Comparative evaluation of the functional properties of superabsorbent dressings and their effect on exudate management

Abstract: A range of wound dressings currently available in the UK and elsewhere, each claiming to possess different performance characteristics, can make dressing selection difficult. This report concentrates on the superabsorbent polymer dressings (SAPs) – which are designed to absorb medium to high levels of exudate and to maintain an 'ideal moist wound healing environment'. What do these dressings achieve, what are they suitable/not suitable for, and are all super-absorbent dressings equal in terms of performance and quality? When assessing the key performance characteristics of absorbency, moisture vapour transmission rate (MVTR), strikethrough and structural integrity, results show that SAPs are not all the same—in fact each of them varies considerably and may lend themselves to different wound aetiologies and usage conditions. While performance data is often presented from non-standard tests or modifications, it is proposed that to provide clarity over dressing selection, all SAPs were measured using International Standards for the key performance characteristics. This will aid clinical staff in selecting the most appropriate dressing for each wound.

Declaration of interest: Paul Browning is a PhD student, who has been an employee of a number of medical device companies. Currently employed by Brightwake Ltd. Richard White (RW) has been an employee of ConvaTec, a Bristol-Myers Squibb wound products company and received paid membership of speakers panels/bureaux and advisory board for numerous UK and European wound products companies over the period 1999 to date. RW also writes and consults for a medical education, promotional and communications companies associated with wound treatments. Tam Rowell is a biomedical scientist employed by Brightwake Ltd.

bandages • superabsorbent polymer dressings • benchmarking • leg ulcer • wound care

The level of exudate in wounds varies, and is based on a number of factors including wound aetiology, healing physiology, environment and pathology. Exudate is produced as a normal part of the healing process during the inflammatory stage of tissue repair. During this stage mediators such as histamine cause capillaries to dilate and increase their porosity, which in turn allows serum along with a number of proteins to leak out.[1,2,3] The serous exudate is vital for tissue repair as it:

- Creates a moist environment conducive to faster re-epithelialisation[1,4]
- Maintains a moist environment which facilitates the transport of cells, proteins and nutrients throughout the wound bed
- Allows white blood cells to be transported throughout the wound bed providing a localised immune-defence
- Allows macrophages to move freely, which act by debriding devitalised tissues.

Effectively managing wound exudate may shorten wound healing times which, in turn, will improve the patient's quality of life (QoL) and have health economic benefits.[5] The volume and type of exudate can vary, and change throughout the wound healing process.

Excessive exudate production can damage the wound and surrounding skin, especially in the chronic wound.[6] The damage includes maceration where exudate remains in the periwound skin area and where proteolytic enzymes attack the periwound area. On the wound, damage can occur when matrix metalloproteinases (MMPs) break down the extracellular matrix (ECM) preventing the migration of cells and subsequently delaying healing.[7]

While it is clear that excessive exudate is detrimental for effective wound healing, the converse is true where a wound bed is too dry, where there is little medium to enable autolysis to occur, and a lack of nutrient flow required for effective wound healing.[1] Too little exudate can be caused by a number of pathologies including hypovolaemic shock, dehydration and microangiopathy.

Costs

In the UK there is an estimated 2.2 million wounds in adults, being managed by the NHS in 2012/2013 at a cost of £5.3 billion.[8] This equates to 3.5% of the total UK health-care spend in 2013.[9] This estimate is greater than the direct NHS costs relating to obesity which for 2013 was shown to be £4.2 billion.[10] The NHS Supply Chain

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reports that it is currently spending £302 million on direct wound care products annually.[11]

Wounds with a sustained high volume of exudate require a number of direct costly interventions from the health-care professional, additional dressings and increased nursing time, to name a few. All interventions increase the economic impact of wounds.[12] When wounds heal effectively, the cost to the NHS equates to £2.1 billion as a total cost of wound care, which when compared with the costs associated with unhealed wounds raises to £3.2 billion[13] thus there is an economic advantage, let alone patient's QoL, when accurately diagnosing and effectively treating wounds. A dressing able to absorb and retain appropriate levels of exudate can extend the time between dressing changes, and reduce the number of dressings required over the duration of treatment.

