Use of Hydrofilm® and Hydrofilm® Plus in the community: an assessment

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The process by which wounds heal and the need for the holistic management of the patient and the role of moisture in wound healing has only recently become more clearly understood. This was a consequence of two landmark studies conducted in the 1940s and 1960s. The first study by Gilje in 1948 found that leg ulcers healed faster when covered with occlusive tape rather than when covered with gauze (Gilje, 1948). It was the study by Winter on wounds in pigs (Winter, 1962) that really gave impetus to the whole movement to promote moist wound healing. Winter demonstrated that re-epithelialization of wounds in pigs occurred more rapidly under an occlusive covering rather than under the dry 'scab' tissue and that if the formation of the scab was prevented, quicker healing occurred. Hinman and Maibach (1963) conducted a study that seemed to confirm the benefits of moist wound healing by comparing superficial wounds in humans. They found that covered wounds had an increased rate of epidermal regeneration compared to those exposed to the air. We now know that the reason for this is that a moist wound surface provides the most suitable environment for wound healing as it allows the body's natural healing process to take place (Hanna and Giacopelli, 1997). If the wound surface dries out epithelial cells have to burrow beneath the scab and it impedes their ability to migrate across the wound surface and adversely affects the delivery of nutrients and immune defences to the wound surface (Benbow, 2008).

Moist wound healing

The normal healing process follows a similar set of stages irrespective of whether a wound is acute or chronic but the amount of time that a wound takes to heal will depend on the cause of the wound, amount of tissue damage, patient co-morbidities and the management of the wound (Benbow, 2008). The stages of wound healing are facilitated by the moist environment under modern dressings and this aids the body's normal healing processes to take place (Vowden, 1999). Patients with chronic and acute wounds have different requirements in terms of what will be necessary for wound healing to occur. Where a patient has a chronic wound research has shown that the underlying cause of the wound needs to be investigated, and if possible, ameliorated or wound healing may only occur after a protracted time – no matter what type of dressing is in place (O'Meara et al, 2001; Chambers et al, 2007; Palfreyman et al, 2007).

In a normal healthy individual with an acute superficial wound it can actually be very difficult to prevent the wound from healing and the wound will progress through a series of stages until it heals (Kerstein, 1997). The first stage (1-4 days post injury) is 'inflammation' with macrophages and leucocytes removing debris and bacteria. The second stage is 'proliferation' (4–20 days) where connective tissue is deposited, a collagen matrix is established, new blood vessels extend into the wound and epithelial cells migrate across the wound surface (Benbow, 2008). The final stage is 'maturation' (21 days–2 years) where collagen fibres strengthen and contract to produce scar tissue.

The manufacturers of wound dressings have embraced and promoted the concept of moist wound healing (Hanna and Giacopelli, 1997) and there are currently a large number of different types of dressings. Today, over 50 manufacturers worldwide produce more than 350 brands of moisture-retentive or 'semi-occlusive' wound dressings (Ovington, 2002) with over 200 different types being listed in the UK National Formulary (BMJ Group, 2010). These include polyurethane films, foams, hydrogels, hydrocolloids, calcium alginates, collagens and other materials.

Modern dressings

Modern dressings that promote wound healing have been shown to have advantages over gauze dressings in that they are less painful and more convenient for patients (Singer and Dagum, 2008). They may also speed healing, although the comparative evidence for the recommendation of a particular occlusive dressing for these types of wounds is equivocal and they are more expensive than gauze dressings (National Prescribing Centre, 2008; Szycher and Lee,

ABSTRACT

The aim of this article was to critically examine the case for using film dressings with a particular emphasis on two dressing manufactured by PAUL HARTMANN Ltd: Hydrofilm® and Hydrofilm® Plus. The authors undertook a review of the current published evidence and present four case studies where Hydrofilm® and Hydrofilm® Plus were used in the community setting.

KEY WORDS

• Healing • Dressings • Preference • Tolerance • Cost

Case Study 1. Mr T

Mr T is a 45 year old gentleman who has lung cancer with bone metastases. Mr T required a syringe driver to administer his medication through a subcutaneous infusion. Film dressings are regularly used in the community for this purpose. They allow continuous inspection of the needle entry site and those with high MVTR prevent moisture build up.

