco 2005, reported that approximately 1 in 300 residents suffered from MRSA. While during the course of the same year 85% of these infections occurred outside of the health care setting (4). A hospital study (5) reported that MRSA patients had, on average, three times longer stays (14.3 days vs. 4.5 days), incurred three times the expenditure ($48,824 vs. $14,141), and experienced five times the risk of in-hospital death (11.2% vs. 2.3%) as compared to patients without this infection (5). Wylie et al, reported a death rate of 34% within 30 days among patients infected with MRSA (6). The most common site of infection includes: The anterior nares (nostrils), respiratory tract, open wounds, intravenous catheters and urinary tract (6).

Hospitals in Denmark, Finland, Netherlands (8) and VA hospitals in Pittsburg (7) report that MRSA infections can be significantly reduced using sanitary methods that include swabbing the nostrils and hands with antibactierial protection. These studies demonstrate the potential benefits of an antibacterial agent prophylactically used on the hands and nostrils as long as resistance is not a potential long term problem.

MRSA is a resistant staphylococcus infection that usually presents as a patch of small pus surrounded by redness and swelling, and resemble pimples, spider bites, or boils that may not be accompanied by a fever and rash. The bumps become larger and spread where larger painful pus-filled boils can develop deep into the tissue (9). Approximately 75% of CA-MRSA infect the skin and whereas a minority of these infections can invade vital organs and cause sepsis, toxic shock syndrome, flesh eating (necrotizing) and pneumonia

(10). It is not fully understood why some healthy people survive MRSA infections and others don't (10).

The current treatments of MRSA include Vancomycin and Teicoplanin, which are prescription antibiotics categorized as glycopeptides (11). The absorption of these antibiotics is very poor and must be given by intravenous administration to control systemic infections (12). There are several new strains of MRSA that have become resistant even to Vancomycin and Teiocplanin (13, 14). Presently the use of Linezolid, Quinupristin/Dalfopristin, Daptomycin and Tigecycline are used to treat more severe infections that do not respond to glycopeptides such as Vancomycin (15). In addition, oral treatments include Linezolid, Rifampicin + Fusidic acid, Rifampicin + Fluoroquinolone, Pristinamycin, Co-trimoxazole, Doxycycline or Minicycline and Clindamycin (26).

Nature (16) reported that there is a new drug which has demonstrated MRSA activity called Platensimycin (17, 18). It should be noted that some of the newest drug discoveries can cost $1600 per day which may prohibit their ubiquitous distribution.

The spread of MRSA is complicated by the fact that hospitals discharge contagious patients into the community, workforce, schools, and general public (19). In the U.S. it is estimated that 95 million people carry staphylococcus aureus in their noses, of these 2.5 million carry MRSA (21), and 23% of these require hospitalization (22). MRSA is nearing pandemic proportions and there is a serious need for a daily use antibacterial that does not produce resistant strains of MRSA. Currently Silver Sol may be the only prophylactic use product that has activity against MRSA and could be used for prevention as well as treatment of MRSA because it does not produce resistant strains (25).

Materials and Methods

Nursing homes from Minnesota and Wisconsin were used. The provider was Advanced Healing systems (AHS). Data for the national average was taken from METSTAR a Wisconsin agent of the Federal Government. Data for the Nursing Homes were provided by AHS. The cost analysis was done using data from Owensboro Kentucky hospital, a 92 bed facility (AHS) and compared with national standard treatment data.

Results

Silver Sol treatments reduce the cost, infection rate and improve healing outcomes. Table 1.0 illustrates how silver sol reduced the occurrence of pressure sores and improved healing times. Table 2.0 illustrates the different types of pressure sores that were included in the report. Table 3.0 reports the costs associated with treating pressure sores and compares them to Patients receiving Silver Sol treatments. The Silver Sol treated patients cost about one third as much as the standard wound care treatments.