It is inappropriate to use unit cost as the primary driver for dressing selection as this cost-containment is not addressing the needs of the patient, and could lead to increased costs overall for the patient's care.[14] However, a well selected dressing appropriate for the clinical indication offers significant efficiencies. It is well reported in literature the cost-effectiveness of superabsorbent dressings in reducing nursing time and associated costs.[12,15,16]

Effective dressing selection

Any dressing selected must be effective to support its continued use and adapt depending on the stage of the wound healing process. It is established that wounds which fail to reduce in size by 40% within 4 weeks, should be discontinued and an alternative dressing should be selected.[17,18] As such the continuous monitoring of the wounds is required. The National Institute for Health and Care Excellence (NICE) reminds us that dressing selection should be based on cost and performance characteristics appropriate of the wound and its stage of healing.[19]

A superabsorbent dressing is designed to rapidly remove excess exudate from a wound bed. It should not only absorb, but must effectively bind wound exudate to remain effective.[20] Its ability to retain the exudate under compression is an important performance criteria, especially considering its extended use on foot ulcers, and with compression bandaging.[14,21–23] The rapid removal of exudate by superabsorbent dressings can assist in managing biofilm formation via accelerating the transit of exudate through the biofilm and preventing the extraction of nutrients.[24] The dressing must protect the periwound area by ensuring any lateral wicking is equally absorbed, and that any moisture is locked away in the dressing, and not available to the periwound which could result in maceration.

Use of superabsorbent polymers have swelled in recent years

Super absorbing polymers were first developed in the early 1970s in granular form. It was ARCO Chemical who developed superabsorbent fibre technology in the 1990s that facilitated the application into wound care.[25] As technology and material chemistry improved, so has their implementation into wound dressings. The results are superabsorbent dressings which have fundamentally improved since their inception with the global medical superabsorbent polymer market valued at £66 million in 2013, and expected to reach £131.5 million by 2020.[26]

Superabsorbent polymers: what do they do?

Superabsorbents can contain a number of compounds including carboxymethylcellulose (CMC), polyacrylate polymers (PAP) and a range of superabsorbent polymers (SAP). They work by changing their structure when in contact with water and ions resulting in swelling of the linear polymer strands. As a result, *in vitro* fluid uptake results can differ between deionised water and a calcium/sodium ionic solution as determined in the ISO standards for absorbency. Some of these polymers are able to maintain their structural integrity when swollen, some form a gel, while others form a colloidal slush. While no single dressing type is universally effective against all wound aetiologies, an effective superabsorbent dressing will have a number of key characteristics which are well established. These include:[27,28]

- High level of absorbency
- High level of moisture vapour transmission rate (MVTR)—the ability to allow evaporation
- Prevent leaks from the dressing
- Prevent strikethrough—where exudate comes through a dressing
- Protect from excoriation
- Protect from maceration of surrounding skin
- Able to be used under compression
- Stay intact
- Minimise trauma and pain on removal
- Comfortable and conformable
- Cost-effective.

MMPs are a group of over 20 zinc-dependent proteolytic enzymes which have an active role in wound modelling. MMPs of both endogenous and exogenous origin are attributed with wound pathogenesis.[29–31] Of this large family, MMP-2 and MMP-9 are recognised as being important in chronic wounds.[32] Some superabsorbent dressings are able to lock in MMP-2 and MMP-9 and collagenase, and while many are reported, very few have robust studies to support them.[32] Products which have demonstrable evidence in support of MMP inhibition would be suitable dressings for chronic wounds where such proteolytic enzymes are likely to be a contributing factor.

Superabsorbent polymers: what they don't do

Due to their strong absorbent properties, these dressings are not indicated for mild to moderate wound exudate. If the wound bed is dry autolysis will not occur. This, together with a lack of nutrient flow, means that the wound would not heal effectively.[5]

Super absorbing dressings are not indicated for bleeding wounds either. The absorption pressure can

reduce normal haemostatic response and make the monitoring of blood loss difficult to measure.

Are they all the same?

The International Standards Organisation (ISO) have six standards to be used as test methods for primary dressings. These are referred to as the ISO 13726 family of standards:

- ISO 13726-1: aspects of absorbency
- ISO 13726-2: moisture vapour transmission rate
- ISO 13726-3: waterproofness
- ISO 13726-4: conformability
- ISO 13726-5: bacterial barrier properties
- ISO 13726-6: odour control.

The use of these tests are adopted internationally, with European adoptions having the EN prefix, and those written as British Standards having the BS prefix. These test methods reflect the results of validation and scrutiny by the National Standards Bodies making up membership of ISO. From a regulatory perspective, the adoption of some of these standards into the 'Harmonised Standards for Medical Devices' in Europe means that applying them can be used to demonstrate compliance with, in this case, Directive 93/42/EEC – the Medical Device Directive.[33] The use of these standards ensures that consumers are able to measure these attributes and make comparisons between dressing types. However, more recently we have seen alternative test methods being used in literature, or modifications to the ISO method—with some companies not even referencing the methodology used to substantiate their claim. The use of non-standard test methods makes the comparison between dressings difficult for the consumer compounded further by the use of non-standard units of measure.

