

The Evaluation of Fluid Retention in Foam Dressings

ABSTRACT

To achieve optimal wound healing, it is essential to maintain a moist wound environment. Wounds often produce an excessive amount of exudate which must be removed in order to prevent maceration and deterioration of the wound. Modern foam dressings have been designed to achieve this through high absorbency and moisture vapour transmission rate (MVTR). However once fluid has been transferred to the dressing, it is important that it is retained, particularly when subjected to movement and pressure from external forces, such as compression therapy. This minimises the risk of dressing leakage and helps avoid peri-wound maceration of the skin.

Several foam dressings were evaluated for their ability to handle fluid using standard methodology. Fluid retention was also assessed using a fluid retention model in which dressings were exposed to simulated wound fluid and subjected to sustained pressure. The amount of fluid retained was measured.

The data show that although a number of dressings have high fluid handling capabilities using standard test methods, TIELLE® Max has a greater ability to retain liquid.

When evaluating the different foam dressings available on the market today, it is important to focus on all aspects of a dressings performance rather than simply considering absorbency and MVTR. If a dressing cannot retain liquid effectively, then there is risk of wound exudates being transferred back into the wound, risking maceration and delayed wound healing.

OBJECTIVE

- To evaluate the ability of foam dressings to retain fluid when subjected to external pressure representative of compression therapy.