Hydrofilm® was used to secure Mr T's infusion *(Figure 1*). The district nursing team were asked to evaluate the dressing's performance against the criteria in *Box 1* and their experience of using the film dressings currently available in the local formulary.

Hydrofilm® performed favourably in both areas. The district nurses (DNs) said they really benefited from the easy application process. As DNs work alone they had previously encountered difficulty holding the subcutaneous infusion set in place while securing with the dressing.

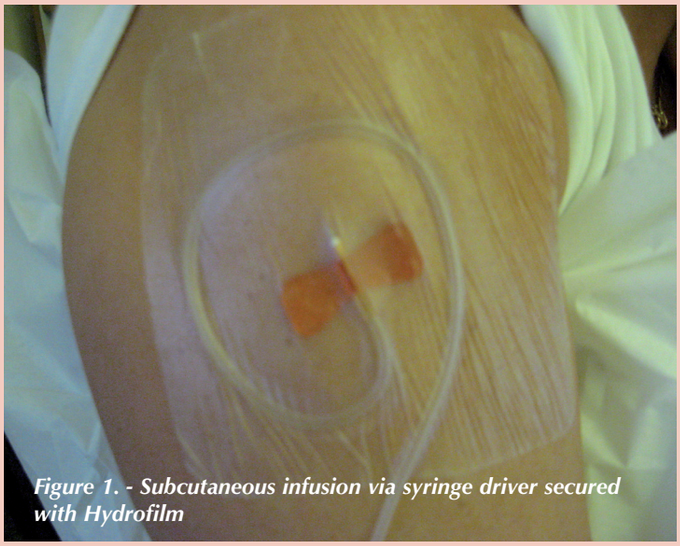

Figure 1. - Subcutaneous infusion via syringe driver secured with Hydrofilm

Box 1. Dressing criteria

- Acceptability to patients
- Ease of application
- Ease of removal
- Conformable
- Extensible
- Hypoallergenic – observation of skin
- Adaptability (whether it can be cut into strips for awkward areas)
- Durability
- Moisture build up (MVTR)
- Range of size.

Table 1. Indications of film dressings

Wound	Other
Minor burns	Secondary dressing
Pressure areas	Protective skin cover
Donor sites	
Post-operative wounds	

1992). Modern dressings have become so pervasive and widely used that it seems almost counter-intuitive that the evidence for their use can seem to be missing.

It has been reported that there is a lack of high-quality evidence, from large randomized controlled trials (RCTs), on the efficacy of modern wound dressings in promoting chronic and acute wound healing (National Prescribing Centre, 2008; Palfreyman et al, 2007). A large number of the published studies had a small sample size and showed inconsistencies in their design, inclusion criteria and choice of outcomes (Chaby et al, 2007)

The British National Formulary (BNF) (BMJ Group 2010) also reports that there have been few clinical trials conducted in order to establish the clear advantage for any particular product or type of wound dressing. In spite of the sometimes contradictory and poor quality evidence, modern dressings do seem to have advantages in terms of comfort and convenience over merely applying a dry dressing. Indeed, the BNF recommends that dressing choice should not only be based on the wound type, site, and stage of healing: but also patient preference or tolerance and cost.

Film dressings

Film dressings were one of the earliest types of occlusive dressings to be introduced and become widely used. They were first introduced in the 1970s but were originally designed as a preoperative cover in order to prevent contamination of the surgical incision by the patient's own skin flora and not as a wound dressing. They were then used as wound covering in order to try and prevent the leakage of wound exudate but also seemed to accelerate healing and reduce pain (Aindow and Butcher, 2005).

These dressings consist of a thin layer of transparent polyurethane film, with an adhesive, which are permeable to water vapour and oxygen but impermeable to liquid and bacteria (Thomas, 1996). As the films are non-absorbent they are not suitable for wounds with excessive exudates, although island dressings with a central non-stick pad are available and can absorb slightly more exudate than the simple films. Films can also be used as secondary dressings to waterproof a primary dressing such as foam. Incorrect removal of film dressings may cause trauma to surrounding skin.

