Selecting a dressing for the diabetic foot: factors to consider

Vanessa Jones

ARTICLE POINTS

1 Foot ulcers account for 20% of hospital admissions among diabetic patients.

2 The majority of ulcers are neuropathic or neuro-ischaemic.

3 Infection is the most serious complication of a diabetic foot ulcer.

4 Selection of an appropriate dressing is crucial to the successful management of diabetic foot ulcers.

5 Dressing choice should be based on careful assessment of the neuropathic and vascular status of the foot.

6 Practitioners need to understand the characteristics of modern dressing materials if they are to make a rational, research-based choice.

KEY WORDS
- **Diabetes**
- **Foot ulceration**
- **Wound assessment**
- **Dressings**

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Introduction

Selection of an appropriate dressing is an important factor in the successful management of diabetic foot ulcers. However, there is evidence to suggest that practitioners are frequently confused by the wide variety of dressings available. This series of six articles on wound care for the diabetic foot aims to provide practitioners with sufficient information to enable them to make a rational, research-based choice of dressing. This first article discusses assessment of the diabetic foot lesion and the factors that need to be taken into account when selecting a dressing, outlining the types of dressings available. The next five articles will cover the main dressing materials in more detail.

Diabetes mellitus is one of the most common endocrine diseases. It is predicted to affect 239 million people worldwide by 2010, presenting a major challenge to healthcare systems and economies (Mandrup-Poulson, 1998).

Amputation is 15 times more common in diabetic patients than in the non-diabetic population (Williams, 1994). Foot ulcers are the most common reason for hospitalisation in patients with diabetes (Elkeles and Wolfe, 1991), accounting for 20% of admissions in this patient group. Among the 750,000 individuals with diabetes in the UK, 4% will have had an amputation and 6% will have an active foot ulcer at any one time.

Foot ulceration

Foot ulceration can occur in individuals with type 1 or type 2 diabetes. The data suggest that 50% of older patients with type 2 diabetes have risk factors for ulceration (Boulton, 1996).

Ulceration does not occur spontaneously but is commonly the result of either trauma or pressure, which often goes undetected because of the underlying peripheral neuropathic or vascular problems associated with the disease process. The majority of ulcers (90%) are neuropathic (*Figure 1*) or neuro-ischaemic, with the remainder being purely ischaemic (*Figure 2*) (Boulton et al, 1994).

Infection is not a primary cause of ulceration, but usually secondary, and is the most serious complication of a diabetic foot lesion (Edmonds, 1984; Boulton, 1996; Sign, 1997). Once infection is established in the diabetic patient, it can be very aggressive and develop rapidly (Baker, 1997). Because of the reduction and alteration in blood flow, defective immunity, and often a lack of patient awareness, systemic infection may quickly ensue, and become life-threatening if left unchecked. Wound care is aimed at eliminating infection if present, or eliminating the factors that precipitate bacterial invasion. Therefore, once ulceration has occurred, it is imperative that the practitioner assesses the degree of damage in order to identify a strategy for preventing infection and to ensure appropriate management.

In many cases the choice of dressing may be less critical than thorough observation and assessment of the wound status. Other treatment modalities may have a greater impact on the management of ulceration: examples include removal and/or redistribution of pressure and friction, and debridement to remove necrotic and/or sloughy tissue or callus, or to drain pus. This not only promotes healing and removes pressure, but also permits examination of the ulcer bed (Knowles and Jackson, 1997).

Wound assessment

Assessment of the ulcer is a prerequisite to any form of treatment. The information

gained from the assessment will vary according to the complexity of the assessment tool used. Basic assessment of wound size, shape, type of tissue and surrounding skin will provide the practitioner with limited information on which to base dressing choice. When caring for diabetic patients, a more in-depth assessment that takes account of the vascular and neurological status is required.

A suitable format, suggested by Harding (1992), is the wound healing matrix (*Table 1*). This general but comprehensive assessment can be adapted to meet the needs of individuals in any healthcare setting. A thorough assessment will ensure that correct management, which includes the selection of an appropriate dressing, is provided.