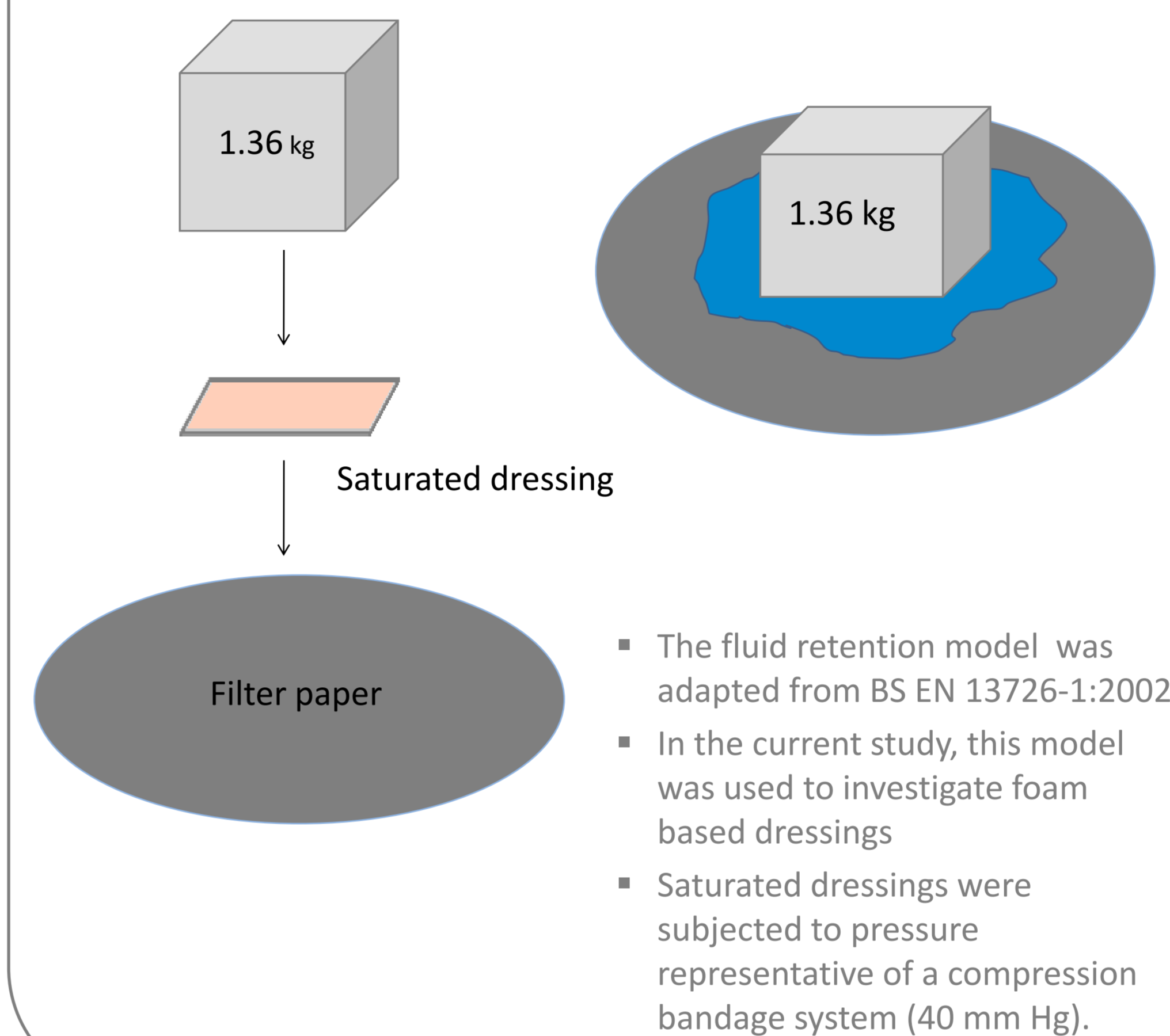
METHODS

- The absorptive capacity and fluid retention of 3 dressings were investigated :
 - TIELLE® Max, ALLEVYN® Non-adhesive and MEPILEX®.
- Absorptive capacity was assessed using standard methodology¹
- Fluid retention was assessed using a fluid retention model. For each dressing, a single sample (5 x 5 cm) was saturated with simulated wound fluid and weighed. Pressure was