Film dressings work by simply adhering to the surrounding skin and maintaining a moist environment, by preventing the loss of moisture from the wound, but care needs to be taken in the assessment of the patient as there is the potential to cause skin tears when the dressing is removed (Queen et al, 2004). Another problem can be maceration, as these types of dressings are non-absorptive and fluids tend to accumulate beneath the dressings (Marshall et al, 1990). It has also been found that there can be an increase in bacteria beneath film dressings – especially in the patient's own skin flora - but this is not thought to adversely affect the wound healing (Aindow and Butcher, 2005). As a result of these problems one precaution that has been recommended when using film dressings is that they are not be used in wounds which

Case Study 2. Mrs W

Mrs W was discharged from hospital with a pressure ulcer overlying the lateral aspect of her left heel (*Figure 2*) into the care of the DN service. The wound bed was covered with 100% sloughy tissue which made accurate grading difficult. However, it was evident that the ulcer was at least a grade 3 and measured 3cm x 3.5cm. There were no signs of clinical infection. The aim was to deslough the wound using products that aided autolysis while protecting the surrounding skin. The wound was treated with a hydrogel, the skin protected with a barrier film and covered with Hydrofilm®.

Following 10 days of treatment the wound bed had significantly improved with 60% healthy granulating tissue *(Figure 3)*. The patient experienced no pain during the treatment and the DNs reported back positively when evaluating the product using the criteria previously mentioned.

Figure 2. Heel pressure ulcer with 100% slough

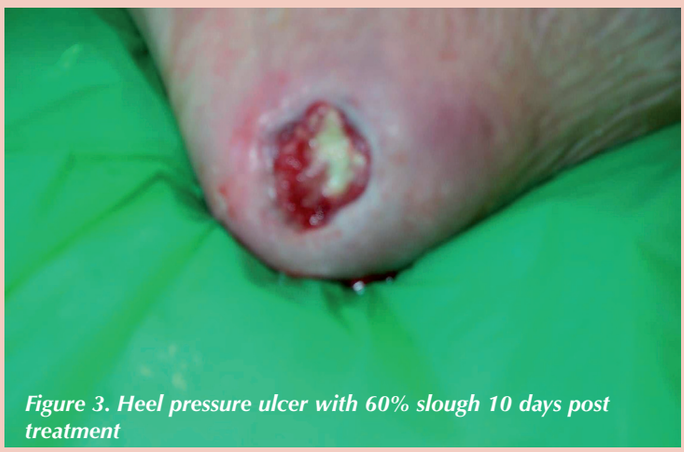

Figure 3. Heel pressure ulcer with 60% slough 10 days post treatment

have excessive exudate or those that show signs of infection (Vaneau et al, 2007).

Film dressings are indicated for acute rather than chronic wounds and can be used on a number of different wound types (see *Table 1*) (Vaneau et al, 2007). They are generally suitable for most superficial wounds, but are not suitable for deep or exudating wounds because of their inability to absorb exudate (Aindow and Butcher, 2005). There are currently over 16 different types of film dressing made by 14 different manufactures with their unit costs ranging from 11–41 pence (for a 6x7 film) (BMJ Group, 2008).

Film dressings are designed to have a high moisture vapour transmission rate (MVTR) in order to allow moisture to escape from the wound (Aindow and Butcher, 2005). The key mechanism of action for these dressings is to provide the best environment to facilitate healing in the inflammation and proliferation phase (Thomas, 1996).

Moisture vapour transmission rate

One way of distinguishing between film and other occlusive dressings is through the MVTR which is a measure of a material's 'breathability' (Seaman, 2002). This is measured as the steady flow (g) of water vapour per unit (m^2) area of surface in unit (h) time induced by the vapour pressure difference ($g/m^2/hr$) (Jonkman et al, 1988). It is used by manufacturers of dressings to assess how much gaseous exchange the material allows from the wound surface to the outside environment but can also be used to examine other types of material, for example, outdoor clothes and damp-proof membranes.

