Treatment of World Health Organisation (WHO) “Priority Pathogens” Relevant to Wound Care by an Activated Carbon Cloth Dressing

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Introduction

Healthy human skin provides a formidable barrier to environmental pathogens, however, patients with chronic wounds or burn injuries have impaired barrier function creating an opportunity for severe infection. Treatment of infected wounds is becoming progressively challenging due to increased bacterial resistance to antibiotics and antimicrobials. In response to the growing challenge, the World Health Organisation (WHO) identified 12 families of bacteria that pose the greatest threat to human health, termed “priority pathogens”. The presence of a drug-resistant organism in a wound infection further complicates treatment and increases the risk to the patient. This study aims to assess the efficacy of Activated Carbon Cloth (ACC), a microbial binding dressing, against two antibiotic resistant bacteria found on the WHO priority pathogens list and commonly found in wound infections**.**

Methodology

- ACC, a competitor anti-microbial gauze dressing and N-A® Knitted Viscose Primary dressing were inoculated with 100 µL of *Acinetobacter baumannii* (Figure 1) or *Enterococcus faecium* (Figure 2) bacterial inoculum.
- Un-inoculated controls were prepared by adding 100 µL of sterile Tryptic Soy Broth (TSB) in place of bacterial inoculum.
- Test dressings were incubated at 37°C ± 2°C for 30 minutes or 24 hours.
- Following incubation, dressing samples were transferred to 3 mL Quench and sonicated for 5 minutes.
- Remaining bacteria were quantified using serial dilutions and plate counting.

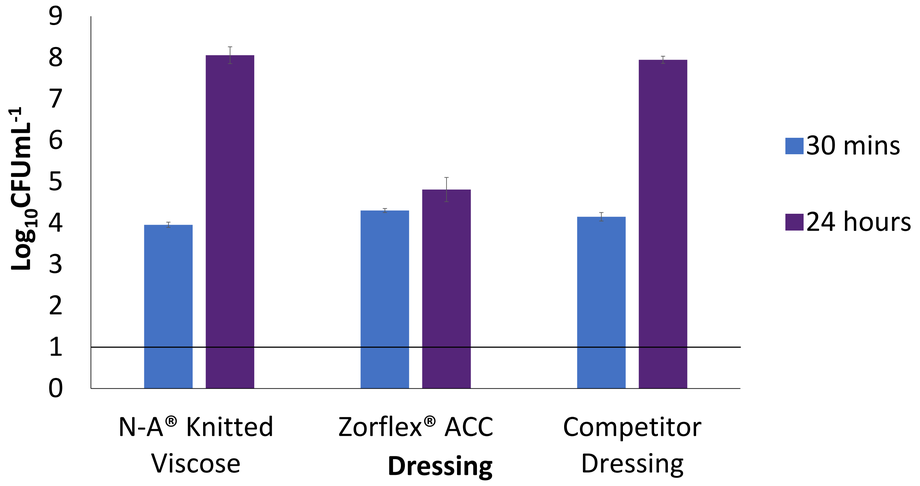

Figure 1. Quantity of viable *Acinetobacter baumannii* recovered from control and test dressings after 30 minutes or 24 hours incubation. Error bars show standard deviation of the mean and the line shows limit of detection (1 Log).

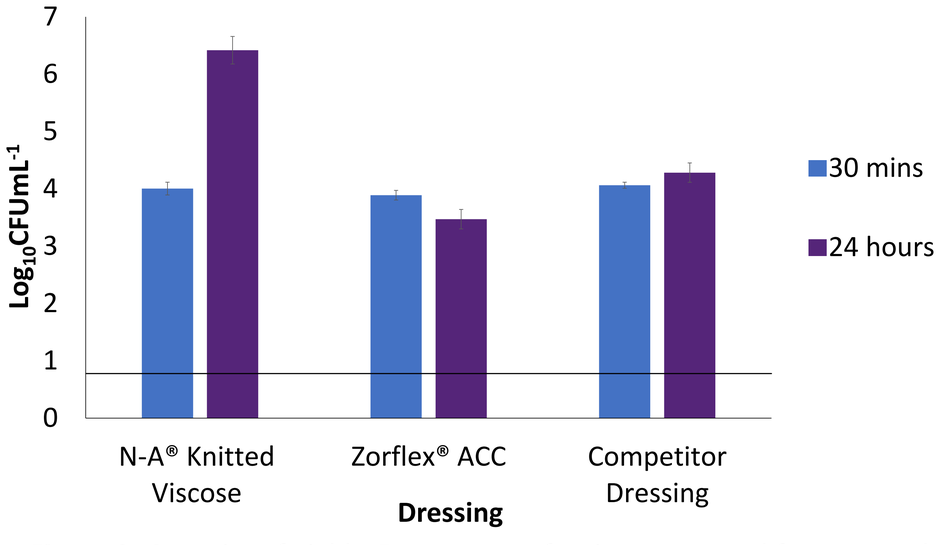

Figure 2. Quantity of viable *Enterococcus faecium* recovered from control and test dressings after 30 minutes or 24 hours incubation. Error bars show standard deviation of the mean and the line shows limit of detection (1 Log).

Results

After 30 minutes incubation, as expected, there was no reduction in the quantity of viable organisms recovered from ACC or the competitor dressing compared to control. Following 24 hours treatment with ACC, a significant reduction in viable *A. baumannii* and *E. faecium* was observed, compared to the negative control. The quantity of *A. baumannii* recovered from the competitor dressing was not significantly different to the quantity recovered from the negative control.

Discussion and Conclusions

The presence of infection in a wound prevents healing and leads to potentially painful wounds with a lengthy recovery time for patients and thus high treatment costs. Organisms identified on the WHO list of “priority pathogens” are common wound pathogens, resulting in further increased timescales and costs with poorer outcomes. Treatment with ACC for 24 hours resulted in reduced growth of *A. baumannii* and *E. faecium*, both drug-resistant “priority pathogens” found in wound infections.

This data suggests that ACC reduced growth of two organisms identified on the WHO list of “priority pathogens” that are commonly found in infected wounds, therefore demonstrating the potential to aid wound healing.

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