

Superabsorbent dressings — have we reached maximum capacity?

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Exudate management is one of the key challenges for clinicians who have to deal with wounds. The World Union of Wound Healing Societies (WUWHS, 2007) highlighted the importance of appropriate dressing selection for exudate control and removal of excess exudate. Correct dressing selection ensures that the wound bed remains moist without becoming saturated, which in turn prevents damage and pain to the surrounding skin and reduces the risk of infection from strikethrough. This article examines the role of exudate in wound healing, and the inherent challenges in its management, both for patients and carers. The role of superabsorbent dressings is discussed and the findings of an evaluation of clinicians' requirements and expectations of superabsorbent dressings are presented.

KEYWORDS:

Exudate ■ Superabsorbent dressings ■ Moist wound healing

Exudate, an essential component of the normal wound-healing process, helps create a moist wound environment. Exudate contains growth factors, nutrients, cytokines, matrix metalloproteinases (MMPs) and white cells, all of which help to stimulate healing (World Union of Wound Healing Societies [WUWHS], 2007). Moisture aids autolytic debridement and is pivotal in the process of epithelialisation, permitting movement of cells across the wound surface.

Exudate production in wounds that are progressing to healing reduces over time. However, in non-healing or chronic wounds, excess volumes of exudate tend to continue, with a corresponding change in its constituents, resulting in negative clinical outcomes (Dealey et al, 2006; Adderley, 2010). For example, an imbalance of MMPs (enzymes that play a key role during the inflammatory phase of wound

healing in degrading devitalised proteins in the extracellular matrix) may result in non-selective protein breakdown activity, which can impact on the inflammatory phase of wound healing and delay the healing process (Trenegrove et al, 2008). Trenegrove et al (2008) have also suggested that chronic wound exudate should be regarded as a wounding agent in its own right.

As said, although exudate plays a central role in healing, it can cause problems. At worst, it can result in malodour, pain, maceration and unsightly soiled dressings, which can have a negative impact on an individual's quality of life, triggering feelings of self-loathing, disgust and low self-esteem (Jones et al, 2008).

Exudate can increase to unacceptable volumes in chronic and/or large surface area wounds, under certain systemic or localised circumstances, such as:

- ▶ Sustained inflammatory response
- ▶ Infection
- ▶ Lymphoedema/oedema
- ▶ Venous disease
- ▶ Medication (i.e. diuretics)

- ▶ Heart failure
- ▶ Malignancy.

Excess exudate can compromise the healing process, as the wound bed and periwound skin are damaged by its caustic cocktail of elements (Bishop, 2003; Okan et al, 2007). The wound bed can become saturated and moisture may leak onto the periwound skin, causing soggy or macerated skin (*Figure 1*), as well as excoriation (Dowsett, 2008) (*Figure 2*). An increase in exudate volume can also be indicative of infection (Cutting and White, 2005), which may further impede healing.

Poor exudate management may have serious consequences (particularly in vulnerable individuals whose health may already be compromised), including:

- ▶ Discomfort or pain
- ▶ Leakage and malodour — a cause of concern and distress for patients (Jones et al, 2008)
- ▶ Risk of infection as a result of strikethrough
- ▶ Enlarged wounds as the surrounding skin breaks down (Benbow and Stevens, 2010)
- ▶ Protein loss/fluid and electrolyte imbalance (Johnstone, 2007)
- ▶ Need for increased dressing changes.

Poorly managed exudate can also lead to undue anxiety and distress, not only for patients, but also for their carers who have to deal with saturated clothing and bed linen (Palfreyman, 2008).

DRESSING SELECTION

Dressings remain the most accessible option for managing wound exudate. It is imperative, therefore, that clinicians dealing with wounds on a regular basis understand the way in which dressing materials function and

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Figure 1.
Soggy and macerated skin.



Figure 2.
Excoriated skin (reproduced with kind permission of Steve Thomas: <http://www.worldwidewounds.com/2008/march/Thomas/Maceration-and-the-role-of-dressings.html>).

handle fluid. Appropriate dressing selection impacts on the wound healing process and, importantly, patient comfort and quality of life of the patient (Romanelli et al, 2010).