One important consideration is that the conditions under which measurements are made can influence the results and both the temperature of and humidity gradient across the sample should be reported with the result (Gretton et al, 1998). An MVTR result without specifying these conditions can be almost meaningless. The most common international unit for the MVTR is $g/m^2/day$. In the USA, $g/100in^2/day$ is also in use, which is 1/15 of the value of $g/m^2/day$ units. There is thought to be some correlation of the ability of the dressing to retain moisture and earlier healing when compared to those dressing with less moisture-retentive properties (Bolton et al, 2000). However, a balance is necessary. If the MVTR is too low, the skin underneath can become too wet and macerated and can be uncomfortable for the patient (Cuzzell, 1997).

Different types of occlusive dressings have different MVTRs. Most film dressings are designed to have a high MVTR but this can vary between manufacturers (Aindow and Butcher, 2005). SMTL data has shown that Hydrofilm® has a mean MVTR in contact with vapour of 1327.6 $g/m^2/24$ hours (SMTL Report no. 08/2883/01).

Evidence for film dressings

The evidence for film dressings from large RCTs or systematic reviews mirrors that of other occlusive dressings. However, although there is little comparative evidence, some studies have shown that there can be advantages for the patient when using film dressings. A small randomized study by Briggs (1996) compared the pain in 30 patients who had undergone abdominal hysterectomy, half of which had a film dressing and half a standard dry dressing. The pain of their surgical incision was assessed using the McGill Pain Questionnaire (Melzack, 1975) for the first four days post-op. There was no difference in scores for the first two days but those who had the film dressing applied seemed to experience less pain on day three compared to the dry dressing group.

A systematic review by Gilles et al (2003) of film dressings for central venous catheters compared to standard dry dressings found 23 studies but had to exclude 15. They found

Table 2. Comparison of film dressing unit costs (based on prices in the NHS Drug Tariff Feb 2010)

Hydro-Film®	£.pp	Active heal	£.pp	Tegaderm	£.pp	C-View	£.pp	Mepore Film	£.pp	Opsite Flexigrid	£.pp
6 x 7	21	6 x 7	31	6 x7	38	6 x 7	38	6 x 7	44	6 x 7	37
10 x 12.5	39	10 x 12.7	74	12 x 12	108	10 x 12	102	10 x 12	117	12 x 12	106
15 x 20	90	15 x 17.8	179	15 x 20	234	15 x 20	232	10 x 25	228	15 x 20	267
10 x 15	49					12 x 12	107	15 x 20	289		

Table 3. Comparison of film dressings which incorporate absorbent pad

HydroFilm® Plus	£.pp	Mepore Ultra	£.pp	Tegaderm and Pad	£.pp	Opsite Post Op	£.pp
5 x 7.2	15	7 x 8	38	5 x 7	25	8.5 x 9.5	81
9 x 10	20	10 x 11	75	9 x 10	62	8.5 x 15.5	112
9 x 15	22	9 x 25	157	9 x 15	92	10 x 12	110
10 x 20	34	9 x 20	142	9 x 20	134	10 x 20	185
10 x 25	36	11 x 15	111	9 x 25	151	10 x 25	233
10 x 30	53			9 x 30	250	10 x 30	276

that the evidence of effectiveness was poor and that there was no evidence of any difference in the incidence of infectious complications between any of the dressing types.

A review by Rakel et al (1998) of film dressings for split skin graft donor sites found 33 studies and concluded that film dressings were associated with faster healing rates and low pain and were cost effective.

A Cochrane review of dressings and topical agents for surgical wounds healing by secondary intention (Vermeulen et al, 2004) were unable to identify any large, high quality RCTs in this area and found 13 poor quality trials. However, they did, with reservations, recommend that gauze should not be used as it may be associated with greater pain or discomfort for the patient.

No systematic reviews of the care of acute superficial wounds currently exists but it is likely that the evidence for the effectiveness of modern dressings compared to gauze or dry dressings will exhibit the same deficiencies as for surgical wounds and graft sites. However, it is also likely that in uncomplicated, non-infected wounds, film dressings would result in less pain, compared to the use of dry gauze dressings.

