

An evaluation of wound dressings to manage wound exudate and conform to the wound bed

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Abstract

Maintaining a moist wound-healing environment is now accepted practice in the treatment of chronic wounds. If moisture balance is incorrect and fluid is in excess it can have a negative effect on healing and cause maceration of the surrounding tissue. Many modern dressings have been developed, providing the clinician with a vast choice of products but difficulty in determining which is best for each wound. The comparative data on fluid handling abilities for these dressings, is laboratory based, and measures total absorbance capacity, which is not always relevant to the clinical situation.

The aim of this study was to develop a wound model, which would assess the ability of several dressings to manage exudate in a more clinically relevant test system. Two models were developed to represent wounds of different or varying depths. These models consist of a high fluid content gel with an indented surface to represent the contours of the wound bed. The indentations facilitated evaluation of dressing conformability, and their ability to absorb fluid from the surrounding matrix, representing wound tissue.

A range of wound dressings were assessed and results demonstrate that TIELLE*, a hydropolymer dressing, expanded into the wound cavity, remaining in intimate contact with the surface, providing better conformability and superior absorption of fluid from the simulated wound bed. Other dressings did not expand or conform to the wound model surface and as a result their ability to absorb fluid from the gel was compromised.

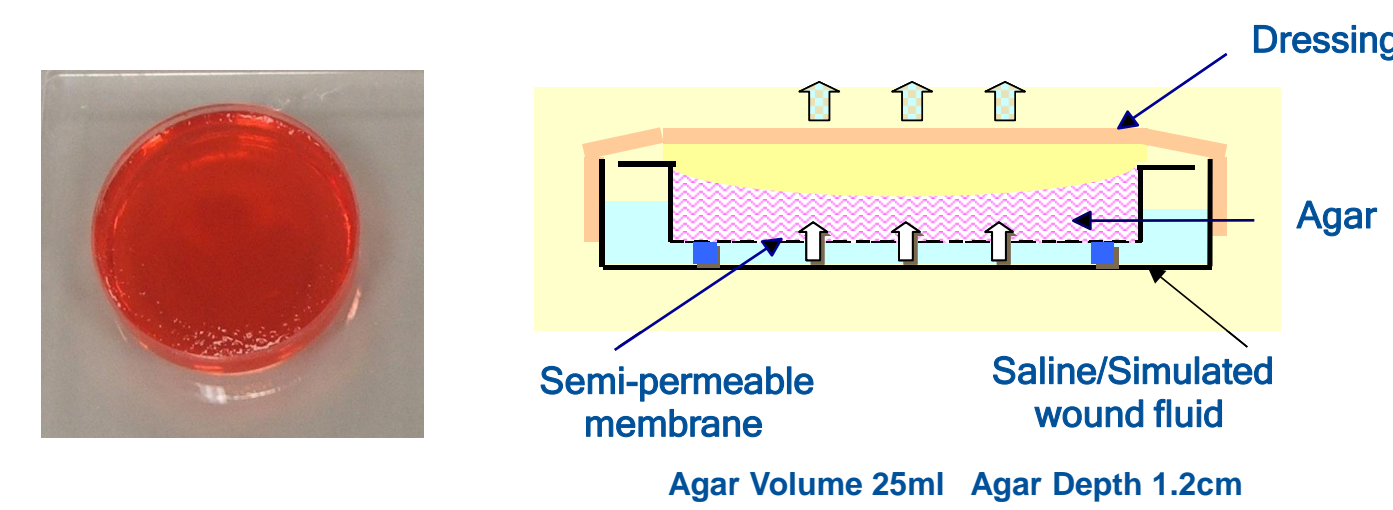
This study demonstrates that this in vitro model is a simple, effective and reproducible method for evaluating wound dressings in a more clinically relevant simulation. The results indicate that the swelling property of the hydropolymer dressing allows the dressing to conform to the contours of the wound bed, a property that enhances its ability to absorb fluid.

