

# Soft silicone dressings made easy

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## Introduction

Soft silicone dressings have been available for over 10 years and were developed to minimise the problems of pain and trauma at dressing change, to protect the periwound skin and promote comfort during wear<sup>1</sup>. However, not all soft silicone dressings are the same and clinicians need to understand how different products vary when selecting the most appropriate dressing for the patient and the wound. This Made Easy looks at soft silicone dressings, when they are indicated and their role in preventing wound-related complications and improving outcomes.

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## Managing patients with vulnerable skin

Patients who have paper-thin, friable skin are very vulnerable to injury<sup>2</sup>. These include the elderly, the very young or those with a genetic skin condition (eg epidermolysis bullosa). Vulnerable skin can be defined as skin that is susceptible to damage as a result of a traumatic incident that would not normally damage the skin of a healthy individual. This can either be at a macroscopic level (for example, skin tears caused by traumatic injury) or at a microscopic level (such as epidermal cell stripping, caused by the removal of an adhesive dressing)<sup>3</sup>.

Maintaining skin integrity can be challenging but is vital to overall patient health and quality of life, particularly in the elderly<sup>2</sup>. It is important that clinicians are aware of the key factors that may exacerbate the vulnerability of skin and take precautions to protect the periwound skin by minimising the contact with exudate, protecting the area with a barrier product and using appropriate dressings that do not cause trauma on removal<sup>3</sup>.

## What are soft silicone dressings?

Silicones are inert, synthetic compounds, which can vary in form — from oil, to rubbers and hard resins. They are made up of long chain polymers that include repeating chains of silicon together with carbon, hydrogen, oxygen and sometimes other elements.

Soft silicones are a particular family of solid silicones, which are soft and tacky<sup>4</sup> (Box 1). These properties enable them to conform and adhere well to dry surfaces. Such silicones have low toxicity,

making adverse reactions rare, and they cannot be absorbed into the body<sup>4</sup>. This makes them ideal for use in wound dressings.

Soft silicone dressings are coated with a hydrophobic soft silicone layer that is tacky to touch. These dressings do not stick to the moist wound bed, but will adhere gently to the surrounding skin. They are designed to minimise trauma on removal and do not leave an adhesive residue on the skin<sup>4</sup>.

## Are there different types of soft silicone dressings?

Dressings that incorporate soft silicones have different target functions suited to particular clinical needs, eg a wound contact layer to be used with a secondary dressing to increase comfort and minimise disruption to the wound bed; absorbent dressings for moderate to highly exuding wounds; and as a first-line treatment for wounds at risk of hypertrophic scarring or keloids<sup>4</sup>.

### Primary wound contact layers

Primary wound contact layers are not designed to be absorbent but to allow exudate to pass through into an absorbent secondary dressing. Typically they are thin and consist of a flexible polyamide net that is non-adherent to the wound bed. They are particularly suited for superficial wounds such as skin tears, burn wounds and blistering diseases (eg epidermolysis bullosa) where patient comfort is a priority.

### Foam dressings with silicone adhesive

In addition, many absorbent dressings now incorporate a soft silicone wound contact layer. This layer forms a gentle bond or seal between the dressing and the wound and ensures that fluid is taken up by the dressing and does not escape on to the surface of the skin. In clinical studies such dressings have been shown to wick fluid vertically with no lateral movement of exudate from the wound onto the surrounding skin<sup>5,6</sup>.

### Silicone gel sheets

Silicone gel sheets are thicker and do not require a secondary dressing and should only be used on healed wounds to reduce or prevent hypertrophic and keloid scarring<sup>7,8</sup>.

#### Box 1 What is 'tack'?

The tack (ability to stick immediately to a surface) of soft silicone dressings relates to their ability to create multiple points of contact between the dressing and the uneven surface of the skin and wound. This creates a tight seal, preventing exudate leakage and maceration of the periwound skin. Ideally, a dressing should have sufficient tack to keep the dressing securely in place for the duration of wear time, but allow removal without causing skin stripping or trauma to the wound bed<sup>9</sup>.

