Are we close to developing the ultimate wound dressing?

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It is more than 25 years since Dr Terry Turner coined the concept and listed the requirements of the ideal wound dressing. Since then a plethora of articles, including reviews and attempts at meta-analysis, clinical research and case reports have addressed this concept and several more relevant criteria have been added. The essentials for an ideal wound dressing seem to have been extended and expanded substantially. However, most of the articles have been based on personal opinion and experience and remain largely conjectural.

Most evidence of the value of an individual dressing is based on animal or experimental studies or on surrogates, such as the extensive investigation of wound fluid, measuring growth factors and proteases in relation to wound healing or chronicity. Some of these studies are of high calibre with clear messages but unfortunately this type of research does not rate highly on the hierarchical scale of clinical, scientific evidence. Conversely, although definitions have improved with the appearance of a new vocabulary, including the phrase 'preparation of the wound bed' (no longer specifically before skin grafting) and the notion of 'critical colonisation' as a prelude to overt infection, there have been few acceptable clinical trials of wound dressings which give clear clinical guidelines.

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Comparative trials have often compared new dressings with ludicrously matched 'basic standards' of care. There are some reviews of large analyses which have identified the advantages of some dressings but they lack the robust qualities of meta-analysis. A scientifically valid, randomised controlled trial in this field is probably financially prohibitive. Such a trial should be confined to chronic wounds that are difficult to heal, and should have very strict definitions for entry. The inclusion of 'pure' venous ulcers defined by multiple and extensive criteria, for example, could decimate a potential cohort by more than 90%.

This leaves an inexperienced practitioner of wound management in a quandary. Where should he or she turn for help when making decisions or devising protocols that indicate which dressing should be used and when and in which stage of healing, for the various types of acute and chronic wounds? Although there have been many advances in the knowledge of the pathophysiology of healing, accompanied by an expansion of educational opportunities, roles and facilities, much confusion remains about which dressing serves each specific purpose. This has been compounded by the increase in number of dressings that are designed for specific purposes which embrace this expanding

Table 1
The optimal wound dressing's properties

Absorbent and reduces excess exudate
Retains integrity when wet; remains durable without fragmentation
Provides moist environment, but avoids maceration
Eliminates dead space
Supports auto-debridement
Permits surface evaporation
Adds no foreign body to the wound and is non-toxic with low allergy
Prevents 'strike through' with risk of secondary exogenous infection
Reduces bacterial burden; prevents critical colonisation/infection

knowledge. Further confusion relates to each dressing manufacturer having a portfolio of a range of wound dressings, particularly the hydrocolloids, hydrogels and alginates, all purporting to have specific advantages over competitors. Another classic example is the relatively recent introduction of silver in dressings as an antimicrobial agent, often in addtion to the properties of already established products.

Even so, it is probably widely understood that there is no dressing panacean, nor is there ever likely to be. The current list of products available continues to expand and embraces extensive technology. It is possible that gene technology may also soon be added — a long way from the universal use of simple lint and gauze dressings and the 'non-adherent' tulles of only 100 years ago, most of which developed when treating war injuries. Before that, dressings were chosen to cover and protect the wound and keep it warm, to provide some antibacterial activity and negate unpleasant smells with their own innate fragrance.

The expanded list of requirements of an optimal wound dressing can be placed into two main groups: dressing properties (*Table 1*) and the needs of the patient (*Table 2*). It must be remembered by practitioners, patients and the industry that wound healing cannot be better than optimal, and no single dressing can give an optimal environment for all stages of healing.

Measuring the effectiveness of dressings has also proved to be difficult to put into practice. The goal is to achieve the most rapid method to complete healing, but surrogates have to be used in difficult-to-heal chronic wounds. These involve reduction of wound size; reduction of infection through to acceptable colonisation; reduction of pain and odour; increased wear time; and measuring quality adjusted life years (QALYs). In practice these alternatives — and there are many more — are difficult to measure and are open to wide variation from different observers. Most quantitative measurements need expensive, research-based instruments, but the progression of wound healing from debridement of necrosis to a healthy wound bed conducive to epithelialisation, wound contraction and satisfactory healing, has been effectively monitored by using simple guides such as progression through black-yellow-red, usually with photographic evidence which can be standardised and validated.

Table 2

The optimal wound dressing's patient-related desirables

- Allows pain-free, atraumatic, easy dressing changes
- Reduces pain between dressing changes
- Comfortable and conformable, e.g. allows bathing
- Contributes to pressure relief
- Protective to external damage
- Reduces odour and controls exudate
- Reduces number of dressing changes required (increased wear time)
- Cost-effective and accessible to all clinical environments
- Measurably improves quality of life

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Most wound healing practitioners aim to produce a moist wound environment by using appropriate modern dressings. This objective is based on work published more than 40 years ago which involved the use of animals in controlled, sterile, laboratory conditions. Although it is widely accepted that open, dry therapy is less than optimal (despite there being little evidence to support this), how moist is moist? Too much exudate gives problems with dressing management and may risk surrounding skin maceration and bacterial colonisation leading to infection.

It is said that nature finds its way and it is fortunate that most chronic wounds do heal using current accepted guidelines. Which dressing to be used and when, proves more contentious in difficult-to-heal chronic wounds. This is still based on widely varied opinion, which is precisely why clinical trials are genuinely needed.

The use of combined clinics or designated wound teams is a luxury few can afford – or maybe there is an incomprehensible reluctance for NHS trusts to support this? All dressings need to be chosen to work in conjunction with rapid and complete debridement; appropriate infection control; and economic analysis and audit which form the basis for effective protocols and guidelines (rather than the preferred meta-analyses which do not exist).

The recognition and control of the underlying disease aetiology involves a wide group of wound care practitioners. Excellence in nursing care may be viewed as adequate four-layer compression in venous ulcer disease for example, but in other patients additional care may be needed, such as the attention of surgeons, microbiologists, dermatologists, endocrinologists and podiatrists (for diabetic care in particular). The acceptance of specialist wound clinics and wound management practitioners who have their own specialist research societies and educational conferences is fortunately growing and will add to the continued search for optimal wound dressings for the various specific wound types. However, a single panacea wound dressing is clearly a dream. WUK