Fluid handling

Free swell is the product's ability to absorb fluid, once left to drip for 30 seconds to remove excess liquid. Free swell is often described as absorbency. MVTR is the amount of moisture lost through the layers of material. Free swell plus MVTR in ISO 13726-1 equals total fluid handling. Products with higher fluid handling will allow increased exudate management as higher proportion of moisture will be lost through the dressing.

The absorbency and MVTR data in Table 1 has been scaled to comply with ISO 13726-1. Table 1 identifies a number of tests which are not performed in accordance with the ISO 13726 family of International Standards.

The action of a superabsorber is to maintain the ideal balance of excessive exudate and not drying out the wound. Saturated dressings act as a constant reminder to a patient or their morbidity and the bacterial action on the exudate release a number of malodour compounds.[34] All of which contribute to decreased patient self-esteem, social isolation and overall reduced QoL.[35,36] Absorbency data alone, therefore should not be the only performance measure when looking at superabsorbent products.

With the race on to provide the most absorbent superabsorbent, we would exercise caution when using this approach alone in dressing selection. For example, Eclypse Boot by Advancis Medical can be supplied as large as 60cm x 70cm—a total surface area of 4200cm^2. This dressing has a fluid handling capacity of 84g/100cm^2.[37] This would result in the Eclypse Boot being able to absorb 3.5 kg of exudate (0.84g/cm^2 x 4200cm^2=3528g=3.5kg). It would be unacceptable for a patient to carry 3.5kg of exudate contained within a dressing.

Strikethrough

Strikethrough occurs when the outer layer of a wound dressing is not waterproof, and allows exudate to leak out (Fig 1). It is often due to a mismatch between dressing selection and exudate level, or, too optimistic a wear time and can causes a number of complications including an increased risk of cross-infection. An infected wound will permit pathogens to travel within the exudate, through a dressing and onto the surface. Pathogens can then be easily transferred via direct contact, or indirect contact like clothing. This poses a significant health risk to those caring for those with heavily exuding wounds.[27] There is evidence of multi-layering of superabsorbent dressings. While their use under compression is uncommon,[38] there is no evidence of the sub-bandage pressures generated when these dressings are layered. This practise could cause damage and is best avoided until further evidence is reported.[39] Multi-layering dressings is not good clinical practice, and to do so is not in the best interests of the patient as this increases the risk of maceration, infection, discomfort, leakage and pain. Heavily exuding wounds require regular observation and redressing.

A recent audit on superabsorbers showed a number of dressings which required an additional one or more superabsorbent dressing to be placed on top of each other.[40] This study showed that around 75% of Zetuvit Plus dressings, 85% of KerraMax Care and 30% of Flivasorb dressings showed strikethrough on day seven. The Eclypse dressings showed no signs of strikethrough after day seven.

Fig 1. Example of strikethrough and multi-layering. Images courtesy of Rafter et al.[40]