Patient comfort and acceptability are important factors when determining the success of a treatment regimen and in optimising patient wellbeing (International Consensus, 2012). Clinicians have a responsibility to their patients to manage wound exudate effectively, and reduce the occurrence of harm (Department of Health [DH], 2009).

SUPERABSORBENT DRESSINGS

Superabsorbent dressings, a new generation in wound care technology, are made of superabsorbent polymers (SAP). They have been developed to help clinicians manage and treat heavily exuding wounds, as they have a greater absorption capacity than traditional foam dressings.

Superabsorbents have the ability to trap unwanted components of exudate, such as bacteria, proteases and inflammatory mediators, within

the core of the dressing (Wiegand et al, 2011), thereby reducing MMPs (Eming et al, 2008). They are also designed to reduce potential leakage and the risk of maceration, which in turn, reduces dressing change frequency. In addition, they protect the periwound skin from the corrosive effects of exudate (Langoen and Lawton, 2009).

In the authors' clinical experience, before the introduction of superabsorbent dressings, managing exudate was a huge challenge for both clinicians and patients. Often the only solution was to increase the frequency of dressing changes and/or apply a thicker (presumably more absorbent) version of the selected dressing. However, these solutions were not ideal and had their own inherent flaws — in many cases, the fluid-handling capacity of the dressings was poor and caused strikethrough, which could result in anxiety for the patient and social isolation (Jones et al, 2008).

Accompanying these problems was the cost of extra nursing time — arguably the most expensive aspect of wound management (Drew et al, 2007) — combined with the risk of trauma through more frequent dressing changes. Dressing change is often the most common trigger for pain in chronic wounds (Meaume et al, 2004), and Gardner (2012) notes that in situations where exudate is poorly managed, patients can quickly lose confidence in the treatment regimen, which affects concordance.

Appropriate use of superabsorbent dressings reduces the need for frequent dressing changes and reassures patients that their wounds will not become saturated, unsightly, or result in problems to the surrounding skin. It is also incumbent on clinicians to be mindful of cost to the organisation — as mentioned above, dressings and nursing time are two of the greatest costs associated with wound care (Drew et al, 2007). Wound care itself is estimated to cost the NHS £2.3–£3.1bn each year, representing up to 4% of total NHS expenditure (Posnett and Franks, 2008; Dowsett and Shorney, 2010).

However, as there is a paucity of research data available on superabsorbents, some unanswered questions remain. For example, Steinlechner et al (2008) suggest that the polymer network structure of superabsorbents allows them to permanently retain liquid in their core, even under compression therapy. What this does not tell clinicians, however, is the potential alteration to the sub-bandage pressure as a result of the dressing swelling significantly in size as it absorbs the exudate. Similarly, another unanswered question in the literature is whether the dressing may become a wounding agent due to the risk of high pressure on a vulnerable area?

The British National Formulary (Joint Formulary Committee, 2011) classifies several dressings as superabsorbents or soft polymer dressings with an absorbent core. The most commonly used ones are listed in *Table 1*, together with the cost, absorption and retention rates.

EVALUATION OF SUPERABSORBENT DRESSINGS

The primary objective of the evaluation detailed here was to gain a greater understanding of clinicians' requirements and expectations of superabsorbents.

METHOD

In the authors' region, clinicians who regularly treat wounds were asked to complete a short questionnaire on their expectations and use of superabsorbent dressings in the management of exuding wounds of varying aetiologies (*Table 2*).

The clinicians were presented with five 10x22cm KerraMax[®] Care (Crawford Healthcare, Knutsford) dressings. The dressings were filled with warm tap water using a syringe in volumes of 10ml, 50ml, 100ml, and 200ml, while one dressing was left empty. The clinicians were encouraged to handle and feel each dressing and then asked their opinions on the following criteria:

- ▶ Fluid capacity before dressing change
- ▶ Most common reason for

changing a dressing before capacity of the dressing is reached

- ▶ Concerns or issues related to wet wounds
- ▶ Average size of wounds currently being treated with superabsorbent dressings
- ▶ Most common reasons given for high exudate volumes.

