Permanently Antimicrobial Surgical Instrument Material

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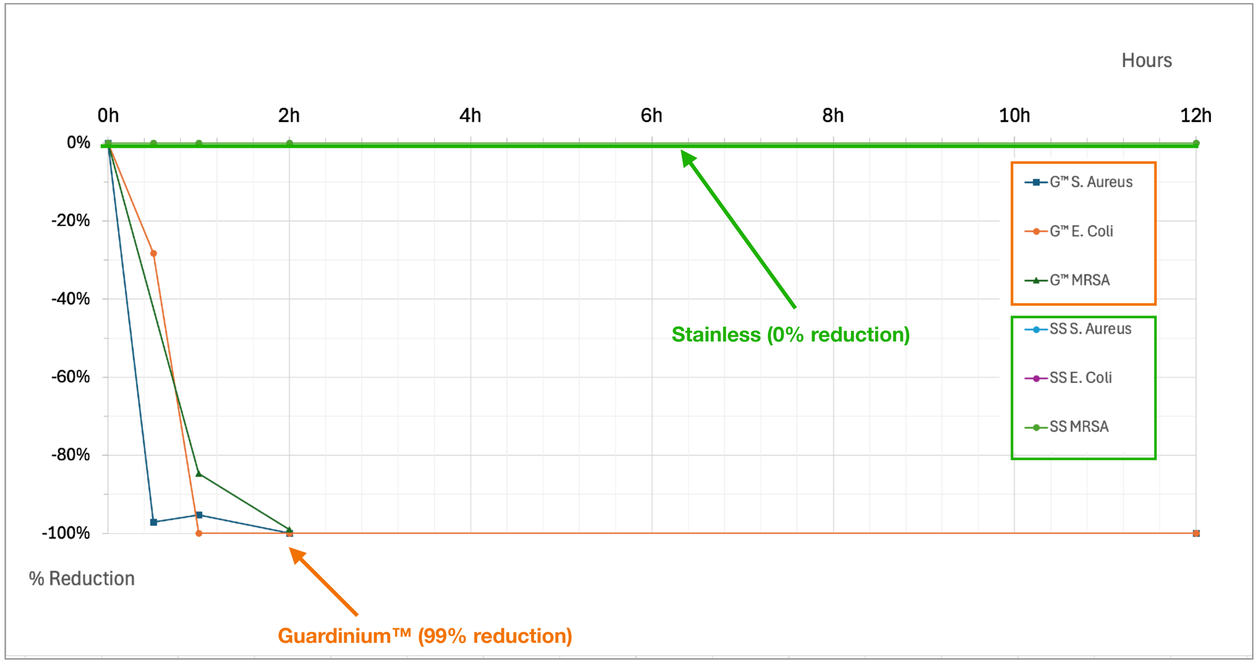
Introduction

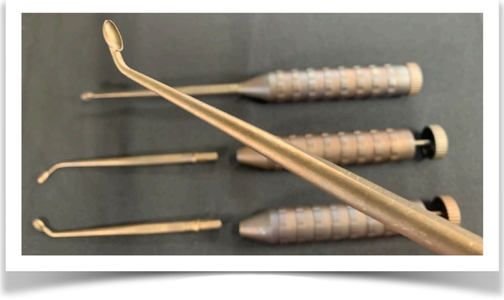
Surgical site infection (SSI) remains a persistent problem. The probable sources of SSI's are many and varied. One potential source of SSI's is surgical instruments that are contaminated. Such contamination may be due to a variety of reasons, including improper sterilization techniques, handling of the instruments in the operating room, exposure to environmental bacteria in the operating room air, or even cross-contamination if bacteria are transferred within the patient during the procedure itself.

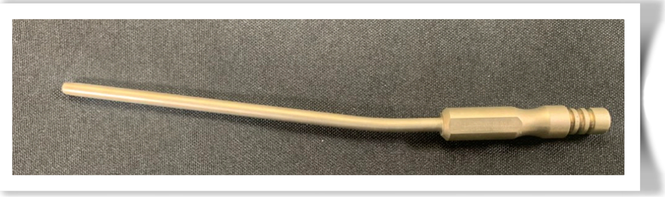
Given the Hospital-Acquired Condition (HAC) Reduction Program initiative, reducing the probability of SSI's provides not only a clinical benefit to the patients, but also a monetary incentive to the hospitals.

Objectives

This study was undertaken to determine if a new biocompatible alloy, which is suitable for manufacturing surgical instruments, is able to eradicate common bacteria associated with SSI. The alloy has a permanent contact antimicrobial effect. Such an alloy has the potential to reduce the incidence of bacterial contamination of the instruments that are made from it.







Methods

S. Aureus, E. Coli, and MRSA were propagated overnight in Tryptic Soy Broth. 50ul of the inoculum of each microbial species was placed on Guardinium™ disc specimens, stainless steel disc specimens, as well as established positive and negative controls utilized in a commercial antimicrobial test lab. Bacterial counts were made at 1 hour and 2 hours for the Guardinium™ samples. If the 1 hour data showed >90% reduction, an additional test was conducted at 30 minutes. Stainless steel was tested at 12 hours.

Results

At 30 minutes Guardinium™ showed reduction of S. Aureus of 97%, and E. coli reduction of 28%. At the one hour time point, S. Aureus showed 95% reduction, E. coli 99.99% reduction, and MRSA 85% reduction. At two hours, reduction levels were 99.99% for S. Aureus and E. Coli, and 98.98% for MRSA. Stainless steel showed zero reduction at 12 hours. At every time point, and for every bacterium, the difference in reduction of bacteria between Guardinium™ and stainless steel was significant at $p<0.00001$.

The testing showed that instruments made from Guardinium™ alloy can rapidly eliminate several common bacteria from their surface by contact alone. In comparison, stainless steel did not eliminate any bacteria at all.

We therefore conclude that the new material holds great promise for manufacturing surgical instruments.

Instruments manufactured from Guardinium™ may have the potential to reduce infections.

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