Objective

To develop a clinically relevant wound model which can assess the ability of dressings to manage exudate
The model should be simple, reproducible and capable of representing different wound shapes and depths

Pressure Ulcer Model

- Concave shaped agar gel represents the depth of a pressure ulcer wound
- 0.5% agar in saline represents wound exudate trapped in tissue
- Red dye was used to track the pattern of fluid absorption



Leg Ulcer Model

- This model represents a shallow wound more typical of a leg ulcer
- 3D patterned agar gel was used to represent the irregular surface of a leg ulcer
- The honeycomb pattern provides a textured surface
- 0.5% agar in saline represents wound exudate trapped in tissue
- Red dye was used to track the pattern of fluid absorption



Method

Gel formulation:

Agar (0.5% w/v) was melted in 0.9% saline (w/v). 1ml red dye was added and the agar was poured over a mould and left to cool in a 60mm diameter Petri dish.

Model setup:

The gel containing Petri dish was secured on top of a square dish (10x10cm). A dressing was placed centrally onto the gel surface, secured using adhesive tape and a disc weight (approx. 30g) placed on the dressing to ensure contact between the dressing and the gel.

Measurement of Fluid Uptake:

The agar, dressing and entire model were weighed and then incubated for 24 hours at 37°C ± 2°C. The model and its constituent parts were then reweighed following incubation to determine dressing absorption, MVTR (Moisture Vapour Transmission Rate) and total fluid removed from the agar gel.

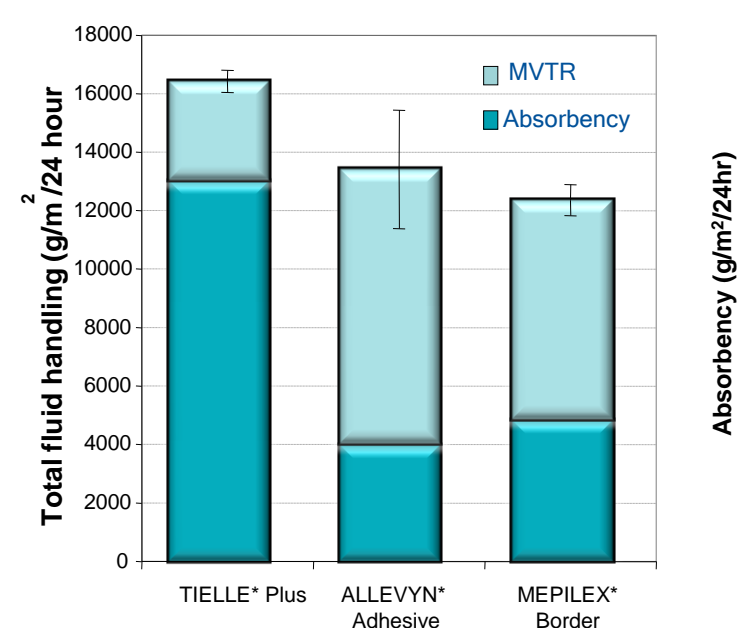
Wound Contact Area:

Photographs of the dressings and the remaining gel were taken after 24hrs to determine the distribution of absorbed fluid.

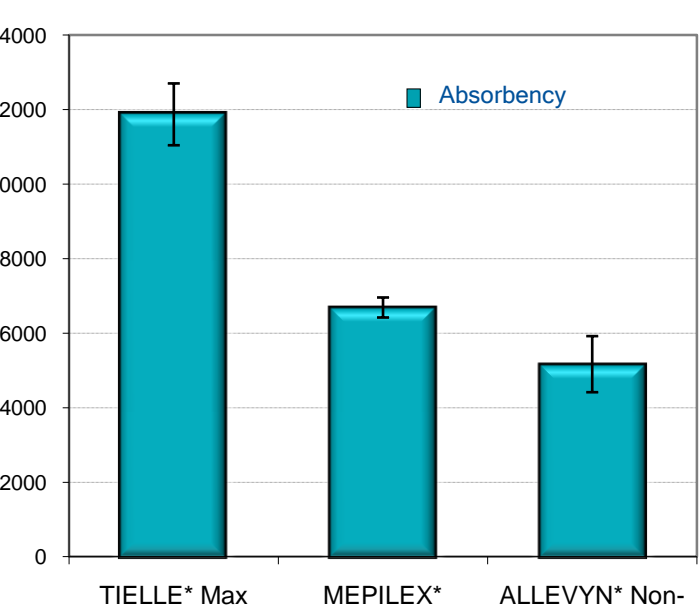
Standard methods for measuring fluid handling properties