RESULTS

Twenty-one experienced and

specialist clinicians, including tissue viability nurses, vascular/leg ulcer nurse specialists, diabetic podiatrists and nurse specialists in plastics completed the short questionnaire. The clinicians in this evaluation were managing wounds of varying dimensions, including wounds more than 20cms in length as well as circumferential wounds and skin loss on the whole of the back or trunk (specialist plastics nurses), with varying levels of exudate.

Dressing absorption

When considering the fluid-handling capacity of the superabsorbent dressing, six clinicians stated that 200mls of exudate was acceptable before the dressing was changed, while 13 clinicians said they would not want the capacity to go beyond 100mls (Figure 3).

Reason for changing a dressing before it has reached absorption capacity

The main reasons cited for changing the dressing before reaching capacity were that the dressing would become too heavy (n=11), to check the condition of the wound (n=9), and for patient comfort (n=8). One clinician mentioned strikethrough to the outer bandage as a reason for changing the dressing (Figure 4).

Concerns or issues related to wet wounds

The most common concerns experienced when a patient has a very wet wound were:

- ▶ Underlying cause of exudate production (n=20)
- ▶ Maceration (n=13)
- ▶ Excoriation and increase in wound dimensions (n=9)
- ▶ Odour (n=10).

Infection (n=6) and patient comfort (n=6) were also mentioned, as well as body image (n=3) and patient wellbeing (n=3) (Figure 5). The general consensus among the clinicians was that very wet wounds should be seen daily.

Most common reasons for high exudate volumes

Clinicians cited infection (n=18), chronic oedema (n=9), and heart problems (n=7) as the most common reasons for high exudate volumes. Venous disease (n=3), lymphoedema (n=4) and concurrent health problems (n=4) were also mentioned as causing excess exudate.

DISCUSSION

In the authors' opinion, managing exudate is one of the most challenging aspects of a specialist nurse's role, as the underlying cause must also be addressed to ensure a positive outcome. For example,

Table 1: Comparison of the most commonly used superabsorbent dressings*

Dressing	Manufacturer	Cost for 10cm x 10cm†	Absorption capacity (g/g)‡	Fluid loss from saturated dressing (adult sitting on dressing for 5 minutes)‡
Cutisorb® Ultra	BSN Medical	£2.08	Data not available	Data not available
DryMax® Extra	Aspen Medical	£1.84	23g	23%
Flivasorb®	Activa Healthcare	£2.20	17.5g	22%
KerraMax Care®	Crawford Healthcare	£1.26	23g	17%
sorbion® S	h&r Healthcare	£2.25	30g	31%
sorbion® S	h&r Healthcare	£2.25	30g	31%

*Data presented for 10x10cm dressings
 †Drug Tariff, February 2013
 ‡Data on file. Crawford Healthcare (2013)

Table 2: Superabsorbent requirements

Question (Questions 1-4 please circle the appropriate response)	Answer
1. Using the samples as a guide, in general, how much fluid would a 10x22cm dressing absorb before you feel it should be changed?	A: 10ml B: 50ml C: 100ml D: 200ml
2. What is the most common reason for changing a dressing before it reaches full capacity?	A: Patient comfort B: Dressing becomes too heavy C: To check on condition of wound D: Other reason
3. When patients have very wet wounds, what are your main concerns?	A: Dehydration due to fluid loss B: Underlying cause of excess exudate C: Concurrent medical issue
4. When patients have very wet wounds, how often should they be seen for observation?	A: More than once a day B: Daily C: Twice per week D: Weekly
5. What is the average size of the wet wounds you are treating?	
6. What are the most common reasons for high volumes of exudate?	
7. What other issues do wet wounds present, e.g. odour?	