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## Can all soft silicone dressings be described as 'atraumatic'?

It has been shown that when removed from the skin, soft silicone dressings do not cause trauma to the wound or periwound skin<sup>9</sup>. They have been described as 'atraumatic' for this reason<sup>10,11</sup>.

However, not all soft silicone dressings can be described as atraumatic (see Box 2). Dressings in which soft silicones are used to provide the adhesive border only cannot necessarily be described as atraumatic because the wound contact layer (not covered by soft silicone) might adhere to some degree to the wound bed<sup>10</sup>.

**Box 2: Definitions of wound dressings (adapted from<sup>10</sup>)**

<b>Adherent</b>	Products that adhere to any type of drying wound. For example, simple dressing pads or cotton gauze
<b>Low-adherent</b>	Products with a wound contact surface that is designed to reduce adherence (eg absorbent wound dressing)
<b>Non-adherent</b>	Products that maintain a moist gel layer over the wound. These dressings are not expected to adhere provided that they are not allowed to dry out (eg alginates, hydrocolloids, hydrogels and Hydrofiber <sup>®</sup> )
<b>Atraumatic</b>	Products that do not cause trauma either to the wound or the periwound on removal (eg soft silicone dressings)

## How do soft silicones help to prevent wound-related complications?

Many dressings require the use of retention bandages or some form of skin adhesive (eg tapes) to keep them securely in position. While this adhesive layer does not come into contact with the wound, repeated removal of adhesive dressings can damage the outer layer of the stratum corneum of the surrounding skin<sup>12,13</sup>, especially if the patient is elderly or the skin is particularly fragile<sup>11</sup>.

The extent of skin damage depends primarily on how much an adhesive sticks to a wound or skin surface. A recent comparative study of eight wound dressings found that wound dressings with a silicone adhesive and self-adhesive polyurethane foam removed less stratum corneum when compared to a composite hydrocolloid and polyurethane foam using an acrylic adhesive<sup>14</sup>.

In addition, when dressings dry out, they may adhere to the wound bed and periwound skin<sup>15</sup>. This may be particularly evident with gauze-type dressings<sup>16</sup>. Removal of dressings that have stuck to the wound can cause damage to delicate, newly formed tissue in the wound and surrounding skin and provoke severe pain<sup>17</sup>. Briggs et al<sup>18</sup> suggest that if soaking is required for

removal and there is bleeding or trauma to the wound bed or surrounding skin, the choice of product should be reconsidered.

The adherence of soft silicone dressings varies<sup>11</sup> and it is important to select a dressing that can remain in place for a number of days without causing trauma to the surrounding skin. Soft silicone dressings remain tacky<sup>9</sup>, ensuring the dressing stays intact, so wear times can be longer which benefits healing, patient comfort and the use of healthcare resources.

## Role of soft silicones in reducing dressing-related pain

The potential to cause trauma to the wound bed and periwound skin on dressing removal is known to increase pain, the size of the wound, and delay healing<sup>19</sup>. According to the World Union of Wound Healing Societies patients experience most pain at dressing changes<sup>17</sup>. While this can be managed appropriately using analgesia or anaesthesia, increased pain at dressing changes is associated with increased costs and can be expensive for healthcare providers<sup>20</sup>.

Patients who experience more pain than they expected during a procedure can become less confident about the clinician treating them and more anxious about future dressing changes<sup>1</sup>. This is supported in a recent study by Woo<sup>21</sup> who measured anticipatory pain and anxiety in 96 patients with wounds. He found that patients who had higher levels of anxiety experienced more intense pain during dressing changes than patients with lower levels of anxiety. In addition there is evidence to suggest that pain-induced stress and anxiety can delay wound healing and adversely affect a patient's quality of life<sup>22</sup>.

Reducing pain caused by the removal of wound dressings is one of the factors to consider when choosing dressing materials<sup>17</sup>. A number of clinical studies have shown soft silicone dressings minimise pain on removal in a range of wound types and patient groups, including paediatrics<sup>23</sup>, burn patients<sup>24,25</sup>, heel ulcers<sup>26</sup> and patients with radiation skin reactions<sup>27</sup>. A study by Timmons et al<sup>28</sup> found that the use of silicone dressings improved patients' quality of life by reducing pain on removal, reducing anxiety and ultimately, speeding up the healing process.