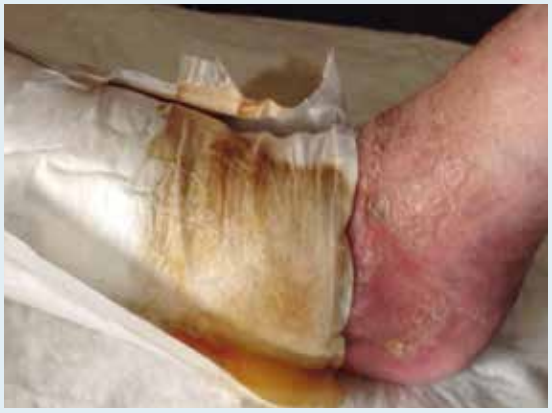
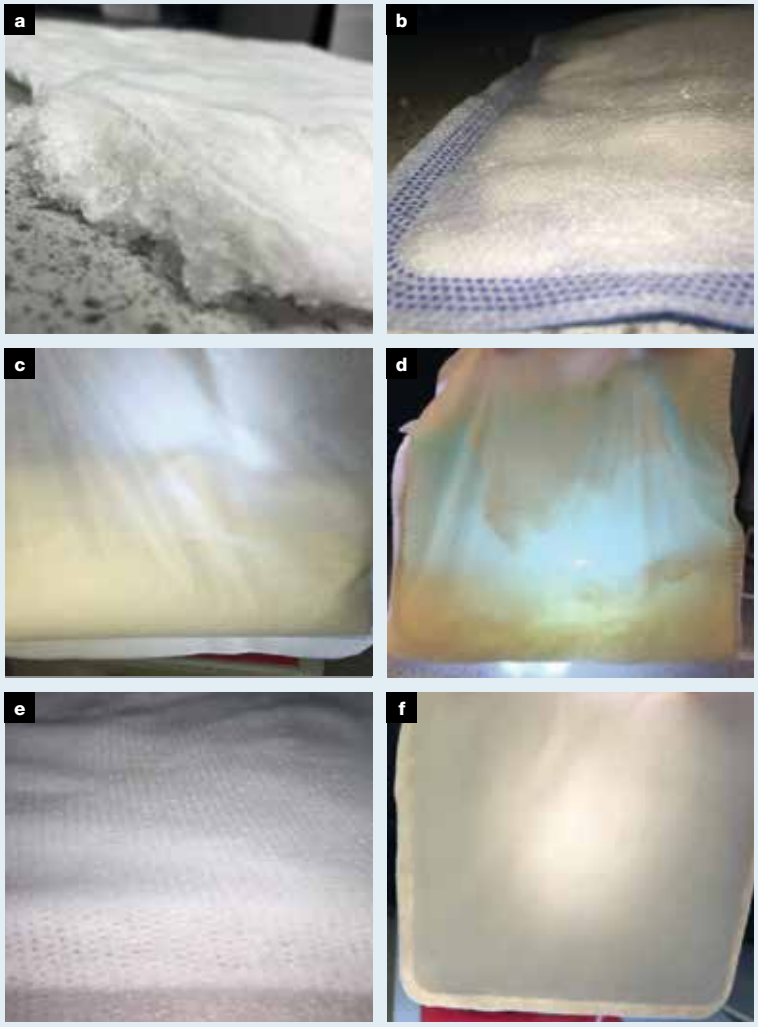


Fig 3. Examples of structural integrity of superabsorbent polymers (SAP). SAP rupture from dressing seals (**a**). SAP seeping through patient contact layer (**b**). Absorbent component failure (**c**). Absorbent component failure (**d**). Example of intact patient contact layer (**e**). Example of Intact absorbent component (**f**)



Structural integrity

Unlike other dressings, containing self-contained materials or layers of textiles, SAPs are contained in envelopes to prevent the absorbent material from leaving the dressing and escape into the wound or local area. Without formal internationally recognised tests for dressing integrity, to measure their ability to keep their contents within the dressing, it falls to clinical staff to observe if a dressing disintegrates when subjected to high levels of exudate. As superabsorbent dressings are designed to be used on highly exuding wounds, they must be able to demonstrate that they are fit for this purpose. If the outer material is breached, then the dressing provides a significant health concern due to the potential spread of infection. Exudate carries bacteria, and if permitted to breach the surface of a dressing, allows direct transmission of infection by touching the surface of the dressing, or by indirect transmission, via clothing or through secondary dressings or bandages.[27] A number of superabsorbent dressings, when saturated, fail structural integrity using only gravity. For example, simply holding some of these dressings by two corners when saturated causes the absorbent core to fall within the outer envelope. Some superabsorbent dressings, when saturated, allow the superabsorbent crystals to pass through the dressing material—some even on the wound contact layer. This also increases the risk of infecting a wound from bacteria-laden exudate (Fig 3).

A recent audit of superabsorbers demonstrated examples where, in home use, they had failed basic wear, resulting in the superabsorbent crystals to spread throughout patient's home.[40] Clearly such catastrophic failures in structural integrity make such dressings inadequate for general use. The ability of a wound dressing to withstand forces under normal use, when used in accordance with the manufacturer' instructions, are a key performance attribute for super absorbent wound dressings.

