

# Pressure ulcers and hydrocolloids **made easy**



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## Introduction

Pressure ulcers pose a significant challenge to healthcare systems, and subject patients to considerable discomfort, pain and indignity. Although every effort should be made to prevent pressure ulcers, not all can be prevented. This article discusses the role of hydrocolloid dressings in the management of Category/Stage I and II pressure ulcers (Box 1).

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## The scale of the problem

The true frequency and associated cost of pressure ulcers is not known. Estimates suggest that in Europe approximately 18% of inpatients may have a pressure ulcer<sup>1</sup>. In 2004, it was estimated that the total cost of pressure ulcer care accounted for about 4% of UK National Health Service expenditure (approximately £2 billion)<sup>2</sup>. Furthermore, in the UK between 2003 and 2008, pressure ulcers were directly attributed as a cause of death in 4,708 people<sup>3</sup>. In the USA, it is believed that in the hospital sector the costs associated with pressure ulcers may be as high as \$11 billion per annum<sup>4</sup>.

## Hydrocolloids and pressure ulcers

Hydrocolloids are widely used in the management of pressure ulcers<sup>5</sup>. They have been recommended for use in Category/Stage II and III pressure ulcers<sup>6</sup>, and increasingly are being used in the management of Category/Stage I pressure ulcers<sup>7</sup>.

## What is a hydrocolloid dressing?

Hydrocolloid dressings are made from a layer of gel-forming material attached to a semi-permeable film or foam backing. The gel layer comprises an adhesive matrix that contains a combination of absorbent materials such as sodium carboxymethylcellulose, pectin and gelatin. The resulting dressing is absorbent and self adhesive, even in moist conditions<sup>8</sup>.

Even though different hydrocolloid dressings may look similar, their fluid handling abilities can differ markedly<sup>9</sup>. Many hydrocolloid dressings are available in a variety of shapes, sizes and thicknesses. These may include products designed for specific anatomical areas (eg the sacrum or heel). Some products are very thin or have tapered edges that make them less likely to wrinkle, ruck or roll at the edges. These thinner products may also be semi-transparent allowing visualisation of the wound without the need to remove the dressing.

Variations in the backing materials may alter the 'slipperiness' of the dressing. Dressings that have a more 'slippery' outer surface reduce the coefficient of friction between the support surface and the patient, and so reduce the amount of shear and friction transmitted to the underlying skin. In this way, they may help to reduce the risk of further damage.

Many of the more recently available hydrocolloid dressings, including some thicker products, combine tapered edges and a smooth backing surface.

## How do hydrocolloid dressings work?

Hydrocolloid dressings are believed to have a number of key

### Box 1 Pressure ulcers: a definition and classification<sup>6</sup>

A localised injury to the skin and/or underlying tissue, usually over a bony prominence, as a result of pressure, or pressure in combination with shear. A number of contributing or confounding factors are also associated with pressure ulcers; the significance of these factors is yet to be elucidated.

NPUAP/EPUAP classification:

Category/Stage I: Non-blanchable redness of intact skin



Category/Stage II: Partial thickness skin loss or blister\*



Category/Stage III: Full thickness skin loss (fat visible)



Category/Stage IV: Full thickness tissue loss (muscle/bone visible)



\*Photograph used with the kind permission of Dale Copson, MSc, BSc(Hons) RN, Tissue Viability Nurse Specialist, formerly of Southern Derbyshire Acute Hospitals NHS Trust. Other photographs courtesy of ConvaTec.

This is a general educational article on Hydrocolloids and pressure ulcers. Not all claims made herein are attributable to ConvaTec's hydrocolloid products.

# Pressure ulcers and hydrocolloids made easy



properties that are useful in the management of pressure ulcers including:

- production of a moist wound environment
- management of exudate
- facilitation of autolytic debridement
- provision of a barrier to micro-organisms
- helping with pain management<sup>10</sup>.

