Fluid Handling Capacity of Ten Silicone Dressings – the Importance of Effective Exudate Management

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Introduction

Exudate plays a key role in wound healing. However, excessive exudate (exudate pooling) is associated with problems such as increased risk of infection, malodour and frequent dressing changes. In chronic wounds, excessive exudate volume, increased inflammatory molecules, and elevated protease levels contribute to delayed wound healing. Therefore, a modern dressing should effectively management exudate to ensure an optimal wound healing environment.[1]

The aim of this study is to compare 24h fluid handling properties of ten commercially available silicone foam dressings shown in **Table 1**.

Methodology[2,3]

Laboratory Standard: all tests were performed by the independent laboratory Surgical Material Testing Laboratory (SMTL), United Kingdom. The 24h fluid handling properties were examined using SMTL test method TM-390, which is consistent with the European Standard BS EN 13726:1:2002. The test was replicated five times for each dressing.

Incubation: A sample of the dressing was applied to a Paddington cup, to which a sodium/calcium chloride solution containing 142 mmol/litre of sodium ions and 2.5 mmol/litre of calcium ions was added. The cup was weighed to the nearest 0.0001g, using a calibrated analytical balance, then placed in a temperature and humidity-controlled chamber for a period of 24 hours. Following incubation, the cup was removed from the incubator, and allowed to equilibrate at room temperature for a period of 30 minutes, prior to reweighing to the nearest 0.0001g.

Permeability Calculation: From these measurements, the loss in weight due to the passage of moisture vapour through the dressing, a measure of permeability, was determined.

Absorbency Calculation: The base of the cup was then removed, and any remaining fluid allowed to drain. If there was an accumulation of test fluid between two components of the dressing, the inner component was slit with a scalpel blade to allow free drainage of the entrapped fluid. After a time period of 15 ± 2 minutes the cup was weighed once again, and the weight of fluid retained by the dressing, a measure of absorbency, was calculated by the difference.

Results

There are substantial variations in permeability (measured by moisture vapour loss), absorbency, and total fluid handling among the ten silicone dressings tested, as shown on **Figure 1**.

The full dataset, including product names of dressings A-J, as well as the mean±SD of measurements, are shown on **Table 1**.

Biatain® Silicone (Dressing A), has significantly higher total fluid handling capacity than any other wound dressing tested.

Discussion

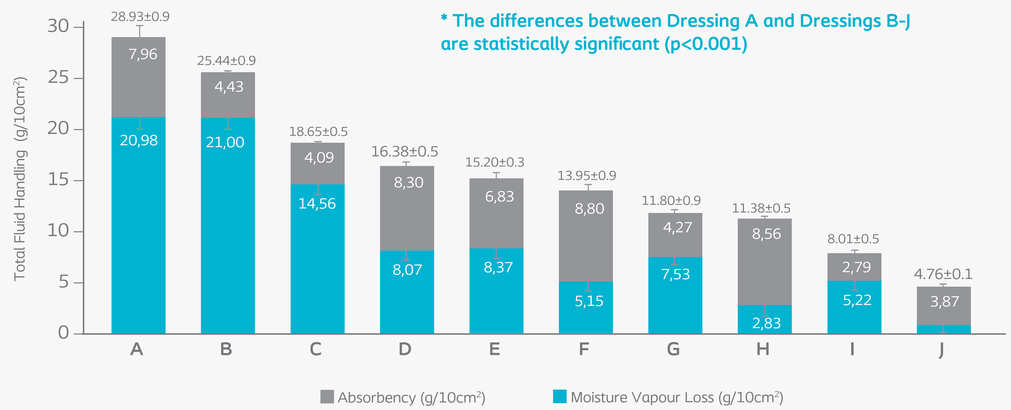
Findings from the current study are consistent with conclusions from a review conducted by the NHS Clinical Evaluation Team (CET) to assess the ability of the foam dressing to handle exudate through a combination of absorption and moisture vapour transmission (MVT), Biatain Silicone was ranked first among 20 silicone adhesive foams in total fluid capacity management (25.32 [SD 3.5] vs. 19.99 [SD 4.2] for Mepilex Border Post Op which had the second highest fluid handling capacity).[4]

Superior fluid handling capacity may reduce healing time.[5] Exudate pooling in chronic wounds is known to cause maceration of the periwound skin, which can break down, leading to extension of the original wound, reduced quality of life, and delayed healing.[6]

Higher total fluid handling capacity may also enable longer wear time and cost savings. For example, the average venous leg ulcer produces 0.43 g/cm²/24 hours of exudate.[7] Based on the results of the CET review, the estimated average wear time is 5.89 days for Biatain Silicone vs. 2.21 – 4.21 days for non-Biatain dressings. Including costs of dressings and nurse time for dressing changes, using Biatain Silicone vs. other silicone foams may lead to potential cost savings of £1,113 - £4,661 per patient per year.[8]

Figure 2. An independent review by the National Health Services (NHS) reached the same conclusion that Biatain Silicone has the highest fluid handling capacity among all silicone adhesive foams.

Figure 1. Dressing A has significantly higher total fluid handling capacity than nine other commercially available wound dressings tested (ANOVA and Dunnett's multiple comparison procedure, p<0.0001).
Total fluid handing capacity = Moisture Vapour Loss + Absorbency. Mean±SD.



Conclusion

Biatain Silicone dressing has the strongest total fluid handling capacity per unit area among alternatives as a result of its unique combination of strong permeability (measured by moisture vapour loss) and absorbency. Its superior fluid handling capacity may enable longer wear time, resulting in cost savings.

(A) Biatain Silicone (Coloplast)
(B) Sorbact foam gentle border (Abigo Medical)
(C) Cutimed Siltec B (BSN Medical)
(D) Mepilex Border Flex (Mölnlycke Healthcare)
(E) Mepilex Border (Mölnlycke Healthcare)
(F) Allevyn Life (Smith&Nephew)
(G) Allevyn Gentle Border (Smith&Nephew)
(H) UrgoTul Border (Urgo Medical)
(I) Aquacel Foam Adhesive (ConvaTec)
(J) DracoFoam (Dr. Ausbettel&Co)

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