In the absence of formal benchmarks, a number of

Table 1. Product comparison table, showing difference between manufacturer reported results and ISO test method result

Product manufacturer	Absorbency (ml per 100cm^2)		MVTR (g/m^2/24hours)		Strikethrough		Cost
	Result from		Result from		Result from		Per 10cm^2
	Aria Medical*	ISO1	Aria Medical*	ISO2	Aria Medical*	ISO3	
Zetuvit Plus Paul Hartmann AG	NR	142.58	NR	4863.90	NR	Fail	0.63
Kliniderm Medeco	172	120.85	NR	5273.72	NR	Fail	0.49
KerraMax Care Crawford Healthcare	143	116.61	NR	5427.82	NR	Fail	1.27
Flivasorb Lohmann & Rausher	118	149.27	NR	2092.32	NR	Fail	0.88
Eclypse Advancis Medical	93	149.49	NR	3480.08	NR	Pass	0.73

ISO1–ISO 13726-1; ISO2–ISO 13726-2; ISO3–ISO 13726-3; NR–not reported: MVTR– moisture vapour transmission rate; *Data reported on website [43]

industry leading brands were selected and their attributes recorded from their literature. These were sent to an independent test laboratory to perform the tests in accordance with the appropriate International Standard. These performance attributes were compared against the data presented by a manufacturer (Table 1).

Methods

Dressing assessment

We took five of the leading brands of superabsorbent dressings and sent them to an independent wound dressing testing laboratory (Medical Engineering Technologies, Kent). The dressings selected were;

- Eclypse. Lot: WO013269[41]
- Flivasorb. Lot: 53933211[42]
- Kliniderm. Lot: 140938-001[43]
- KerraMax Care. Lot: Di0288[44]
- Zetuvit Plus. Lot: 500903139 412908.[45]

Each of the dressings underwent the following tests under ISO 17025 accreditation:

- Absorbency using BS EN 13726-1:2002 Section 3.3
- MVTR using BS/EN 13726-2:2002
- Waterproof testing in accordance with BS/EN 13726-3:2003.

Statistics

The results were analysed using IBM SPSS. The authors note that the dressings used in this evaluation were purchased from local UK pharmacies. As such the mean results are taken from a single batch and may not represent the product as a whole.

Results

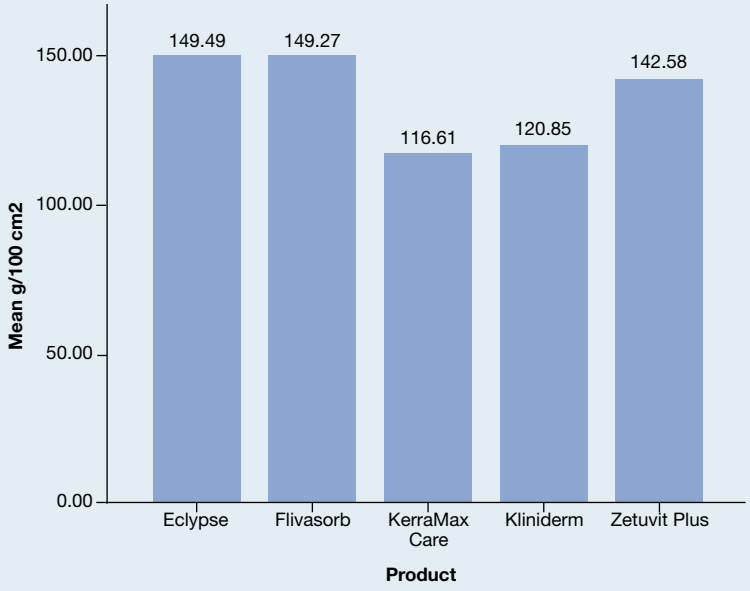
Absorbency

The mean absorbency for the dressings are as follows Eclypse 149.49g/100cm^2 (SD 8.76), Flivasorb 149.27/100cm^2 (SD 11.39), Kliniderm 120.85g/100cm^2 (SD 6.85), KerraMax Care 116.61g/100cm^2 (SD 8.43), and Zetuvit Plus 142.58g/100cm^2 (SD 13.49) (Table 1 and Fig 4).

The data indicates that there is evidence (p≤0.001) that absorbency differs significantly between the groups of dressings tested. Multiple comparisons (using Bonferroni tests) suggest that Eclypse is statistically more absorbent than KerraMax Care (p≤0.001) and Kliniderm (p≤0.002). Flivasorb was also shown to be more absorbent than Kliniderm (p=0.002) and KerraMax Care (p=0.001), and Zetuvit Plus was shown to be more absorbent than Kliniderm (p=0.028) and KerraMax Care (p=0.006). The full analysis can be seen in Table 2.

Fig 4 shows Eclypse and Flivasorb are equal as having the highest absorptive capacity when tested in accordance with 13726-1:2002. When calculated into grams of water per gram of dressing (Fig 5), Eclypse offers the highest level of absorbency at 28.19g/g. Converting the data from the standard into grams of water per gram of dressing is useful in demonstrating the mass of fluid that is absorbed by the weight of the dressing. This can be useful in highlighting heavy and bulky dressings.