## Creating an optimal environment for healing

Hydrocolloid dressings create a moist wound environment that is known to be beneficial to wound healing<sup>11</sup>. Specifically, hydrocolloids are believed to promote angiogenesis, increase the number of dermal fibroblasts, stimulate the production of granulation tissue, and increase the amount of collagen synthesised<sup>10</sup>.

## Autolytic debridement

The moisture retentive properties of hydrocolloids help to gently soften and rehydrate necrotic tissue and slough, aiding autolytic debridement. This may take longer than sharp or biosurgical debridement (eg larval therapy), but may be more appropriate in some situations.

## Prevention of infection and cross-infection

Hydrocolloids are adhesive and waterproof, and some hydrocolloids have been shown to act as a viral and bacterial barrier (eg to methicillin-resistant *Staphylococcus aureus* (MRSA), hepatitis B virus (HBV) and the human immunodeficiency virus (HIV-1)) provided the dressing remains intact and without leakage<sup>12-14</sup>. Hydrocolloid dressings may therefore be advantageous for use in areas such as the sacrum that are regularly subjected to heavy contamination. Several studies have examined whether the occlusive nature of hydrocolloid dressings increases the risk of infection. However, no evidence has been found to suggest that this is the case<sup>15,16</sup>.

## Protection of newly forming skin or Category/Stage I pressure ulcers

A hydrocolloid dressing with a smooth slippery backing reduces the friction coefficient of the patient-support surface interface<sup>17</sup>. The reduction in friction means that the patient is able to move more easily over the support surface and the area covered by the dressing is likely to be exposed to lower levels of pressure, shear and friction<sup>7,18</sup>, reducing the risk of a Category/Stage I pressure ulcer progressing to deeper damage.

Semi-transparent hydrocolloid dressings may be used over reddened skin (Category/Stage I pressure ulcers) as it is possible to observe for deterioration without removing the dressing.

### Box 2 Tips for pressure ulcer assessment

- Systematic assessment and monitoring of progress can be facilitated through the use of a validated wound assessment instrument<sup>6</sup>
- Use of photography (with appropriate consent) is helpful to provide a baseline, and a serial library, upon which improvement or deterioration may be determined<sup>19</sup>
- A standardised method for categorising/grading pressure ulcers should be employed
- Wound size should be monitored every one to two weeks; other wound characteristics should be monitored at each dressing change<sup>6</sup>
- During each assessment, care should be taken to identify and address specific patient concerns regarding treatments and wound status<sup>6</sup>
- Wounds that have been identified as healable, but that are not progressing within the first two weeks of treatment should have the plan of care re-evaluated and changes in patient specific characteristics assessed<sup>6</sup>

## Pain management

The gel that forms during use of a hydrocolloid dressing makes removal easy and atraumatic. The moist, oxygen-depleted, environment produced by the dressing is thought to protect the nerve endings and so help to reduce pain in the wound bed<sup>20,21</sup>.

## What is the evidence?

Hydrocolloid dressings have been available for many years and have been extensively researched in a wide range of acute and chronic wound types. Many studies have confirmed that hydrocolloids are more effective than traditional dressings (such as gauze)<sup>10</sup> (Table 1).

## Principles of pressure ulcer management

Accurate and ongoing assessment of the individual and the wound are essential for effective pressure ulcer management<sup>22</sup>. Bearing in mind the negative impact pressure ulcers have on health-related quality of life<sup>23</sup>, it is essential that a systematic approach to assessment is adopted (Box 2). Involvement of the patient and their family is central to ensuring that individual problems and concerns are addressed<sup>6</sup>.

Assessment should include consideration of all activities of daily living<sup>6</sup>. In addition, selection of the correct topical wound dressing/intervention is dependent on having a clear understanding of the goal of treatment<sup>24</sup>. Development of the goal is facilitated through a detailed assessment of the wound, including the Category/Stage, location, size and shape, wound bed condition, exudate level and consistency, pain, malodour, peri-wound skin condition, and the presence or absence of infection<sup>6</sup>.