In addition, a recent evaluation of pain intensity measurement during dressing removal found that pain intensity was significantly lower when soft silicone dressings were used in healthy volunteers<sup>29</sup>.

When selecting a dressing the adhesion properties or propensity of different wound dressings on the skin of patients should be considered. A statistically significant correlation between the adhesion and pain intensity has been reported<sup>30</sup>.

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## When are soft silicone dressings indicated?

Soft silicone dressings can be used on a wide range of low to highly exuding wounds, including pressure ulcers, diabetic foot ulcers and venous leg ulcers, traumatic wounds (eg skin tears), partial thickness burns and for skin graft fixation. They can also be used on hypertrophic scars and minor keloid scars although the mode of action is not fully understood<sup>7</sup>.

They are particularly suitable for patients:

- **with fragile skin, including young children and the elderly**
- **experiencing pain at dressing changes**
- **in whom it is important to protect at-risk periwound skin.**

Soft silicone dressings should not be used in patients with a known allergy to silicone or on bleeding wounds<sup>4</sup>.

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## Role of soft silicones in skin tears

Unlike pressure ulcers and other chronic wounds, skin tears are acute wounds with the potential to be closed by primary intention<sup>31</sup>. These wounds often occur in elderly patients whose skin is fragile. The degree of tissue damage associated with a skin tear was first classified by Payne and Martin<sup>32</sup> using three categories. In category 1 the skin flap is intact and can be eased back into place. In category 2 there is partial tissue loss (from scant to moderate or large loss of the epidermal flap). In category 3 there is complete loss of the flap (this may have occurred during the original trauma or later when it has necrotised). A further classification system (STAR) is commonly used in Australia<sup>33</sup>, with some uptake in the UK. This also comprises three categories.

For optimal management, it is important to maintain the viability of the flap by

realigning it as soon as possible after the trauma. Careful manipulation avoids damage of the skin flap<sup>31</sup>.

Use warm water or saline to irrigate the wound and remove any residual haematoma or debris from the underlying tissue. Unless contamination with dirty material during the trauma it is not necessary to use antiseptics. After precise realignment of the flap in a category 1 or 2 skin tear, a silicone coated net dressing can be applied to secure the skin flap in place. The dressing should be left *in situ* for a minimum of five days to allow the flap to adhere to the underlying tissue.

To avoid exudate and blood collecting under the flap, an absorbent secondary dressing can be applied, together with an optional mild compressive bandage<sup>34</sup>.

Using a silicone coated primary wound contact layer can provide the following benefits:

- **Ensures secure fixation of the skin flap**
- **Provides an atraumatic method of fixation (skin sutures or staples are not suitable and adhesive tape is no longer recommended)**
- **Is atraumatic to skin and has low allergy potential, minimising pain or irritation on removal of the dressing**
- **Allows exudate to pass through to a secondary absorbent dressing for effective management of exudate.**

When selecting a silicone dressing, it is important to use one that provides a good tack strength to ensure that the dressing stays in place for the longest appropriate wear time<sup>34</sup>. Comparative studies would be necessary to support the clinical experience in the choice of the silicone dressing.

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## Role of soft silicones in pressure ulcers

Sacral pressure ulcers are the most common type of pressure ulcer and can be problematic to treat due to their location, risk

of infection from faecal matter and increased exudate production<sup>35</sup>. Wound dressings are a key component of pressure ulcer management, together with appropriate pressure redistribution and skin care<sup>36</sup>.

An open randomised controlled study compared the use of a soft silicone dressing to a hydrolymer wound dressing in 38 patients over 65 years with a Category/Stage II pressure ulcer. During the study eight (44%) ulcers in the soft silicone group and 10 (50%) ulcers in the hydrolymer group healed. Although differences in wound healing were not significant, damage to the surrounding skin, maceration and dressing removal were less frequently reported with the soft silicone dressing and differences in tissue damage between the two dressings were significant during weeks 1–3 ( $p < 0.05$ )<sup>5</sup>.