Hydrofilm® film dressing

Hydrofilm® is made from a semi-permeable, transparent polyurethane film coated with a hypoallergenic acrylic adhesive. Hydrofilm® Plus differs from Hydrofilm® in that it has an absorbent pad with a soft polyethylene surface to prevent adherence. It is a waterproof transparent adhesive wound dressing that enables the exchange of water vapour

Case Study 3. Mr K

Mr K is a 67 year old gentleman discharged from hospital to the community post-op clinic for management of his surgical wound. Mr K had an excision and removal of a lump from his neck which was closed with clips (*Figure 4*). At the time of this case study Mr K was waiting for the histology results from the tissue removed.

The wound was located in an awkward area to dress and Mr K asked if he could wash his hair. Hydrofilm® Plus was used to dress the wound. The dressing conformed well to the awkward area demonstrating good extensible properties. It performed well as a waterproof dressing with no evidence of water infiltration following Mr K washing his hair. Mr K said he found the dressing comfortable to wear and less bulky than the pad and tape used previously.

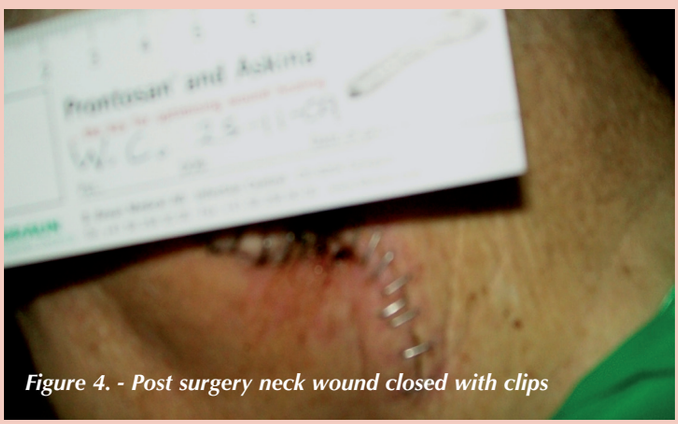

Figure 4. - Post surgery neck wound closed with clips

Case Study 4. Mr B

Mr B is a 64 year old gentleman discharged into the community following surgery for a triple coronary artery bypass. Prior to discharge clips were removed from the chest incision which subsequently dehisced at the bottom of the incision line. The dehisced area measured 1.5cm x 1cm with minimal exudates (*Figure 5*).

Mr B expressed his great desire to shower as he had not been able to do this for the 4 weeks he spent in hospital. Hydrofilm® Plus was used to dress the wound on alternate days. Mr B showered each day and the DNs reported that the dressing offered an effective waterproof barrier. General feedback from the DNs was extremely positive in relation to the criteria previously mentioned. Mr B was delighted with the dressing in that it allowed him to shower every day, caused no pain on removal and did not leak onto his clothes. The wound closed completely after 2 weeks.

