An *in vitro* comparative assessment of a new primary wound dressing

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Introduction

Antimicrobial dressings such as silver dressings may be used as a barrier to microorganisms in wounds at high risk of infection or re-infection[1]. When a reduction in microbial load is required, the selection of antimicrobial dressings must also take into account the primary and secondary dressing requirements[2]. An *in vitro* comparative assessment has been performed on a new primary wound dressing against two commercially available devices.

Dressing A – A needled non woven dressing containing fibres made of alginate and sodium carboxymethyl cellulose (NaCMC) comprising 2.3% silver nominally[3].

Dressing B - A needled non woven dressing containing fibres made of NaCMC comprising 1.2% silver nominally[4].

Dressing C – A needled non woven dressing containing fibres made of NaCMC comprising 1.2% silver nominally and stitchbonded with cellulosic yarns[5].

Methods

Fluid absorption and retention was tested by fully hydrating the dressing samples and calculating the amount of physiological saline solution absorbed; upon hydration a weight equivalent to 40mmHg was applied to measure the fluid retention. The following equations were used to calculate the values:

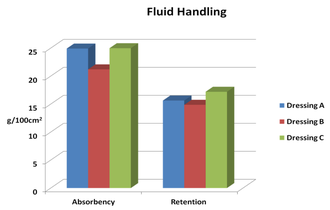
Fluid Absorption (g/cm^2): $(W_2-W_1)/A$
Fluid Retention (g/cm^2): $(W_3-W_1)/A$

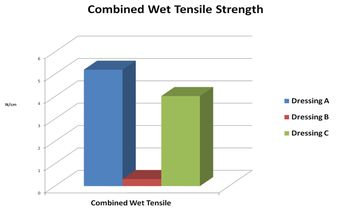
Where:
W_1: Weight of the dressing sample (g)
W_2: Weight of the dressing following hydration (g)
W_3: Weight of the dressing sample following the application of 40mmHg compression (g)
A: Area (cm^2)

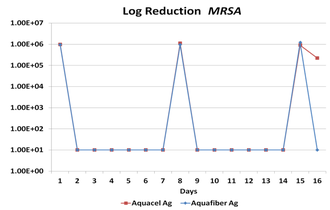
The combined wet tensile strength of the dressings was measured using a tensometer with the dressings hydrated with physiological saline solution prior to measuring the tensile force; samples were measured in the longitudinal and transverse directions and the average was reported.

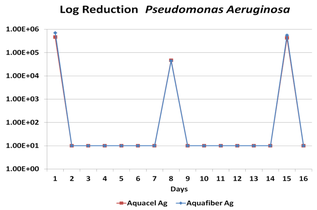
Sustained antimicrobial efficacy on dressings A & B has been assessed *in vitro* for 15 days, including re-challenges at days 7 and 14 to determine the ability to eradicate a number of common wound pathogens[6] . Considering that the silver content on dressings B & C is identical, Dressing C has not been tested.

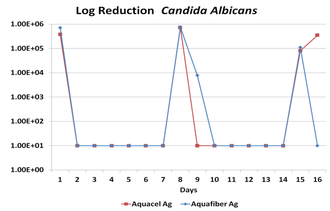
Results

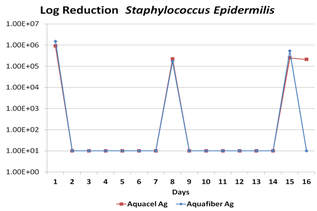












Discussion

As a result of the *in vitro* assessment it can be concluded that Dressing A provides fluid absorption capabilities and wet tensile properties that are comparable to market leading devices.

Effective exudate management can reduce time to healing, reduce exudate related problems such as periwound skin damage and infection, improve patient's life, reduce dressing change frequency and clinician input, and so, overall, improve healthcare efficiency[7].

Sufficient dressing integrity may contribute to a more efficient dressing change; thus, minimising pain to the patient and time for the healthcare provider.

All dressings have demonstrated a broad spectrum antimicrobial efficacy exerting significant reduction (>log4) of gram positive and gram negative bacterial species as well as a yeast.
However, when dressings have been re-challenged for the second time at the 14 day time-point, Dressing B has been unable to produce a significant reduction on Candida Albicans, Methicillin Resistant Staphylococcus Aureus and Staphylococcus Epidermilis, which suggests a significant reduction of its antimicrobial effectiveness; on the other hand, Dressing A has successfully delivered antimicrobial efficacy throughout the length of the *in vitro* assessment.

Conclusion

Based on the *in vitro* physical properties observed on Dressing A in relation to Dressings B and C, it can be concluded that Dressing A may provide a cost effective solution for the management of infected wounds or wounds which are at increased risk of infection.

References

1. Vowden P, Vowden K, Carville K. Antimicrobial dressings made easy. Wounds International 2011; Volume 2: Issue
2. European Wound Management Association (EWMA). Position Document: Management of wound infection. London: MEP Ltd, 2006
3. Dressing A is Aquafiber Ag commercialised by ActivHeal.
4. Dressing B is Aquacel® Ag commercialised by ConvaTec Inc.
5 .Dressing C is Aquacel® Ag EXTRA™ commercialised by ConvaTec Inc.
6. Pathogens are: Methicillin Resistant Staphylococcus Aureus ATCC43300, Staphylococcus Epidermilis ATCC12228, Pseudomonas Aeruginosa ATCC9027 and Candida Albicans ATCC10231.
7. M Romanelli, K Vowden, D Weir. Exudate Management Made Easy. Wounds International 2010; 1(2)

Data on file