then applied to the sample, equivalent to 40 mm Hg. The sample was then re-weighed. The fluid retention capacity and percentage fluid retained was calculated as described below.
- Fluid retention capacity was calculated using the following equation:

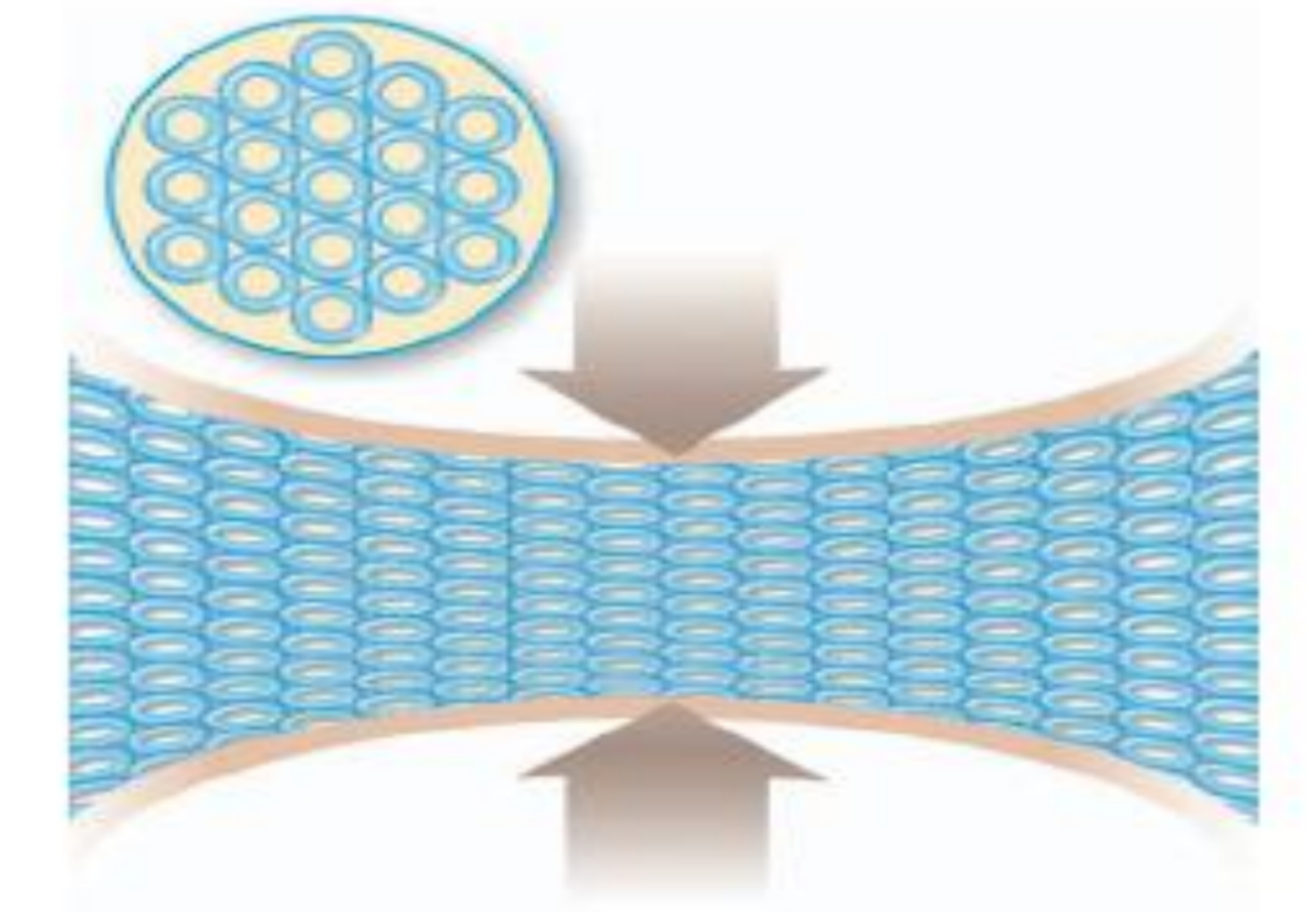
$$\text{Fluid Retention Capacity} = (a-b) \times 4$$
- The percentage fluid retained was calculated using the following equation:

$$\% \text{ Fluid Retained} = \frac{c}{a} \times 100$$
 - a = Weight of saturated dressing prior to 40 mm Hg pressure applied
 - b = Dry weight of dressing
 - c = Weight of saturated dressing after 40mm Hg pressure applied

Fluid Retention Model



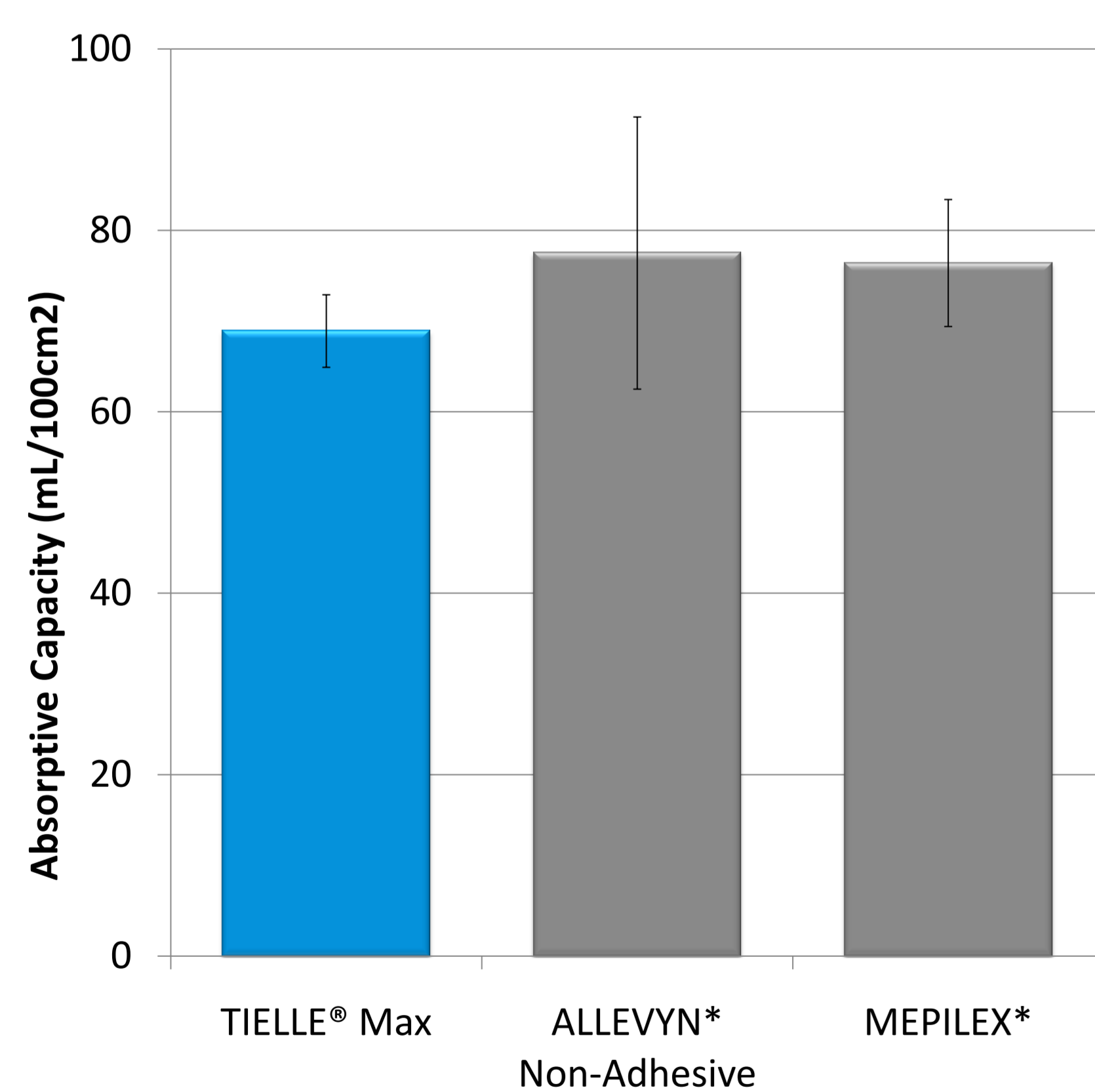
TIELLE® LIQUALOCK®



TIELLE® Max had the highest fluid retention capacity of the dressings tested in this *in vitro* model

- TIELLE® Max consists of hydro-polymer foam layer and a highly absorbent wicking layer.
- The hydro-polymer layer absorbs wound exudate from the wound site, and expands to fit the cavity of the wound.
- The exudate is initially locked within the hydro-polymer, and is then transferred to the highly absorbent wicking layer which prevents the fluid from returning to the wound site when pressure such as compression is applied.