**Table 1 Study summaries**

Study reference	Therapy	Design	Selection criteria	Clinical outcomes
Hollisaz M, et al. <i>BMC Dermatology</i> 2004; 4: 18 <sup>25</sup>	Hydrocolloid dressing (n=31) vs phenytoin cream with gauze (n=30) vs simple dressing (wet gauze) (n=30)	Randomised clinical trial	Category/Stage I and II pressure ulcers in paraplegic males (n=83 with 91 ulcers)	More ulcers, regardless of location and Category/Stage, were completely healed in the hydrocolloid group than in the other groups
Chang KW, et al. <i>Med J Malaysia</i> 1998; 53(4): 428-31 <sup>26</sup>	Hydrocolloid (Duoderm CGF (ConvaTec) vs saline gauze	Randomised controlled trial	Category/Stage II or III pressure ulcers (n=34)	Adherence to wound bed, exudate handling, overall comfort and pain during dressing removal all significantly favoured hydrocolloid Mean reduction in surface area measurement was 34% for hydrocolloid. Patients treated with gauze experienced a mean 9% increase in surface area
Graumlich J, et al. <i>J Am Ger Soc</i> 2003; 51: 147-54 <sup>27</sup>	Hydrocolloid vs collagen	Randomised, parallel group, single blind, controlled trial	Category/Stage II (80%) or III (20%) pressure ulcers; median age 83.1 years	Healing rates and overall healing time were similar in both groups Costs were estimated as \$222 for hydrocolloid and \$627 for collagen per patient for 8 weeks
Meaume S, et al. <i>J Wound Care</i> 2002; 11(6): 219-24 <sup>28</sup>	Dressings used on venous leg ulcers and pressure ulcers	Development of cost-effectiveness models based on a literature review	The models were used to calculate cost per ulcer healed over a 12 week period	For pressure ulcers, a hydrocolloid (DuoDERM (ConvaTec)) was most cost-effective in France
Kerstein M, et al. <i>Dis Manage &amp; Health Outcomes</i> 2001; 9(11): 651-3 <sup>29</sup>	Pressure ulcer and venous leg ulcer protocols	Modelling study using outcomes from a literature review	The cost of 12 weeks of wound care was modelled for modalities with a pooled evidence base of at least 100 wounds	Costs per patient healed were lowest for pressure ulcers treated with hydrocolloids and highest for those treated with saline gauze due to differences in person-time required
Heyneman A, et al. <i>J Clin Nurs</i> 2008; 17(9): 1164-73 <sup>30</sup>	Hydrocolloid dressings	Systematic review of hydrocolloids in pressure ulcers	Randomised controlled trials of hydrocolloids in the treatment of pressure ulcers (28 studies in total)	Hydrocolloids had greater absorptive capacity, shorter time for dressing change and less pain during dressing changes than did gauze dressings Hydrocolloids seemed to be less expensive than collagen, saline and povidone soaked gauze, but more expensive than hydrogel, polyurethane foam and collagenase Hydrocolloids are more effective than gauze dressings for reducing wound dimensions, but less effective than alginates, polyurethane dressings, topical enzymes and biosynthetic dressings

## When to use hydrocolloids for pressure ulcer management?

The management of individuals with pressure ulcers involves a myriad of interventions such as optimising nutrition, repositioning and use of specialised beds, mattresses and cushions, in addition to skin and continence care<sup>7, 31</sup>. Priority should be given to relieving the cause of pressure and to dealing with any general factors such as nutrition that may delay the process of healing. Local wound care should focus on achieving the optimum environment to facilitate healing and to achieve any other patient focused outcomes, such as relief of pain and reduction of exudate production.