For those at risk of developing pressure ulcers, the use of a soft silicone bordered foam dressing to protect vulnerable areas can also be considered<sup>37</sup>. A recent consensus recommends that a multi-layer soft silicone dressing may help to minimise friction and shear when turning patients or to prevent footwear from rubbing. They may also play a role in managing the skin's microclimate by removing moisture trapped against the skin<sup>38</sup>.

By identifying those at risk of developing sacral pressure ulcers, Brindle and colleagues<sup>39</sup> were able to reduce the incidence to zero using a soft silicone dressing within the surgical intensive care (ICU) setting. Furthermore, where a sacral soft silicone foam dressing was incorporated into a pressure ulcer prevention programme in ICU patients, there was a decrease in the number of hospital acquired sacral pressure ulcers from 50 to 13 over 12 months<sup>40</sup>.

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## Cost implications of using soft silicone dressings

A recent review of three randomised controlled trials comparing a soft

silicone dressing with other commonly used dressings on burns and split-skin grafting, found that the soft silicone dressing significantly reduced the time required for dressing changes, the number of dressings used and pain management costs<sup>41</sup>. In addition, healing rates were faster and the soft silicone dressing needed to be changed less frequently, resulting in an overall reduction in costs<sup>41</sup>.

This work is supported by a randomised, multicentre study in patients with partial-thickness burns<sup>42</sup>. However, further work is needed to extrapolate these findings to other soft silicone products and wound types.

## What are the benefits of using soft silicone dressings?

- **Low trauma with minimal adhesion to the wound bed or surrounding skin — increasing patient comfort and minimising pain at dressing changes**

- **Flexible and conform well to body contours**
- **Safe to use (unlikely to cause sensitivity reactions, do not produce any systemic effects)**
- **May also help to prevent the development of hypertrophic scars or keloids after surgery**
- **Cost-effective — minimises need for analgesia at dressing changes and may offer longer wear time.**

## Case studies using a foam dressing with a soft silicone adhesive

The following case reports (Case 1 below and Case 2, page 5) evaluate the use of Askina DresSil® in the treatment of an amputation stump ulcer and Category/ Stage IV pressure ulcer.

### What is Askina DresSil®?

Askina DresSil® is a self-adherent foam dressing with a soft silicone adhesive wound contact layer and a vapour permeable waterproof outer film layer.

Askina DresSil® Border has the same structure as Askina DresSil®, but offers an additional adhesive border, for more security during wear. It is specially adapted for difficult-to-dress or moving areas (eg knees and elbows).

Askina DresSil® has been shown *in-vitro* to provide a safe level of adhesion and facilitates atraumatic dressing removal without damage to epidermal cells and to have good fluid handling properties<sup>43</sup>.

Askina DresSil®'s silicone wound contact layer is perforated to enable vertical absorption of exudate to the foam layer, preventing exudate leaking onto the surrounding skin and maceration of the wound edges<sup>43</sup>.

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### The use of a soft silicone absorbent dressing on a patient with a stump ulcer: a case study

A 54-year old gentleman presented with a pressure ulcer to the left leg amputation stump area. This had been caused by his prosthesis and was treated surgically. He lived at home and was being treated by the community care team. He had no history of diabetes.

The wound had been present for 60 days and measured 4cm x 3cm x 3cm. There was some evidence of granulation tissue in the wound bed with small areas of necrosis. The surrounding skin was pink. There were no clinical signs of infection (Figure 1).

#### Treatment

The wound was cleansed using a wound irrigation solution (Prontosan®, B Braun). Askina DresSil® (B Braun) was chosen to protect the wound and reduce pain at dressing changes. The first dressing change was planned for 2 days time, with subsequent dressing changes every 3 days.