Absorptive Capacity Results

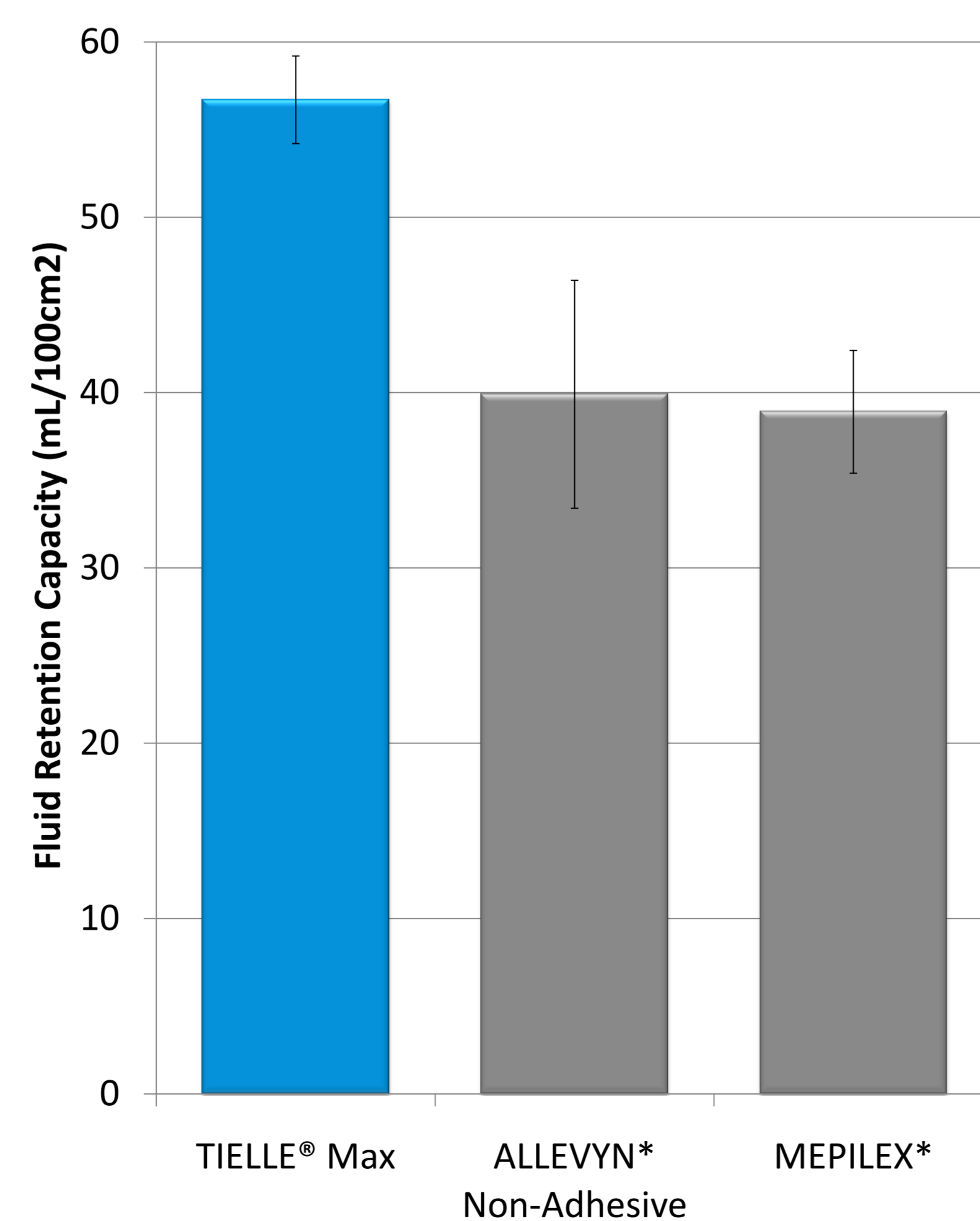


All dressings absorbed approximately the same amount of fluid (68.9 to 77.5 mL/100 cm²)

- These values were not statistically different
 - TIELLE® Max vs ALLEVYN® Non-Adhesive p=0.189
 - TIELLE® Max vs MEPILEX® p=0.054