Fig 4. Absorbency for five superabsorbent wound dressings in accordance with ISO 13726-1:2002, shown as gram/100cm^2



The MVTR results show statistically significant differences (p≤0.001) in performance of the five dressings used in this evaluation. The mean MVTR for Eclypse were 3480.08g/m^2/24 hours (SD 144.27), Flivasorb mean of 2092.32g/m^2/24 hour (SD 229.69), Kliniderm mean of 5273.72g/m^2/24 hour (SD 233.12), KerraMax Care mean of 5427.82g/m^2/24 hours (SD 149.24), and Zetuvit mean MVTR of 4863.90g/m^2/24 hours (SD 202.70) (Fig 6).

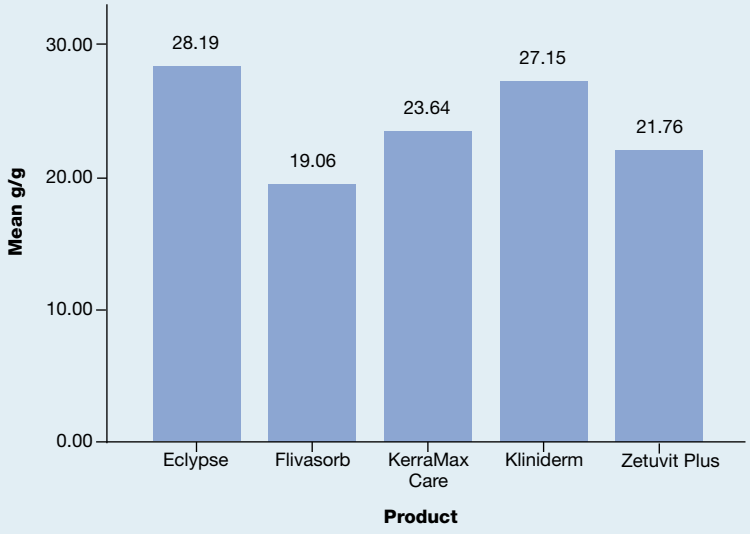
Multiple comparisons (using Bonferroni tests) suggest

Table 2. ANOVA comparison of absorbency (Bonferroni)

Product name (I)	Product name (J)	Mean difference (I-J)	p	95% confidence interval	
				Lower bound	Upper bound
Eclypse	Flivasorb	0.22	1.000	–19.85	20.30
	Kliniderm	28.64	0.002	8.57	48.72
	KerraMax Care	32.88	0.000	12.81	52.96
	Zetuvit Plus	6.91	1.000	–13.16	26.98
Flivasorb	Eclypse	–0.22	1.000	-20.30	19.85
	Kliniderm	28.424	0.002	8.35	48.49
	KerraMax Care	32.66	0.001	12.59	52.73
	Zetuvit Plus	6.69	1.000	-13.39	26.76
Kliniderm	Eclypse	–28.64	0.002	-48.72	-8.57
	Flivasorb	–28.42	0.002	-48.49	–8.35
	KerraMax Care	4.24	1.000	-15.83	24.31
	Zetuvit Plus	–21.73	0.028	-41.81	–1.66
KerraMax Care	Eclypse	–32.88	0.000	–52.96	–12.81
	Flivasorb	–32.66	0.001	–52.73	–12.59
	Kliniderm	–4.24	1.000	–24.31	15.83
	Zetuvit Plus	–25.97	0.006	–46.04	–5.90
Zetuvit Plus	Eclypse	–6.91	1.000	–26.98	13.16
	Flivasorb	–6.69	1.000	–26.76	13.39
	Kliniderm	21.73	0.028	1.66	41.81
	KerraMax Care	25.97	0.006	5.90	46.05

Absorbency result (g/100cm^2)

Fig 5. Absorbency for five superabsorbent wound dressings expressed in grams of water per gram of dressing in accordance with ISO 13726-1:2002 when shown as gram/gram of water to dressing



that KerraMax Care has significantly higher MVTR than Eclypse, Flivasorb and Zetuvit ($p \leq 0.001$) (Table 3).

Table 3 shows KerraMax Care and Kliniderm offer the highest MVTR from the samples selected, when conducted against ISO 13726-2:2002. Eclypse MVTR results are likely to be associated with it being the only dressing with a waterproof backing.