- European Standards for measuring fluid handling ability of wound dressings
- BS:EN 13726 Aspects of absorbency (part 1 3.2) - measures maximal absorptive capacity by saturating the dressing in a saline solution for 30mins
- Moisture vapour transmission rate (part 2 3.2) - Paddington cup method. Cylinder is filled with fluid, sealed and incubated for 24 hours allowing maximal fluid absorption & evaporation

Total fluid handling of Adhesive Dressings
BS:EN 13726 standard method



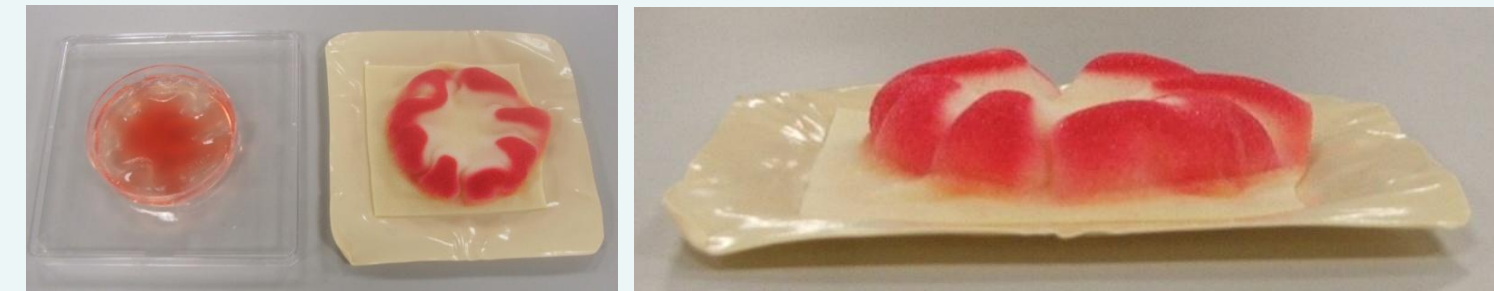
Absorbency of Non-adhesive dressings
BS:EN 13726 standard method



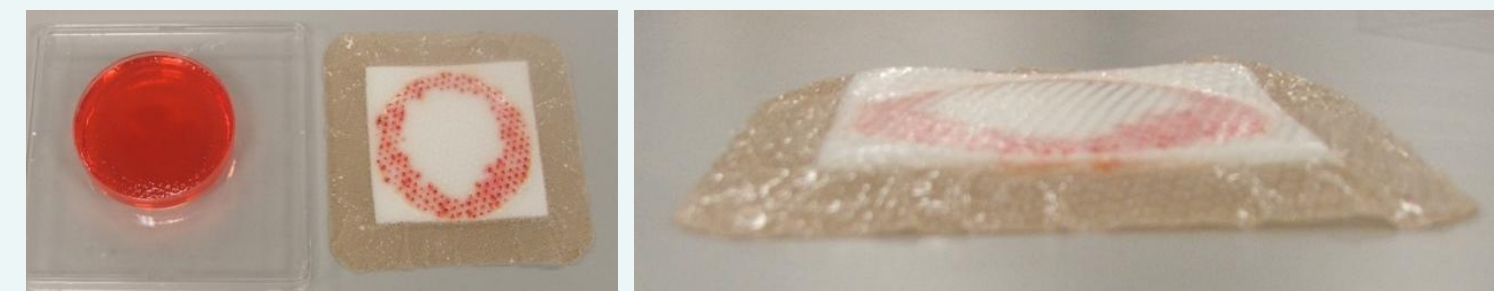
- Although methods are standard they are not very clinically relevant
- Dressings are exposed to excess fluid and measures maximal absorptive capacity of the dressings
- Non-adhesive dressings are applied under compression which impairs MVTR, therefore only absorbency measured