Table 1.0
Bethel Home & Services 525591
Percent of Long stay, high-risk residents who have pressure sores

Month	Silver Sol used in Nursing Home # 525591	Wisconsin	Nation average
May 07	10.2%	12.2%	14.2%
June 07	9.6%	11.7%	14.0%
July 07	9.8%	11.7%	13.8%
Aug 07	12.0%	11.9%	13.7%
Sept 07	9.6%	11.2%	13.5%
Oct 07	9.6%	10.8%	13.4%
Nov 07	12.3%	10.8%	13.4%
Dec 07	10.2%	11.1%	13.4%
Jan 08	8.5%	11.3%	13.6%
Feb 08	7.4%	11.4%	13.6%

Table 2.0
Resolved Wound Summary
Number and types of resolved wounds using silver sol gel topically
(Wisconsin Nursing Home with 100% patient compliance to using Silver Sol).

Arterial	4
Diabetic	15
Injury	6
Other	21
Pressure sores	221
PVD (vascular)	3
Skin tears	5
Surgical	9
Venous	24
Total resolved wounds	308

Table 3.0
Cost of treatment for Pressure Sores (Owensboro, Ketucky)

	Standard wound Care Treatments	AHS Formulary Silver Sol Treatments	Expected Savings
Cost to treat Presented wounds	$ 353,589	$148,001	$ 205,588
Daily cost of Wounds per Patient per day	$ 31.25	$ 13.08	$ 18.07

Conclusions

It is evident from the results that Silver Sol will reduce the occurrence of pressure sores including MRSA by 40 %. Wounds heal significantly faster due to less infection, inflammation and activation of stem cells as a result of the topical use of Silver Sol.

The cost of treatment is significantly lower and the duration of treatment in the hospital are significantly reduced.

Silver Sol is a less expensive and more effective treatment that results in better healing rates, less scarring, and improved outcomes when compared to national averages found in nursing homes.

References

1. ^ Okuma K, Iwakawa K, Turnidge J, *et al* (2002). "Dissemination of new methicillin-resistant *Staphylococcus aureus* clones in the community". *J Clin Microbiol* **40** (11): 4289–94. doi:10.1128/JCM.40.11.4289-4294.2002. PMID 12409412.

2^*a b* Klein E, Smith DL, Laxminarayan R (2007). "Hospitalizations and Deaths Caused by Methicillin-Resistant Staphylococcus aureus, United States, 1999–2005". *Emerg Infect Dis* **13** (12): 1840–6.

3 ^ UK Office for National Statistics Online (February 22, 2007), "MRSA Deaths continue to rise in 2005"

4 ^ Liu et al., A population-based study of the incidence and molecular epidemiology of methicillin-resistant Staphylococcus aureus disease in San Francisco, 2004-2005. Clin Infect Dis. 2008 Jun 1;46(11):1637-46)

5 ^ Noskin GA, Rubin RJ,Schentag JJ, Kluytmans J, Hedblom EC, Smulders M, Lapetina E, Gemmen E (2005). "The Burden of *Staphylococcus aureus* Infections on Hospitals in the United States: An Analysis of the 2000 and 2001 Nationwide Inpatient Sample Database". *Arch Intern Med* **165**: 1756–1761. doi:10.1001/archinte.165.15.1756. PMID 16087824.

6 ^ Wyllie D, Crook D, Peto T (2006). "Mortality after *Staphylococcus aureus* bacteraemia in two hospitals in Oxfordshire, 1997–2003: cohort study". *BMJ* **333** (7562): 281. doi:10.1136/bmj.38834.421713.2F. PMID 16798756.

7^ "Science Daily".

8^ McCaughey B, *Unnecessary Deaths: The Human and Financial Costs of Hospital Infections* (2nd. ed.),

9^ "Symptoms". Mayo Clinic.

10^ "MRSA Toxin Acquitted: Study Clears Suspected Key to Severe Bacterial Illness". *NIH news release*. National Institute of Health (2006-11-06).