Dressing choice

Since the work of Winter (1962) and Hinman and Maibach (1963) it has been recognised that a moist wound environment is optimal for wound healing. Most modern wound management products meet some of the requirements of an 'ideal' dressing, although these requirements will vary according to the wound type. The properties of an ideal dressing have been described as follows:

- Creates a moist environment at the wound–dressing interface
- Provides thermal insulation
- Impermeable to microorganisms
- Free from particulate contaminants
- Allows removal without trauma
- Acceptable to the patient
- Capable of absorbing excess exudate
- Cost-effective
- Allows monitoring of the wound
- Allows gaseous exchange
- Provides mechanical protection
- Conformable
- Available in hospital and the community
- Requires infrequent changing.

Consideration should be given to the fact that these properties may be altered when the dressing is used on feet (Morgan, 1997), as dressings are not designed to take the high and repetitive forces exerted on the sole of the foot (Baker, 1997).

Dressing choice for the diabetic foot lesion should be based on careful assessment of the neuropathic and/or vascular status of the foot (Knowles and Jackson, 1997).

Publisher's note: This image is not available in the online version.

Figure 1. Neuropathic foot ulcer.

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Figure 2. Ischaemic foot ulcer.

It is important for practitioners to be able to identify the different characteristics of each ulcer type in relation to complex aetiology, e.g. neuro-ischaemic ulcers do not usually produce a high level of exudate, so that a highly absorbent dressing would be inappropriate (McInnes, 1997). In the presence of infection (*Figure 3*), however, where exudate levels are likely to be high, the wrong choice of dressing can cause maceration and major deterioration of the wound, with potentially serious consequences.

Dressings should not be too bulky as this will affect the fit of the shoe (Knowles and Jackson, 1997). Foster et al (1994) have simplified the properties of a dressing that meets the needs of the patient with a diabetic foot ulcer as follows:

- Does not take up too much space in the shoe
- Does not increase the risk of infection

PAGE POINTS

1 The wide variety of dressing materials available may leave the practitioner confused.

2 Many modern products are designed to be left in place for a number of days.

3 However, this has become an area of contention among specialists, as frequent dressing change is advocated, particularly for infected diabetic foot ulcers..

- Absorbs exudate
- Can be changed frequently.

However simplified these properties may be, the wide variety of dressing materials currently available may leave practitioners confused. Although many trials have been conducted with dressing materials, the findings do not always provide overwhelming evidence in favour of one dressing over another. If choice of dressing is not based on a systematic framework, dressing materials may be used inappropriately, leading to delay in wound healing and increasing the cost of care.

Table 1. Wound healing matrix

SITE
- Skin
- Bone
- Blood vessels
- Nerves

PHASE OF HEALING
- Haemostasis
- Post-wounding
- Inflammation
- Proliferation (granulation)
- Autolysis (slough and necrosis)
- Epithelialisation
- Maturation

AETIOLOGY

Acute wounds
- Abscess formation?
- Elective or emergency surgery?
- Direct/indirect trauma?
- Thermal/chemical injury?

Chronic wounds
- Leg ulcers
- Pressure sores
- Diabetic ulcer
- Malignancy/infected

CLINICAL MANIFESTATION
- Sinus
- Cavity
- Wet
- Dry

ENVIRONMENT AND CARER
- Teaching hospital
- General hospital
- Geriatric hospital
- Long-term care
- Residential home
- Patient's home
- Homeless

HEALTHCARE SYSTEM
- NHS
- Private

This type of approach to dressing choice was demonstrated by Fisken and Digby (1996) in a questionnaire survey of diabetes specialist nurses and state-registered chiropodists. They reported that between five and eight different dressings could be chosen for the same type of ulcer. It was not clear from the study whether the inability of respondents to make informed choices was due to lack of information or to a belief that it did not matter which type of dressing was used. The most popular dressings were low/non-adherent, hydrocolloids, hydrogels and alginates.