* This product is a trademark of its owner

TIELLE* Plus



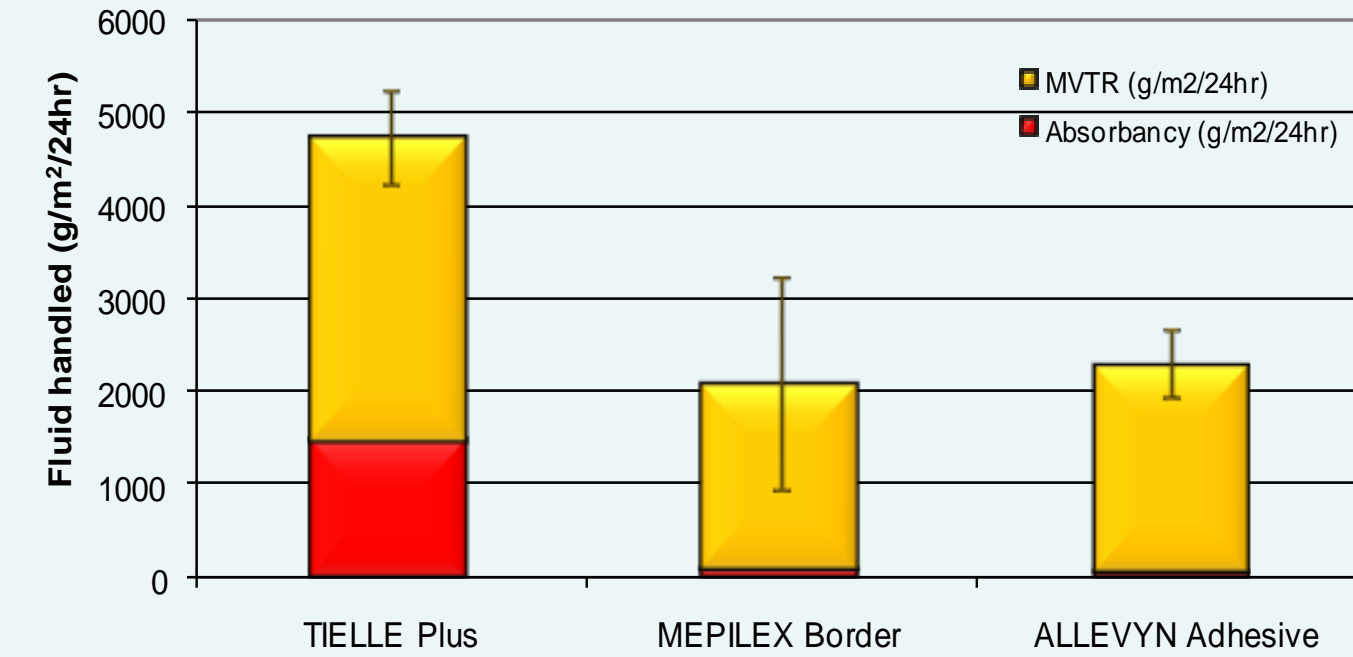
MEPILEX* Border



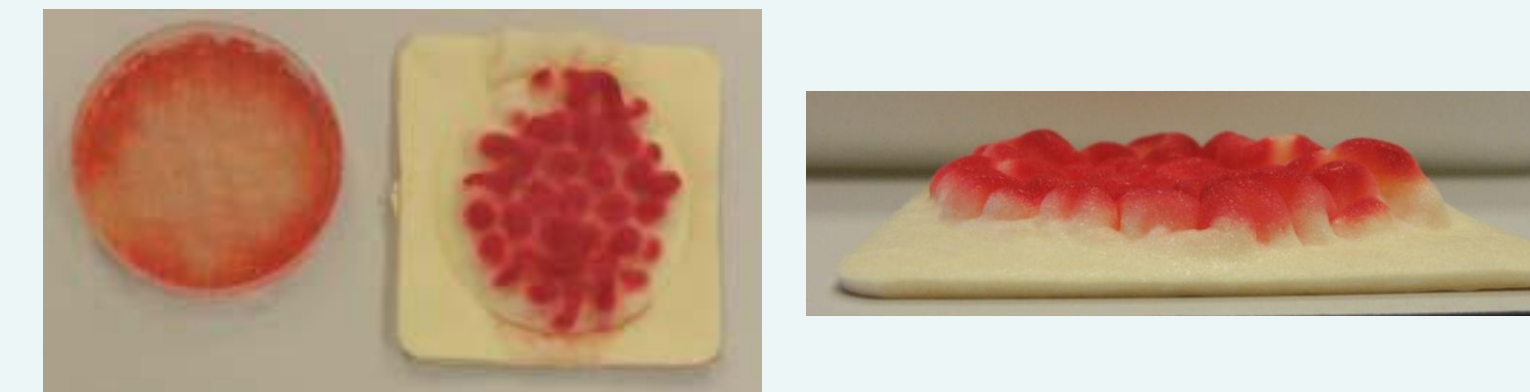
ALLEVYN* Adhesive



Total fluid handling of Adhesive Dressings
Pressure Ulcer Model



TIELLE* Max



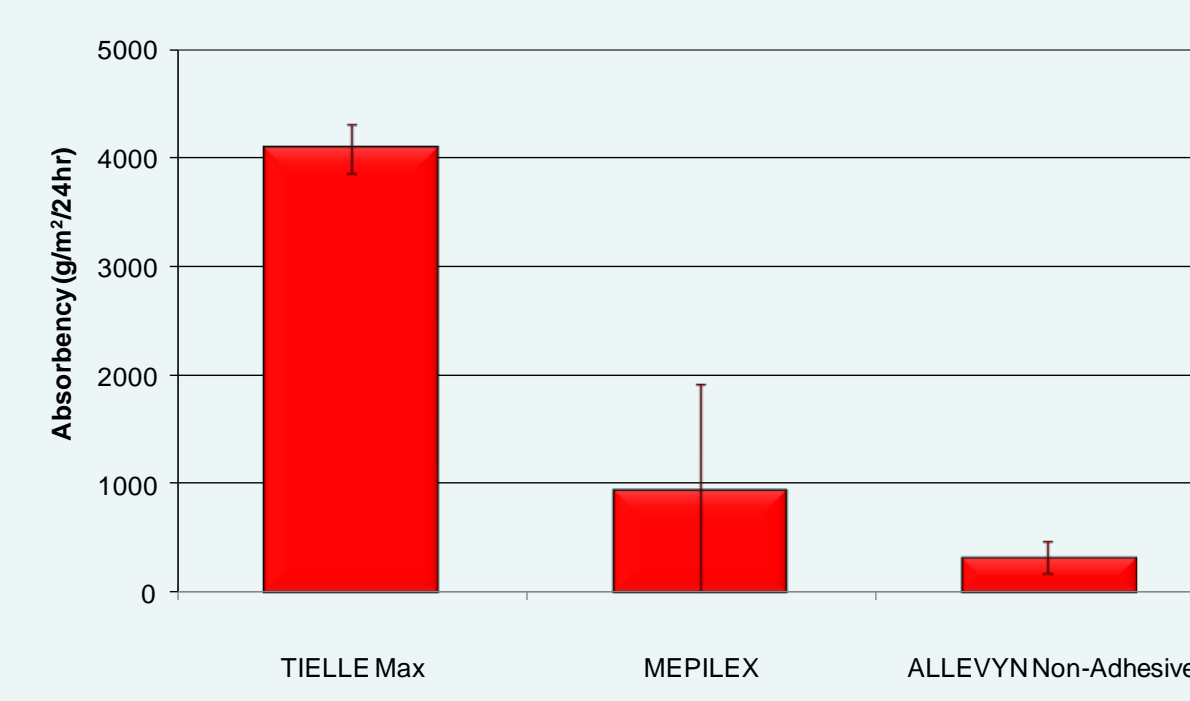
MEPILEX*



ALLEVYN* Non-Adhesive



Absorbency of Non-Adhesive Dressings
Leg Ulcer Model



Conclusions

The results demonstrate the use of a new model to evaluate the ability of wound dressings to conform to the contours of the wound bed and effectively remove fluid from the wound environment.