Hydrocolloid dressings are believed to have a number of key properties that are useful in the management of pressure ulcers, eg:

- **protection of periwound skin**
- **removal of necrotic tissue and slough**
- **maintenance of a moist wound bed without over-hydrating the wound<sup>22</sup>.**

There is much debate within the literature as to the role of specific dressing types in addressing these issues in pressure ulcers<sup>30, 32, 33</sup>. Currently, hydrocolloid dressings are widely used in individuals with Category/Stage II pressure ulcers. They are also used as primary dressings in the management of Category/Stage III and IV pressure ulcers that are healing well and have become shallow. Hydrocolloids create a moist wound-dressing interface, facilitate autolysis and promote granulation tissue production, so creating an optimal local wound environment that is thought to be conducive to wound healing<sup>30</sup>.

Thin hydrocolloid dressings (eg DuoDERM® Signal™ and DuoDERM® Extra Thin) are increasingly used in the management of Category/Stage I pressure ulcers. The slippery outer surface assists in reducing friction or shear to the underlying skin to protect it against further damage<sup>7</sup>.

The moisture control provided by the hydrocolloid dressing may also have a role in maintaining tissue integrity and preventing deterioration of Category/Stage I pressure ulcers by preventing

maceration. Good absorbency has been identified as an ideal characteristic of a dressing used for pressure ulcer prevention<sup>34</sup>. In addition, thin hydrocolloids are much easier to handle than are film dressings because they are less likely to fold on themselves.

Irrespective of the stage of healing, hydrocolloids are also useful as a secondary dressing because of their waterproof backing and ability to reduce shear and friction. The interaction between the hydrocolloid and the primary cavity filler must always be considered. For example, a hydrocolloid, Hydrofiber® or alginate cavity filler may be usefully covered with a hydrocolloid dressing, but amorphous gels tend to produce too wet an environment for a hydrocolloid dressing to manage.

### Protection of periwound skin

Hydrocolloid dressings generally overlap the wound edge and extend onto healthy skin and protect periwound skin by:

- **providing a protective covering to the healthy periwound skin**

- **absorbing wound exudate, so keeping excessive moisture and potentially damaging proteolytic enzymes away from healthy skin<sup>35</sup>.**

### Autolytic debridement

In the presence of devitalised tissue, hydrocolloid dressings facilitate autolytic debridement by creating a moist wound–dressing interface<sup>10</sup>. However, the decision to use a hydrocolloid dressing will depend on the level of exudate in the wound. If the wound has low to moderate exudate a hydrocolloid may be an appropriate treatment choice, but if the wound has a high level of exudate, a more absorbent primary dressing may be needed<sup>9</sup>.

### Moist wound healing

The gel formed when exudate is absorbed by a hydrocolloid maintains a moist wound–dressing interface while preventing fluid accumulation on the wound surface. Hydrocolloids are therefore also of value in the management of clean shallow granulating pressure ulcers.

Indeed, a systematic review noted that hydrocolloids were more effective than gauze dressings for enhancing wound healing, and were associated with lower levels of pain and reduced time for dressing changes<sup>30</sup>.

## Practicalities Selecting a hydrocolloid dressing

Thicker hydrocolloid dressings are most appropriate for moderate levels of exudate. Conversely, if exudate levels are low or the dressing is being applied to skin at risk of further breakdown, a thin dressing may be most appropriate. Similarly, as the pressure ulcer heals and exudate levels drop, it may be necessary to use a thinner dressing.

Hydrocolloid dressings are not designed to be used with a secondary dressing. If exudate levels are high, an alternative dressing may be needed.

Where the skin is at risk of breakdown, ie in Category/Stage I pressure ulcers, choosing

### Hydrocolloids and pressure ulcers case study

Mr I was a 70 year old man with gastric carcinoma and metastases who was hospitalised for treatment of dyspnoea and terminal cancer pain. Although a film dressing was applied to the sacral area and an advanced air mattress was used, a sacral pressure developed one month after hospitalisation. The total area was 45cm<sup>2</sup> (Category/Stage I: 30cm<sup>2</sup>; Category/Stage II: 15cm<sup>2</sup>) (Figure 1).

Because Mr I was very thin, polyurethane sponge padding was applied around the sacral area to protect the bony prominences. The wound was dressed twice weekly with a thin hydrocolloid dressing.

