

Introduction

The emergence of multi-drug resistant organisms (MDRO) in wound care has led to recalcitrant wound infections, resulting in higher health care costs, poorer outcomes, and a higher risk of death for patients infected with resistant strains. The WHO published a priority pathogens report in 2017 which discussed the main impact of MDROs on human health, the contributing factors and consequences. The report aimed to promote the research and development of new antibiotics and antimicrobials to treat drug-resistant bacterial infections. Of the organisms published, a number are common wound pathogens and it is therefore key to find effective alternative treatments to antibiotics when dealing with an infected wound.

Aim

To assess the efficacy of SurgihoneyRO™ antimicrobial wound gel against a range of wound-relevant, antibiotic resistant bacteria.

Method

Cultures of Methicillin-resistant *Staphylococcus aureus* (MRSA), *Enterococcus faecalis*, *Streptococcus pyogenes*, *Staphylococcus aureus*, *Escherichia coli* and *Klebsiella pneumoniae* were harvested from agar plates and used to prepare single species bacterial suspensions. Cultures of wound-relevant WHO Priority 1 *Acinetobacter baumannii*, *Pseudomonas aeruginosa* and *Enterobacter cloacae*, Priority 2 *Enterococcus faecium* (VRE) and *Staphylococcus aureus* and Priority 3 *Streptococcus pneumoniae* were also harvested from agar plates and used to prepare individual bacterial suspensions. A total of 100 µL of SurgihoneyRO™ antimicrobial wound gel, 20 µL of bacterial inoculum and 80 µL of organism-specific broth were added to each well of a 96-well microtitre plate and incubated at 37°C ± 2°C for 24 hours. Following incubation, viable organisms were recovered and log reductions were calculated compared to the negative control.

Results

When SurgihoneyRO™ antimicrobial wound gel was incubated with MRSA, *S. pyogenes*, *S. aureus* and *E. coli*, no viable organisms were recovered 24 hours post treatment. In addition, no viable organisms were recovered from SurgihoneyRO™ antimicrobial wound gel samples inoculated with WHO priority wound care pathogens *A. baumannii*, *P. aeruginosa*, *E. cloacae*, *S. aureus* and *S. pneumoniae*. A 5.52, 4.53, 6.44 log reduction in the quantity of *E. faecalis*, *E. faecium* and *K. pneumoniae*, respectively, was observed compared to the untreated controls.

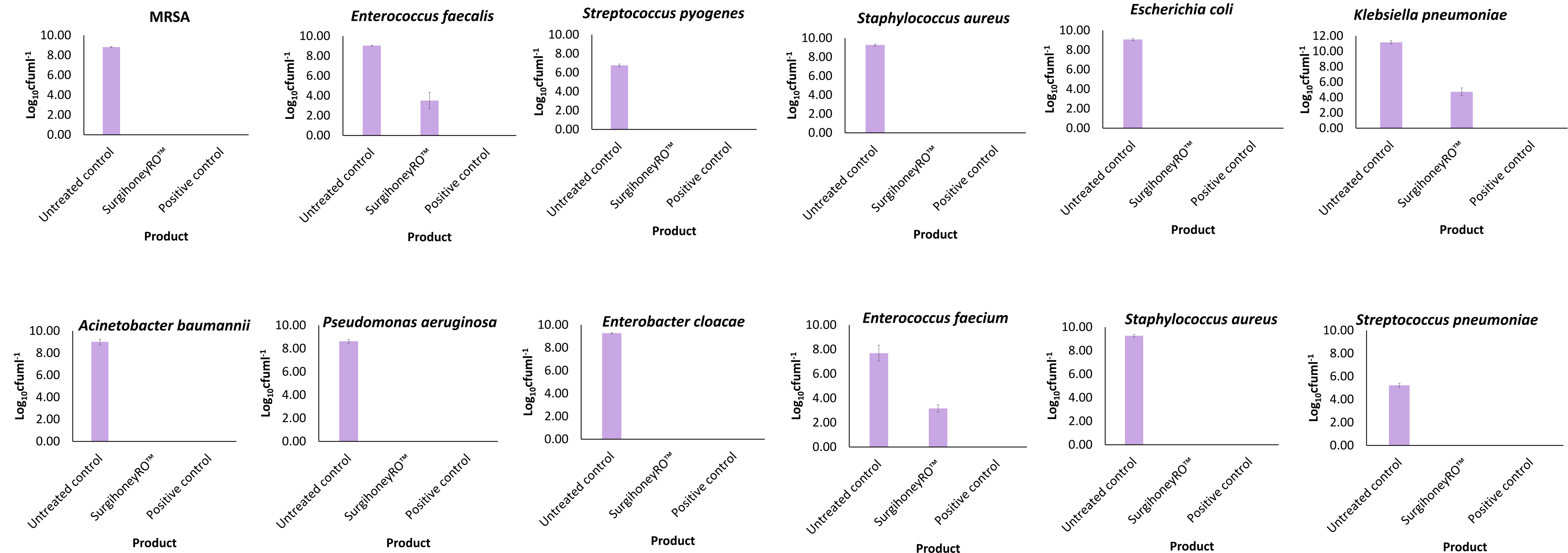


Figure 1. Quantity of viable: WHO priority pathogens (top row): Methicillin-resistant *Staphylococcus aureus* (MRSA), *Enterococcus faecalis*, *Streptococcus pyogenes*, *Staphylococcus aureus*, *Escherichia coli* and *Klebsiella pneumoniae*. Wound pathogens (bottom row): *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, *Enterobacter cloacae*, *Enterococcus faecium*, *Staphylococcus aureus* and *Streptococcus pneumoniae*.

Discussion & Conclusions

MDROs are increasingly implicated in both acute and chronic wound infections. Wound infections resulting from antibiotic resistant bacteria may result in prolonged debility of the patient and increased healthcare costs. Effective treatments against MDROs could improve quality of life for patients and reduce strain on healthcare costs. Treatment with SurgihoneyRO™ antimicrobial wound gel was shown to be effective against a range of drug-resistant microorganisms commonly found in chronic wounds e.g. carbapenem-resistant *A. baumannii*, carbapenem-resistant *P. aeruginosa*, VRE and MRSA. Effective treatment and a reduction in bacterial bioburden of an infected wound could result in accelerated wound healing times and improved patient outcomes. Treatment of MDRO with SurgihoneyRO™ effectively reduced the number of recoverable pathogens, thus presenting as a viable treatment option where antibiotic resistant organisms are suspected or where the risk of emerging MDRO is high.