Strikethrough

The waterproof testing results showed only Eclypse as providing a waterproof barrier in accordance with ISO 13726-3:2003 standard (Table 4). None of the other products specifically claim to be waterproof, but some do suggest strikethrough resistance in their literature.

Table 3. ANOVA comparison of MVTR (Bonferroni)

Product name (I)	Product name (J)	Mean difference (I-J)	p	95% confidence interval	
				Lower bound	Upper bound
Eclypse	Flivasorb	1387.76	0.000	997.68	1777.84
	Kliniderm	–1793.64	0.000	–2183.72	–1403.56
	KerraMax Care	–1947.74	0.000	–2337.82	–1557.66
	Zetuvit Plus	–1383.82	0.000	–1773.90	–993.74
Flivasorb	Eclypse	–1387.76	0.000	–1777.84	–997.68
	Kliniderm	–3181.40	0.000	–3571.48	–2791.32
	KerraMax Care	–3335.50	0.000	–3725.58	–2945.42
	Zetuvit Plus	–2771.58	0.000	–3161.66	–2381.50
Kliniderm	Eclypse	1793.64	0.000	1403.56	2183.72
	Flivasorb	3181.40	0.000	2791.32	3571.48
	KerraMax Care	–154.10	1.000	–544.18	235.98
	Zetuvit Plus	409.82	0.035	19.74	799.90
KerraMax Care	Eclypse	1947.74	0.000	1557.66	2337.82
	Flivasorb	3335.50	0.000	2945.42	3725.58
	Kliniderm	154.10	1.000	–235.98	544.18
	Zetuvit Plus	563.92	0.002	173.84	954.00
Zetuvit Plus	Eclypse	1383.82	0.000	993.74	1773.90
	Flivasorb	2771.58	0.000	2381.50	3161.66
	Kliniderm	–409.82	0.035	–799.90	–19.74
	KerraMax Care	–563.92	0.002	–954.00	–173.84

MVTR– moisture vapour transmission rate; result (g/m^2/24 hours)

Discussion

It is clear that superabsorber wound dressings are not all the same. Each variant has a unique set of performance characteristics and performs against these differently. There is no single formula that offers a dressing suitable for all exuding wounds, and clinical judgment must be used to ensure the most effective dressing for the unique wound presentation is selected.

All wound dressings in this category are designed to encourage wound healing by secondary intent, and manufacturers will produce dressings best matching the materials and technology with their own expertise with the purpose of promoting wound healing. So it is inaccurate to say that any one dressing is ineffective—only an inappropriate choice. No wounds are identical, and each wound and each patient must be treated as such, which is why adequate education into wound aetiology and appropriate dressings must be high on the agenda in the health-care syllabus. The only criteria used to select the appropriate dressings is clinical judgment.

To aid clinical staff in selecting dressings, and procurement staff in sourcing via tenders, it is clear that there is a need for manufactures to display a set of performance criteria in which to test and report their dressings. All tests should be conducted to ISO test methods, and may lead to further development of these methods via National Standards Bodies.

Providing clear labelling of performance characteristics will aid health-care professionals in using their clinical judgment to select a dressing best suited for the wound presented. As such we would recommend that at least, the following criteria (Table 5) are used by manufacturers when reporting the performance of wound dressings.

It is suggested that absorbency data is universally reported in 100cm^2 units. This includes cavity dressings, where the 2002 version of ISO 13726-1 standard states cavity dressing to be reported per gram. Even these dressings are not dimensionally stable, as the effects of absorbption will alter the total volume of the product and thus its dimensions. As such quoting results per gram is not appropriate. To report all absorbent dressings in 100cm^2 units ensures a clear and level playing field when reporting on performance.

ISO 13726 part 1 and 2 both contain MVTR methods, but differ in light of their application and substrate. In Part 1 it is used in the calculation of total fluid handling but does not place fluid in direct contact with the dressing. However, part 2 affords a fair assessment of true MVTR regardless of dressing construction as the dressing is inverted, ensuring the test solution is in gravitational contact with the dressing, and is therefore the recommended method when reporting MVTR.