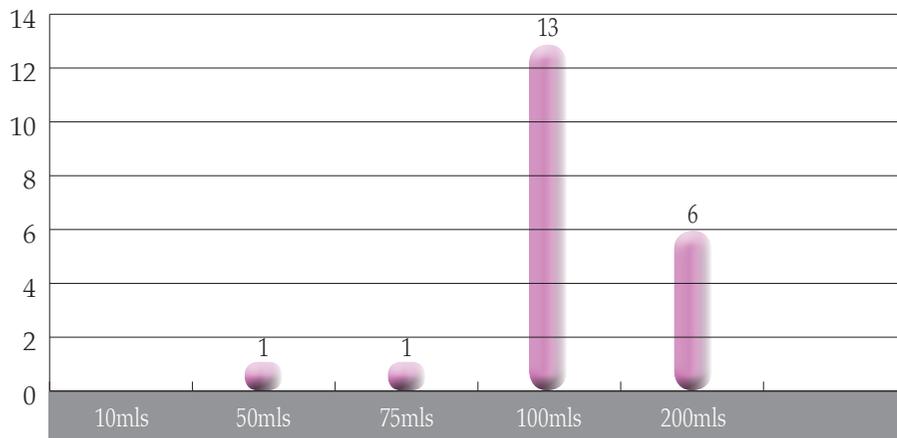


Figure 3.
How much fluid would a 10x22cm dressing absorb before it should be changed?

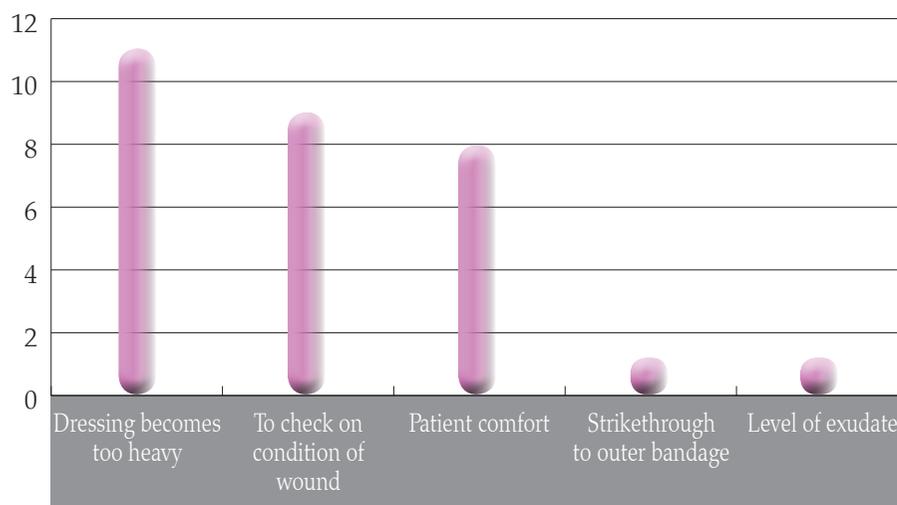


Figure 4.
What is the most common reason for changing a dressing before it has reached full capacity?