The Category/Stage I area of the pressure ulcer had healed and the Category/Stage II areas were showing signs of improvement on the seventh day after treatment started (Figure 2). The Category/Stage II areas were completely healed when the dressing was changed on the fourteenth day after treatment had started (Figure 3). Sadly, Mr I died from gastric carcinoma 17 days later.

Fig 1: Sacral pressure ulcer – Category/Stage I and II



Fig 2: After seven days of treatment with a thin hydrocolloid dressing the Category/Stage I area was healed



Fig 3: After 14 days of treatment the pressure ulcer the Category/Stage II area was fully healed



Photographs courtesy of K Matsuzaki

a thin hydrocolloid dressing (eg DuoDERM® Signal™ or DuoDERM® Extra Thin) will reduce the chances of it wrinkling and rucking and causing further problems<sup>7</sup>.

### Applying hydrocolloid dressings

The hydrocolloid dressing selected should be an appropriate size and shape for the wound, and overlap onto normal skin for about 3cm (1.25 inches) around the wound.

Hydrocolloid dressings should be warmed between the hands before application. Warming enhances the adhesiveness and pliability of the dressing, allowing it to better conform to the wound contours. Generally, it is advised that the patient does not put weight over the dressing for 20-30 minutes after application to give the dressing time to stick properly<sup>36</sup>.

If leakage is or may be a problem from one side of the dressing, eg due to gravity, consider applying the dressing so that there is greater overlap onto the skin on that side<sup>36</sup>. Dressings with tapered edges are less likely to wrinkle, ruck or roll up. Hydrocolloid dressings are waterproof: patients can continue to shower or bath with the dressing *in situ*.

### Frequency of dressing change

In general, hydrocolloid dressings are changed every three to five days, although some may be able to stay in place for up to seven days. However, more frequent changes may

be required if exudate production is high, eg at the start of treatment, or if infection is suspected.

### Removing hydrocolloid dressings

Unless early removal is required for clinical reasons, hydrocolloid dressings should stay in place until the gel bubble that forms comes close to the edge of the dressing<sup>36</sup>. The gel will allow easy and atraumatic removal of the dressing. If removal is required before the gel bubble has formed, careful removal by lifting the edge and peeling away the hydrocolloid while moistening the skin is recommended<sup>36</sup>. Some dressings incorporate a system to indicate when dressing change is required (eg DuoDERM® Signal™).

### For how long should a hydrocolloid be used?

The use of a hydrocolloid in the treatment plan may be continued as long as the dressing meets the clinical objectives. At each dressing change the wound and other clinical parameters should be assessed to determine what adjustments are required to the current plan of care<sup>6</sup>. The use of a systematic approach to assessment is particularly useful, ideally with use of a reliable and valid assessment tool<sup>6</sup>.

At all times, careful documentation of the patient and wound is essential to enhance communication, provide a rationale for decision making and to demonstrate the

delivery of high quality care<sup>37</sup>. Hydrocolloid dressings can be used on pressure ulcers to the point of wound closure.

### Cost-effectiveness

Hydrocolloids have been shown to be more cost effective than gauze in the treatment of pressure ulcers<sup>28, 29</sup> (Table 1). This appeared to be mainly due to the lower clinical contact time required during treatment with a hydrocolloid dressing.

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## Summary

Pressure ulcers are a widespread problem and are highly costly in terms of resource usage and detrimental effect on quality of life. Hydrocolloid dressings promote moist wound healing, manage exudate, aid autolytic debridement and assist with pain management. They may also be used as a primary dressing for Category/Stage I or II pressure ulcers, shallow Category/Stage III or IV pressure ulcers, and for newly formed skin. The shiny outer surface and tapered edges of some newer hydrocolloid dressings help to protect tissues from further pressure-related damage by reducing the effects of pressure, shear and friction, and reducing the likelihood of rucking, wrinkling or edge rolling.

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