Optimal Exudate Management – Retention, fluid handling and conformability to the wound bed

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The ideal solution to reduce exudate pooling

Optimally, a wound dressing should manage exudate in a way that keeps the wound moist, controls exudate, retains the liquid to keep the periwound skin dry, and eliminates dead space by filling all cavities with dressing material i.e. conforming to the wound bed.[1] These abilities can be quantified/measured in-vitro by its capacity to absorb and permeate, absorb and retain, and produce a swelling rise Alpha of ≥ 0.2. Likewise, Biatain® Silicone and Biatain Silicone Ag's capability to produce a swelling rise of Alpha of ≥ 0.2 has recently been quantified and validated.[2]

Recently, total fluid handling capacity (measured as the sum of absorbency and moisture vapour loss) of silicone foam dressings were measured and compared with Biatain® Silicone showing the highest fluid handling capacity.[3] Fluid retention is just as important to keep exudate retained in the dressing rather than pooling in the wound or creating leakage and maceration of the wound edges and periwound skin. The capacity to retain fluid differs between the available silicone foam on the market.

Here tests of absorbency and retention performed at an independent laboratory are presented against dressings from other brands.

Test of fluid absorbency and retention

The Free Swell Absorption Capacity and Fluid Retention was determined by an external laboratory using the SMTL test method TM-404.[4] In this test, the dressing was weighed using a calibrated balance then immersed in a tank containing a test solution (sodium/calcium chloride test solution 142 mmol/litre sodium ions and 2.5 mmol/litre calcium ions) warmed to the required temperature. The tank (with dressing) was then incubated for 30 minutes. Following incubation, the dressing was transferred into an empty receiving tray and allowed to drain for 30 seconds, then weighed to calculate the absorption capacity of the dressing. Using the dimensions of the raised padded active area, a rigid template and mass with a pressure equivalent to 40 mmHg was then applied to the dressing for 30 seconds. The mean active area of the five dressing samples was used to calculate the mass required. The dressing was then re-weighed to calculate the fluid retention capacity of the dressing.

The testing was performed on five replicates.
Eight different bordered silicone foam dressings were tested Tielle™ Plus, Allevyn Gentle Border, Allevyn Life, Mepilex® Border, Mepilex® Border Flex (Mepilex® Border Comfort), Urgo Foam Border, AQUACEL™ Adhesive Border and Biatain® Silicone.

Products

The included products were bordered silicone foam dressings indicated for moderate to highly exuding wounds.

Product	Dressing size (cm)	Active area (cm²)
Biatain® Silicone	10x10	42.25
Allevyn Life	12.9x12.9	56.39
Allevyn Gentle Border	10x10	58.06
Tielle™ Plus*	11x11	48.42
Urgo Foam Border	10x10	34.80
Mepilex® Border Flex	10x10	41.99
Mepilex® Border	10x10.5	42.38
AQUACEL™ Adhesive Foam	10x10	48.56

Results

Biatain Silicone had both a significantly better absorbency and retention (t-test, $p<0.01$) compared to the seven other bordered silicone foam dressings. Between the highest and lowest performing dressing, both free swell absorption capacity and fluid retention was more than four times greater.

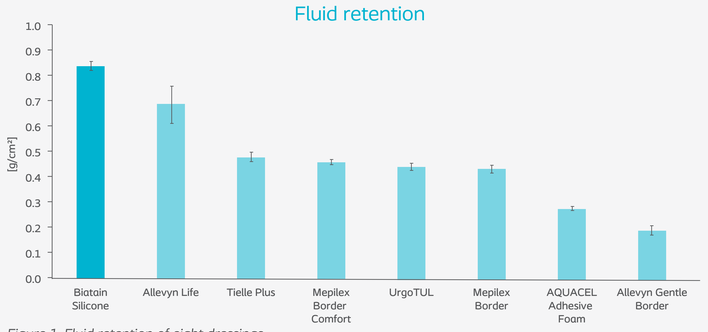


Figure 1. Fluid retention of eight dressings.

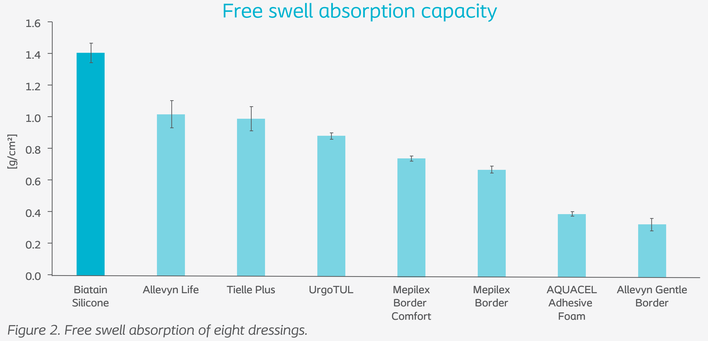


Figure 2. Free swell absorption of eight dressings.

Clinical implication

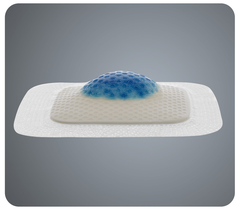
Biatain Silicone shows to deliver the ability to conform to the wound bed , absorb vertically and retain exudate at highest performance.

Fluid handling capacity and retention of fluid may have implication for the healing and healing time of the wound. Wound fluid escaping the wound reaching the periwound skin may cause maceration which causes enlargement of the wound area. This is directly leading to a delay in wound healing.[5]
Another problem with exudate pooling between the wound bed and dressing is the risk of infection.

In 2019, Hoffman & Røn presented how Biatain Silicone products swell and conform after absorbing fluid. The wound bed conformability is defined by a relative value of swelling height over diameter of wound cavity.[5]

For Biatain Silicone and Biatain Silicone Ag products swelling heights are measured up to 2 cm. Another publication at Wounds UK 2020 presents how the wound bed conformability is defined and quantified. Here it is validated how the products are capable of absorbing fluids producing a relative swelling height (swelling height by wound diameter) of more than 0.2.[2]

Despite the great variability in performance on both fluid handling capacity, fluid retention and free swell absorption, all the included dressings are indicated for moderately to highly exuding wounds and all (except Mepilex Border) have a wear time of up to 7 days depending on the level of exudate.



Conclusion

The capacity to absorb and retain differs significantly between products. Between the highest and lowest performing dressing, both free swell absorption capacity and fluid retention was more than four times greater. Retention of exudate within the dressing has implication for the maceration of the periwound skin and thereby healing time.[6] These results show Biatain Silicone's high performance on retention. Similarly, extensive in-vitro data supports Biatain Silicone as an ideal solution to reduce exudate pooling having high absorption and the ability to conform to the wound bed.

References:
1. Sibbald et al., Preparing the Wound Bed - Debridement, Bacterial Balance and Moisture Balance. Ostomy/Wound Management, 2000;46(11):14-35. **2.** Lorentsen B. & Andersen M.B. Defining Wound Bed Conformability (2020). Poster presentation at Wounds UK 2020. **3.** Nielsen 2019. Fluid Handling Capacity of Ten Silicone Dressings – the Importance of Effective Exudate Management. Poster presented at Wounds UK. **4.** SMTL test report no: 20/6063/2. **5.** Hoffmann & Røn, Fill the Gap and Reduce Exudate Pooling with a Silicone Dressing with 3DFit Technology. Poster presented at Wounds UK. 2019. **6.** Haryanto et al. Relationship between maceration and wound healing on diabetic foot ulcers in Indonesia: a prospective study. Int Wound J 2017;14(3):516-522.