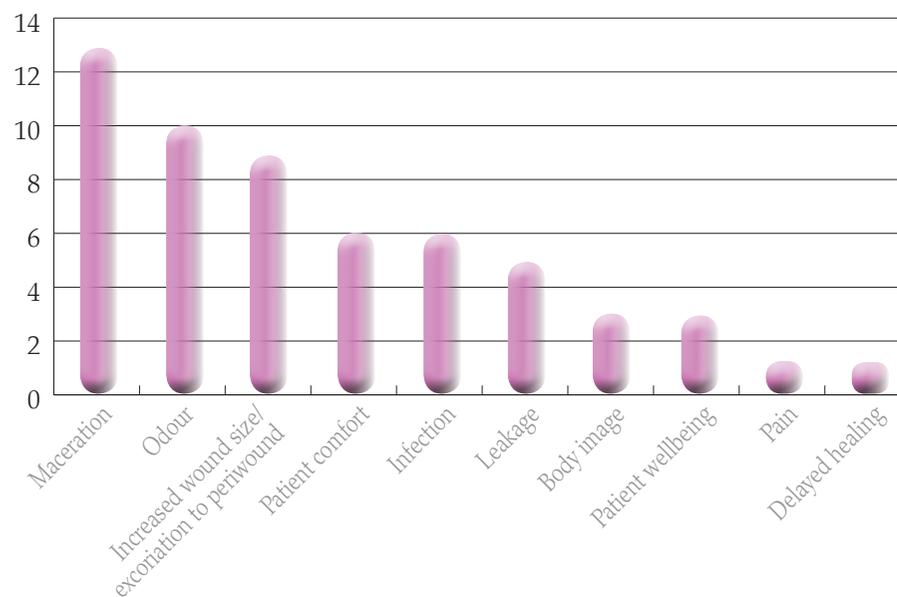


Figure 5.
What other issues do wet wounds present?

if exudate occurs as a result of uncontrolled oedema, venous disease or infection, these must be the primary goal of management.

The importance of treating the underlying condition as well as the symptoms is reflected in *Figure 4*, where nine clinicians wanted to check a wound before the dressing's capacity was reached, an important consideration if the wound is infected. Experienced nurses should use their clinical judgement and understand that leaving a dressing in place until it has reached maximum capacity could result in additional discomfort for the patient. Similarly, diabetic podiatrists and tissue viability nurses should review an infected wound more frequently than if the patient was infection-free.

The clinicians' responses in this evaluation also reflect the literature on the increased risk of infection where there is strikethrough and leakage, with its concomitant malodour, maceration and poor patient experience (Graham, 2004; Jones et al, 2008). As outlined in *Figure 5*, clinicians were concerned about the potential for macerated skin, which has a white 'soggy' appearance (caused by over-hydration of the surface keratinocytes) and can break down easily, resulting in increased wound dimensions (Dowsett, 2008).

While there are claims that some superabsorbents are able to hold large quantities of exudate (i.e. more than 100mls), in the authors' clinical experience, from a patient perspective such a dressing, once at maximum capacity, would become bulky, heavy and uncomfortable and risk dragging the primary dressing from the wound, particularly if the wound was on the leg. This was clearly a concern for clinicians in this evaluation, who largely agreed that the dressings would become too heavy and uncomfortable. As discussed earlier, there are also concerns regarding the potential impact on compression therapy profiles.

A plethora of wound care dressings are available within a variety of categories, including foams, hydrogels, hydrocolloids

and alginates, some of which offer high absorption. Manufacturers of superabsorbent dressings tend to claim that they provide greater absorption and retention than traditional absorbent dressings and result in a reduction in dressing changes. However, the results of this evaluation suggest that absorption beyond 100mls in a 10x22cm dressing confers no additional benefit.

The authors found that most of the clinicians in this evaluation did not consider increased wear time to be a key factor — highly exuding wounds are often observed daily and so dressing changes are not predominantly determined by dressings reaching their capacity. Perhaps a greater consideration than absorption capacity is retention of wound fluid, especially under pressure.

CONCLUSION

Dressings that provide both high absorption capacity and retention rates offer the clinician a safe and cost-effective tool to combat the negative effects of exudate on the wound and periwound skin. They also help to improve quality of life for the patient and their carers by minimising the negative psychosocial impact of high exudate volumes (Lloyd-Jones, 2012).

But, how do clinicians differentiate between these superabsorbent dressings, especially as, based on other dressing categories, it is safe to assume that this category of dressings will continue to expand? In the authors' opinion, absorption capacity, retention rates and cost should all be key differentiators and have found that KerraMax Care, with its mid-range absorption capacity, retention rate and price, meets these criteria. **JCN**

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KEY POINTS

- Exudate is an essential component of the normal wound healing process and helps create a moist wound environment.
- Exudate contains growth factors, nutrients, cytokines, matrix metalloproteinases (MMPs) and white cells, which stimulate healing.
- Superabsorbent dressings have a high absorption capacity to help combat the negative effects of exudate on the wound and periwound skin.

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