At the first dressing change the surrounding skin was intact and the wound showed evidence of granulation tissue and signs of healing. The patient reported a pain score of 2 (on a VAS 0-10 pain scale) on dressing removal. The dressing was easy to remove and the patient had found it to be comfortable during wear. The patient was advised not to wear his prosthesis. By week 3, the patient reporting no pain on dressing removal. The wound showed signs of improvement, with evidence of epithelialisation and it had reduced in size to 2.5cm x 1cm x 2cm. It was decided to continue the current regimen. By week 8, the wound had closed and the patient was pain free (Figure 2).

#### Outcome

The development of stump ulcers in amputees is common and it is important to protect the vulnerable skin to avoid further complications and surgery. Askina DresSil® was well tolerated, providing a good level of comfort. The overall performance of the dressing was considered to be excellent in terms of its ability to stay in place and ease of application. Following healing of his wound, the patient was encouraged to wear his prosthesis to improve mobility.



Figure 1 Wound status on presentation



Figure 2 Stump appearance at week 8

### The use of a soft silicone absorbent dressing on a patient with a Category/Stage IV pressure ulcer: a case study

A 89-year-old gentleman presented with a Category/Stage IV pressure ulcer with a duration of 60 days. He was bedridden/wheelchair bound and lived in a nursing home. He had a history of diabetes.

The wound was located in the sacral area and measured 3cm x 0.5cm x 1.5cm. The wound bed was covered in thick slough; there was no evidence of epithelialisation or clinical signs of infection. The exudate level was high and the surrounding skin was reddened (Figure 1).

#### Treatment

The wound was cleansed with a wound irrigation solution and gel (Prontosan®, B Braun) prior to application of Askina DresSil® to the sacral wound. This dressing was chosen to manage the high levels of exudate and protect the surrounding skin. Dressing changes were planned for every two days.

At the first dressing change, the wound bed contained less slough and the surrounding skin remained intact with no signs of irritation. The patient recorded a pain score of 2 (on a 0-10 VAS pain scale) on dressing removal. Dressings continued to be changed every 2 days over the Christmas period.

At week 3 the patient reported a significant improvement in pain and reported that the dressing improved his levels of comfort. The wound had decreased in size slightly (2cm x 0.3cm x 1.2cm) and exudate levels had reduced. There was less sloughy tissue in the wound bed, with evidence of epithelialisation. The appearance of the surrounding skin had improved (Figure 2).

By week 8 the patient was pain free on dressing removal, which continued through to week 12. At this time there were signs of healing with evidence of granulation tissue and the wound bed was clean.

By week 16, the wound measured 0.5cm x 0.1cm x 0.5cm and exudate levels were low. Signs of healing were evident and the surrounding skin was not irritated (Figure 3).

#### Outcome

Elderly patients with a low level of mobility are at high risk of pressure ulcer development. Effective management of exudate and well as protecting the wound from contamination and further tissue damage are important for wound healing. Askina DresSil® was found to be easy to apply, was able to conform well to the wound area and to stay in place during wear. There was no evidence of trauma to the surrounding skin on removal and the patient did not experience pain at dressing changes.



Figure 1 Sacral pressure ulcer prior to starting treatment with Askina DresSil®



Figure 2 Wound appearance at week 3



Figure 3 Reduction in wound size and exudate with signs of wound healing at week 16

## Summary

Soft silicone dressings have been shown to prevent trauma to the wound bed and periwound skin and have been described as 'atraumatic' for this reason. They can be used on a wide range of low to highly exuding wounds and may be particularly suited to patients with fragile skin and/or those experiencing pain at wound dressing changes. They have been shown to help prevent wound-related complications and to minimise pain on removal in a range of wound types and patient groups. However, not all soft silicone dressings are the same and it is important that clinicians understand the difference between the products available in order to select the most appropriate dressing for the patient and the wound for optimal outcomes.

#### How to cite this publication:

Meuleneire F, Rücknagel H. Soft silicones Made Easy. Wounds International 2013 (May). Available from: [www.woundsinternational.com](http://www.woundsinternational.com)

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Supported by an educational grant from B Braun. The views expressed in this 'Made Easy' section do not necessarily reflect those of B Braun.