The Development of a Leg Simulation Model to Assess the Fluid Handling Capabilities of Dressings

Let's Comfort™

Michelle Delbono, Steve Foster, Risham Amjam, Systagenix, Gargrave, UK

LET'S HEAL™

ABSTRACT

Aim: To assess the fluid handling properties of dressings in a clinically relevant *in vitro* model.

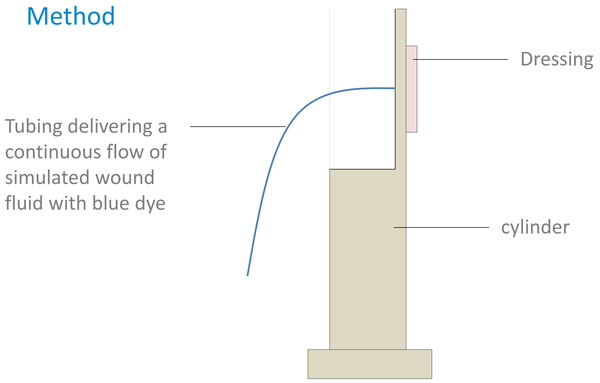
Introduction: Wounds produce exudate which must be removed in order to prevent maceration and deterioration of the wound. Dressing performance is therefore often assessed by measuring total fluid handling capacity: a combination of absorbency and moisture vapour transmission rate. However, these tests may not correlate to how a dressing will perform clinically. We have therefore developed a simulated vertical leg model to assess how dressings manage wound fluid in a clinically-relevant situation.

Method: A vertical leg model was developed whereby simulated wound fluid containing a blue dye was continuously fed onto moist wound healing dressings (5.5–8 mL/24 hrs). Dressings were monitored daily for fluid absorption, retention and leakage.

Results: TIELLE® Max provided enhanced fluid handling capability compared with other moist wound healing dressings when tested in a clinically-relevant leg model. This was demonstrated by measuring the time taken for fluid to pool at the edge of the dressing: 4–6 days for TIELLE® Max compared with 24 hrs for the majority of other dressings tested. In addition, time until dressing leakage for TIELLE® Max was 5–7 days when a heavily exudating wound was simulated. Fluid was also distributed evenly throughout the TIELLE® Max dressing and retained, which will help to reduce the potential of wound maceration.

Conclusions: Results suggest that application of TIELLE® Max may result in fewer dressing changes than other moist wound healing dressings and will potentially reduce wound maceration.

Method



- The Leg Simulation model is designed to deliver a set quantity of test fluid into each dressing (5.5- 8ml/24hours)
- Dressings were secured to the cylinders with Sleek dressing tape
- The cylinders were kept upright for the length of the experiment
- Three replicates were tested for each dressing type
- Dressings were evaluated a minimum of every 24 hours until failure
- Dressing failure criteria was when the test fluid pooled outside the dressing, a large pooling of fluid within the dressing, or any other physical abnormalities.

RESULTS

Dressings at 24 hours

TIELLE® Max

ALLEVYN * Non-adhesive

MEPILEX*

BIATAIN* Soft Hold

BIATAIN* Non-adhesive

VERSIVA* XC Non Adhesive

ACTIVHEAL* Non-adhesive

TIELLE® Max and VERISVA* did not show pooling of liquid at the edge of dressing until at least day 4 compared to all other dressings tested where pooling was observed after 24 hours.

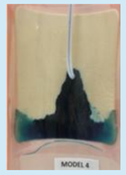
Dressings tested until failure

TIELLE® Max

Failure 5-7 days

- Best overall performance of all dressings tested
- Longest time until breach of test fluid from the dressing
- Minimal leakage onto test cylinder
- Better distribution of fluid

ALLEVYN* Non-adhesive



Failure 2-6 days

- Dressing performance inconsistent
- Significant pooling of fluid at edge of dressing after 24 hours
- Uneven distribution of fluid

MEPILEX*

Failure 3 -4 days

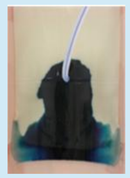
- Pooling of fluid at edge of dressing after 24 hours which then tracked upwards before failure

BIATAIN* Soft Hold

Failure 2 days

- Short time before dressing failure
- significant pooling of fluid at edge of dressing after 24 hours
- Uneven distribution of fluid
- Significant swelling at the back of the dressing

BIATAIN* Non-adhesive



Failure 1 - 4 days

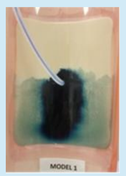
- Dressing performance inconsistent
- significant pooling of fluid at edge of dressing after 24 hours
- Significant swelling at the back of the dressing

VERSIVA* XC Non Adhesive

Failure 5-6 days

- Long time until breach of test fluid from edge of dressing, however it became saturated and significant leakage of test fluid was observed on test cylinder.

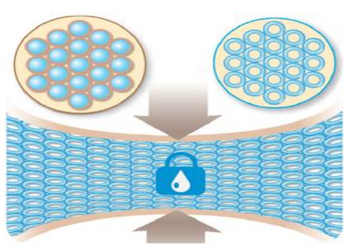
ACTIVHEAL* Non-adhesive



Failure 1-7 days

- Dressing performance inconsistent
- Uneven distribution of fluid resulted in pooling of fluid at dressing edge after 24hours

TIELLE® LIQUALOCK™ ADVANCED ABSORPTION TECHNOLOGY



TIELLE® Max provided enhanced fluid handling capability compared with other moist wound healing dressings tested on a clinically-relevant leg model

- TIELLE ® Max consists of a hydropolymer foam layer and a highly absorbent wicking layer
- The hydropolymer layer absorbs wound exudate from the wound site and expands to fit the cavity of the wound
- The exudate is initially locked within the hydropolymer, and is then transferred to a highly absorbent wicking layer enhancing the fluid handling capabilities

CONCLUSION

Results suggest that TIELLE® Max may result in fewer dressing changes when compared to the other moist wound healing dressings tested.

This is confirmed by the ability of TIELLE® Max to manage simulated wound fluid which was evenly distributed throughout the dressing during the experiment. The majority of other dressings tested in this study showed sub-optimal management of simulated wound fluid as demonstrated by pooling of the fluid at the dressing edge within 24 hours.

Wear time with TIELLE® Max was greatest, with time until dressing failure 5-7 days. This combined with minimum fluid remaining on the test cylinder, suggests optimal wound fluid management and reduced risk of wound maceration in a clinical setting.

Systagenix