Preventing strikethrough is a key performance attribute for superabsorbent dressings to prevent a

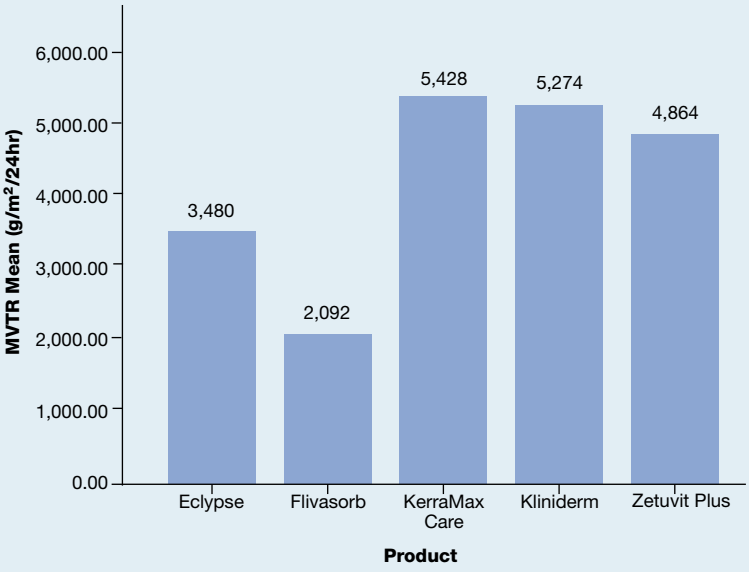
Table 4. Results of waterproof testing in accordance to BS EN 13726-3

Product	Test 1	Test 2	Test 3
Eclypse	Pass	Pass	Pass
Flivasorb	Fail	Fail	Fail
Kliniderm	Fail	Fail	Fail
Kerramax Care	Fail	Fail	Fail
Zetuvit Plus	Fail	Fail	Fail

Table 5. Suggested performance characteristics to be used universally by wound care manufacturers

Criteria	Result	Method
Absorbency	In 100 cm^2	ISO 13726-1
MVTR	In g/m^2 /24 hours	ISO 13726-2
Strikethrough barrier	Yes / No	ISO 13726-3

Fig 6. Moisture vapour transmission rate (MVTR) of five superabsorbent dressings mean (g/m^2/24 hours) in accordance with ISO 13726-2:2002



number of complications including cross-infection, and to improve patient QoL. Furthermore, it is observed that multi-layering of superabsorbent dressings that do strikethrough is not uncommon practice, which increases the risk of maceration, infection, discomfort, leakage and pain. Therefore, ensuring a waterproof barrier will prevent strikethrough is a key performance characteristic.

Dressings, especially in the community nursing environment, are left unobserved for a number of days. Furthermore, due to the ambulatory nature dressings are subjected to forces incurred during general mobility. As such it is not common for dressings to remain horizontal—the plane in which most tests are performed. The wound dressing must be able to withstand the forces it will experience when placed in any orientation, and when heavy with exudate. There is currently no standard for measuring structural integrity of the multi-textile formats of common superabsorber dressings, and is suggested that National Standard Bodies develop such a performance measure.

With a basic requirement that all wound dressings should be able to conform to the wound, and anatomical location, it was deemed that this specification was not required for labelling purposes, but would normally be conducted in order to demonstrate conformance to the essential requirements of the medical device directive.

Conclusion

Wound dressings grouped by their similarity in performance or material, like superabsorbing polymer dressings, can vary immensely in performance. It is also demonstrated that manufacturers may modify the test methods used to demonstrate performance. This provides an opportunity to misinform the consumer. With established International Standards on wound dressings, industry should adhere to these validated methodologies to enable consumers to compare dressings in equal standing. As textile technology advances, manufacturers should initiate amendments to these standards to ensure a standard method of reporting key performance characteristics is maintained.

There is an advantage in manufacturers displaying key performance attributes for wound dressings, being able to compare their absorbency, MVTR, and structural integrity in a clear and concise manner. Perhaps this would lend itself to similar labelling as seen on food.

For adequate therapy to be selected clinical staff must be educated in wound prevention, accurate diagnosis and dressing selection. Clinical staff must select dressings based on their individual performance characteristics as they relate to the needs of the wound and patient. This could be aided by clarity within formularies including the NHS Drug Tariff, where there are clear advantages of segregating wound dressings by performance and intended use.

With the personalisation of medicine, and recognition that every patient, their wound and underlying pathology is a unique combination of attributes, there is a dressing available that is likely to suit. For each combination of intrinsic factors, there is an ideal wound dressing to promote healing. There are no wrong dressings, just wrong dressing selection. That said, there is more innovation required in order to provide a toolkit for every wound aetiology. To aid the clinician in selecting the most appropriate therapy, harmonised standards must be used to ensure they are adequately educated and clear concise, and fair labelling will aid this endeavour. **JWC**

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