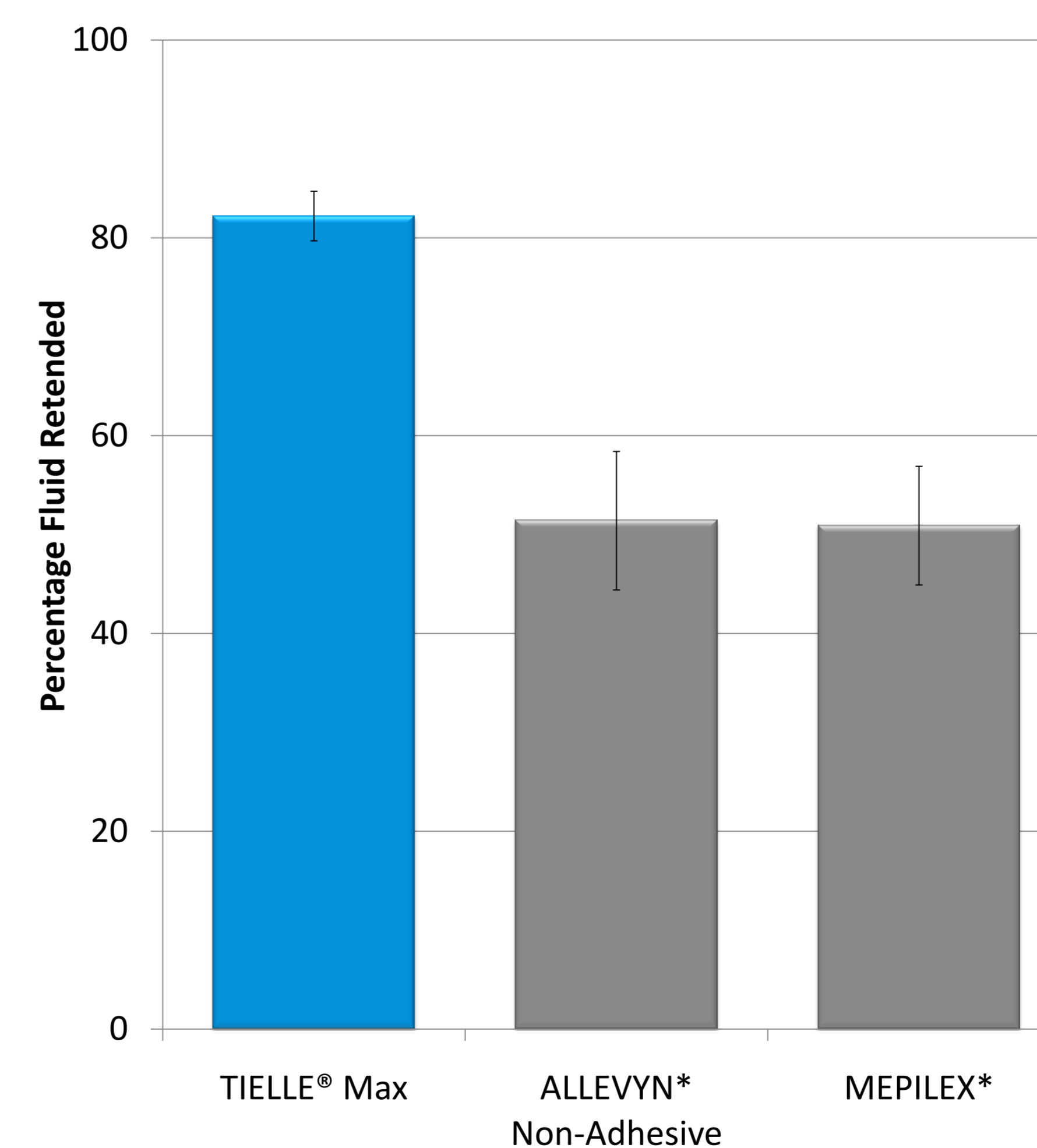
Fluid Retention Results

Fluid retention capacity (mL/100cm²)



TIELLE® Max retained significantly more fluid than either ALLEVYN® Non-Adhesive (p= 0.014) or MEPILEX®(p= 0.001)

Percentage of fluid retained



CONCLUSIONS

- There was no statistical difference in absorptive capacity when comparing TIELLE® Max with ALLEVYN® Non-Adhesive (p=0.189) and MEPILEX® (p=0.054).
- When subjected to pressure representative of compression therapy, TIELLE® Max showed significantly higher fluid retention than ALLEVYN® Non-Adhesive (p=0.014) or MEPILEX® (p=0.001).
 - TIELLE® Max fluid retention capacity was 56.7mL/100cm² compared with 39.9 mL/100cm² for ALLEVYN® Non-Adhesive and 38.9 mL/100cm² for MEPILEX®.
 - TIELLE® Max retained 82.2% of fluid compared with 51.4% for ALLEVYN® Non-Adhesive and 50.9% for MEPILEX®
- TIELLE® Max minimises the risk of dressing leakage. Reduced dressing leakage may help to avoid peri-wound maceration of the skin.

REFERENCE

- BS EN 13726 - : 2002 – Test methods for primary wound dressings part 1: Aspects of Absorbency

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