11^ Schentag JJ, Hyatt JM, Carr JR, Paladino JA, Birmingham MC, Zimmer GS, Cumbo TJ (1998). "Genesis of methicillin-resistant *Staphylococcus aureus* (MRSA), how treatment of MRSA infections has selected for vancomycin-resistant Enterococcus faecium, and the importance of antibiotic management and infection control". *Clin. Infect. Dis.* **26** (5): 1204–14. doi:10.1086/520287. PMID 9597254

12^ Janknegt R (1997). "The treatment of staphylococcal infections with special reference to pharmacokinetic, pharmacodynamic, and pharmacoeconomic considerations". *Pharmacy world & science : PWS* **19** (3): 133–41. doi:10.1023/A:1008609718457. PMID 9259029.

13^ Sieradzki K, Tomasz A (1997). "Inhibition of cell wall turnover and autolysis by vancomycin in a highly vancomycin-resistant mutant of *Staphylococcus aureus*". *J. Bacteriol.* **179** (8): 2557–66. PMID 9098053.

14^ Schito GC (2006). "The importance of the development of antibiotic resistance in *Staphylococcus aureus*". *Clin Microbiol Infect* **12 Suppl 1**: 3–8. PMID 16445718}.

15^ Mongkolrattanothai K, Boyle S, Kahana MD, Daum RS (2003). "Severe *Staphylococcus aureus* infections caused by clonally related community-associated methicillin-susceptible and methicillin-resistant isolates". *Clin. Infect. Dis.* **37** (8): 1050–8. doi:10.1086/378277. PMID 14523769.

16^ Birmingham MC, Rayner CR, Meagher AK, Flavin SM, Batts DH, Schentag JJ (2003). "Linezolid for the treatment of multidrug-resistant, gram-positive infections: experience from a compassionate-use program". *Clin. Infect. Dis.* **36** (2): 159–68. doi:10.1086/345744. PMID 12522747.

17^ Bayston R, Ashraf W, Smith T (2007). "Triclosan resistance in methicillin-resistant *Staphylococcus aureus* expressed as small colony variants: a novel mode of evasion of susceptibility to antiseptics". *J. Antimicrob. Chemother.* **59** (5): 848–53. doi:10.1093/jac/dkm031. PMID 17337510.

18^ Wang J (May 2006). "Platensimycin is a selective FabF inhibitor with potent antibiotic properties". *Nature* (441): 358–361. PMID 16710421}.

19^ Cooper BS, Medley GF, Stone SP, *et al.* (2004). "Methicillin-resistant *Staphylococcus aureus* in hospitals and the community: stealth dynamics and control catastrophes". *Proceedings of the National Academy of Sciences* **101** (27): 10223–8. doi:10.1073/pnas.0401324101. PMID 15220470.

20^ "MRSA Infections". Keep Kids Healthy.

21^ Graham P, Lin S, Larson E (2006). "A U.S. population-based survey of *Staphylococcus aureus* colonization". *Ann Intern Med* **144** (5): 318–25. PMID 16520472.

22^ Jernigan JA, Arnold K, Heilpern K, Kainer M, Woods C, Hughes JM (2006-05-12). "Methicillin-resistant *Staphylococcus aureus* as community pathogen". *Symposium on Community-Associated Methicillin-resistant* Staphylococcus aureus *(Atlanta, Georgia, USA). Cited in Emerg Infect Dis*, Centers for Disease Control and Prevention. Retrieved on 2007-01-27.

23. United States Patent Office, Nov 2006. US Patent # 7135195.

24. Nelson Labs. Staph Aureus report July 2008.

25. Roy, Rustom. Ultridilute Ag-aquasols with extraordinry bactericidal properties: role of the system Ag-O-H2O. Current Science Investigation, 2007

26. University of California Berkely, MRSA and VRE susceptible to silver sol treatments, 2007

27. Nexus, August 2008