Dressing types

Traditional dressings such as gauze and absorbent cellulose dressings adhere to the wound bed and cause bleeding on removal (Wijekunge, 1994). They also provide little protection against bacterial contamination, especially if 'strike-through' (leakage of exudate) is allowed to occur (Lawrence, 1994).

In contrast, many modern products are designed to be left in place for a number of days. This reduces the risk of contamination, leaves the delicate wound tissue intact and reduces cost (Jones and Harding, 1995). However, this has become an area of contention between specialists, as frequent dressing change is advocated, particularly for infected, diabetic foot ulcers to allow daily wound inspection (Foster et al, 1997; Vowden, 1997).

Although clean, non-necrotic ulcers can withstand dressing changes two or three times a week without ill-effect (Apelqvist et al, 1994), infected foot lesions require at least daily changes (Boulton et al, 1997).

Using an appropriate rationale based on individual patient characteristics determined from the wound assessment, the practitioner can select a dressing according to the criteria shown in *Table 2*.

Conclusion

Selection of an appropriate dressing is an important factor in the successful management of diabetic foot ulcers. It is important for practitioners to understand the general and specific properties of modern dressing materials in order to make

Table 2. Criteria for determining choice of dressing

Wound attributes	Types of dressing	Rationale for use
Necrosis/slough	Surgical or mechanical debridement; enzymatic debrider; hydrogel	Promote autolysis and healing Decrease risk of infection
Gangrenous	Dry; low/non-adherent	Prevent formation of 'wet' gangrene
Infection	No adhesive dressing Alginates; low/non-adherent; foams	Daily dressing change
Exudate:		
low	Low/non-adherent foam; film; hydrocolloid	Maintain moist environment
high	Alginates; foams	Prevent strike-through or maceration
Wound shape and depth:		
flat — low exudate	Low/non-adherent film; hydrocolloid	Maintain moist environment
— high exudate	Foams	Prevent maceration
Cavity:		
without sinus	Hydrogel; hydrocolloid paste; alginate rope; foam cavity dressings	Maintain moist environment Fill the cavity
with sinus tracts	Alginate rope; hydrogel	

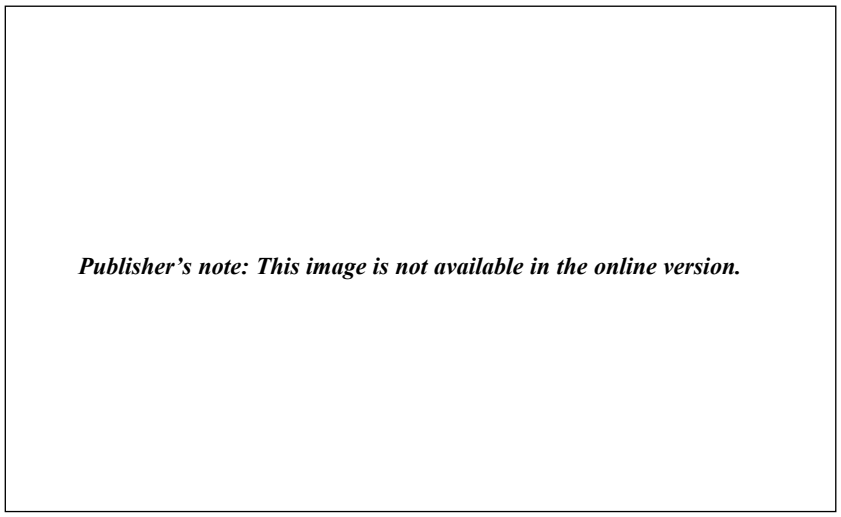

Figure 3. Infected foot ulcer.

a rational, research-based choice.

This overview of dressing selection for diabetic foot ulcers is the first in a series of six articles which will cover all the major dressing materials, highlighting the advantages and disadvantages of each from the available research evidence. ■

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