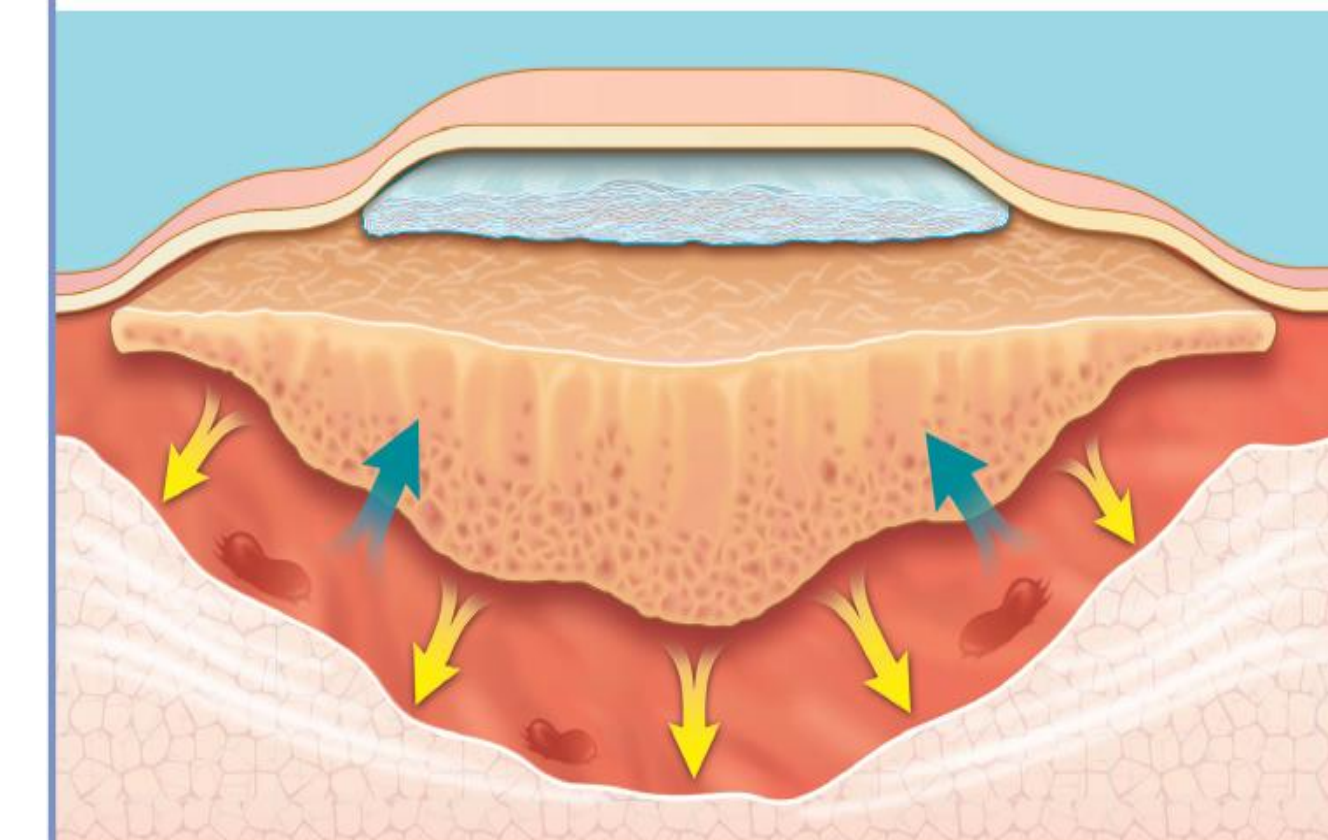
The results obtained from this new model appear to be more clinically relevant;

- Assesses dressing ability to conform to wound shape
- Controls release of fluid from agar gel
- Mimics wound contours & depth
- Adopted for pressure ulcer & leg ulcer wounds

The results show the ability of TIELLE* to swell when in contact with fluid enabling it to conform to the wound bed, reducing pooling of fluid in a more efficient manner compared to the other dressings.



Super absorption and expansion



- Absorbs up to 30 x its own weight!
- Expands and conforms to the contour of the wound bed

TIELLE with LIQUALOCK Technology

- TIELLE absorbs fluid and expands
- Fluid fills the hydropolymer cells
- Fluid permeates into the cell walls
- TIELLE's unique LiquaLock Advanced Absorption Technology then locks fluid in even under movement and pressure
- TIELLE's ability to expand into the wound area increases its ability to absorb exudate, minimizing maceration