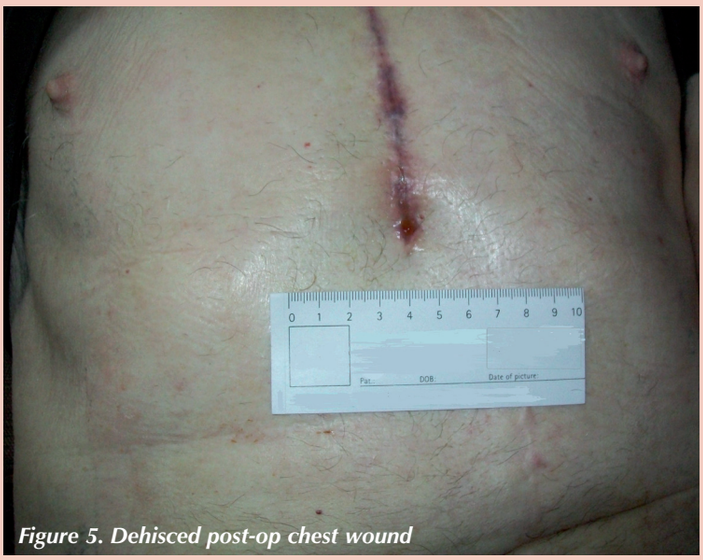

Figure 5. Dehisced post-op chest wound

and other gases between the wound and the outside environment, therefore helping excess moisture to escape and so prevent wound maceration. It is impermeable to micro-organisms and is transparent so that the wound can be inspected without having to remove the dressing. It also protects the wound against dirt, trauma and supports the natural moist wound healing process. It is available in a wide range of sizes. Like other film dressings it is indicted for use on wounds where there is little or no exudate. Hydrofilm® can be used on a range of different wounds and circumstances:

- Post-operative wounds where there is likely to be no excessive exudate
- Wound covering for surgical procedures
- As a sterile dressing for superficial wounds such as cuts and abrasions
- Superficial pressure ulcers
- As a secondary dressing over alginates and hydrogels
- For fixation of catheters or cannulae
- As a prophylactic measure to reduce skin shear and friction.

The manufacturers recommend that it should not be used in clinically-infected, bleeding or highly-secreting wounds.

It should be applied using an aseptic or no-touch technique using a four-stage application process which is shown by the numbers on the dressing liner. This technique ensures that the film does not wrinkle. It is removed by the 'support and pull' method which reduces the chance of wound trauma.

Hydrofilm® and Hydrofilm® Plus are competitively priced as can be seen from *Table 2* and *Table 3*. The dressings are between 32-52% cheaper than the majority of alternative dressings in the same group. For some sizes of dressings Hydrofilm® Plus was up to 80% cheaper.

Case studies

The aim of conducting these case studies was to examine whether Hydrofilm® and Hyrdrofilm Plus® offered a clinically and cost-effective alternative to the equivalent products on the current formulary (Tegaderm, Activeheal Film, Tegaderm + Pad and Mepore Ultra).

The dressings were evaluated against the criteria in *Box 1*, and by drawing comparisons with the equivalent products currently used.

All the case studies produced favourable evaluations from both patients and clinicians for both Hydrofilm® and Hydrofilm® Plus. In addition to meeting the criteria in *Box 1*, both products were also competitively priced compared to other film dressings previously used by the clinicians (See *Table 2*). The Trust has realized substantial savings of between 38-75%, depending on the size of dressing by replacing products previously used with the Hydrofilm® range

Discussion

In this article the authors sought to undertake a balanced assessment of two dressings: Hydrofilm® and Hydrofilm® Plus. The available literature was critically examined in order to obtain an overview of the dressings. This highlighted that there was a lack of high quality comparative studies and that the evidence of benefit was not always clear. However, film dressings are used widely within the health setting and both patients and clinicians can have positive experiences of using these types of dressings (Thomas, 1996; Aindow and Butcher, 2005). There does seem to be a lack of published studies that conform to the standard of what is usually considered high quality evidence, i.e. cost effectiveness studies alongside large RCTs. However, Carter et al (2009) criticized wound care RCTs for not reflecting the true population in the clinical setting with wounds and only including a selected subset of the overall population. In the absence of Level 1 evidence or where there is a clear cost difference between dressings, it may be that other considerations such as patient/clinician preferences and subjective outcomes could also be included in any evaluation of a dressings effectiveness.

A series of subjective outcomes were assessed within the presented case studies (see *Box 1*) and these highlighted that Hydrofilm® and Hydrofilm® Plus exhibited a number of benefits. Clinicians appreciated that the dressings could be easily applied and removed, managed exudate reasonably

well and conformed to wounds in difficult areas. Patients reported that they experienced a reduction in pain and appreciated that the dressings were waterproof and so allowed them to shower.

A final consideration was that both Hydrofilm® and Hydrofilm® Plus were competitively priced when compared to comparative dressings available on the NHS drug tariff (see *Table 2* and *Table 3*).

Conclusion

Clinicians should base their choice of dressing on a thorough assessment of the patient, wound and local guidelines. These case studies provide some preliminary evidence that Hydrofilm® and Hydrofilm® Plus dressings are acceptable alternatives to some of the more established film dressings.

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