

Wounds

— what should a dressings formulary include?

By DAVID MORGAN, MRPHARMS, BSc, MCPP

The second part of the special feature on wounds considers the range of dressings available to be included in a hospital formulary

The purpose of this part of the special feature is to describe the range of wound care products which is available in hospitals. Similar products are described in groups with reference to their ideal characteristics, advantages, disadvantages, effectiveness and use. Emphasis is given to newer groups of wound care products. This information will be of particular interest to those who are involved in compiling wound care formularies in hospitals. It should be noted that decisions about the contents of a hospital formulary have to be made locally and for this reason no recommendations are made about the addition of particular products.

BACKGROUND

In the early 1980s, few wound care products were available apart from traditional dressings and paste bandages. The first representatives of modern wound care products, such as Inadine, Granuflex, Kaltostat and Sorbsan, were introduced into hospitals during the mid 1980s. As can be seen in Table 1, few products were added to the Drug Tariff in the late 80s and early 90s. During the mid 1990s, the range slowly expanded into the well recognised groups of products as such as vapour-permeable adhesive films, hydrogels, hydrocolloids, alginates and foam dressings, and newer groups of products were marketed, such as silicone, silver and collagen dressings, tissue adhesives, barrier films and skin substitutes (tissue-engineered products).

From 1996, however, this overly cautious approach appears to have been abandoned as an avalanche of new products was added both to the Drug Tariff and to the list of preparations which can be prescribed by nurses, Part XVIIIB of the Drug Tariff.¹

Precise details of sizes, shapes and prices of products can be found in the approved list of appliances, Part IXA of the Drug Tariff.¹ General information about individual products is available in the British National

Formulary,² in the 'Formulary of wound management products'³ and from the Surgical Materials Testing Laboratory website (see Panel 8, p266). A general assessment can be made about an individual product by comparing it with the characteristics of an ideal

Evidence-based

practice in wound care has not kept pace

with the vast number of products marketed

dressing (Panel 1, p262). However, there is a paucity of information on the evidence of effectiveness of individual products or of comparative effectiveness; evidence-based practice in wound care has not kept pace with the vast number of products marketed.

When developing a hospital formulary, it is easier to consider products having similar

characteristics in groups. Generally, it is only necessary to use one product from each group. Products should have as many ideal characteristics as possible, should have some research evidence supporting their use and be competitive on price. Often, products are chosen to treat particular kinds of wounds. These are colour-coded, eg, epithelialising (pink), granulating (red), infected (green), sloughy (yellow) and necrotic (black). The range of wound care products available is described below in groups, starting with some of the newest products.

SKIN SUBSTITUTES

Skin substitutes are tissue-engineered products using living cells (fibroblasts, keratinocytes) in a scaffold of natural or synthetic extracellular matrices which provide mechanical stability and a three-dimensional framework for subsequent tissue infiltration and development.^{4,5} Often, biodegradable scaffold materials are used that are resorbed as new tissue is laid down. Natural scaffolds are derived from human or animal tissues, such as collagen and hyaluronan. Synthetic scaffolds, such as polyglycolic acid and polylactic acid, can be manufactured on a large scale.

The living cells consist of three types: epidermal, dermal and combined dermal and epidermal.

Epidermal Epidermal skin substitutes, eg, Epicel and Laserskin, consist of grafts of cultured epidermal cells with no dermal components, eg, cultured autologous epidermal cells, cultured allogenic epidermal cells. Culture time may be prolonged and there may be difficulties with handling.

Dermal Dermal cells help to prevent wound contraction and provide greater mechanical stability, eg, allogenic skin, bovine collagen, Biobrane, Alloderm, Dermagraft.

Combined dermal and epidermal Examples of combined dermal and epidermal products are composite cultured skin and Apligraf. Care must be taken to apply the

Table 1: Number of products added to the Drug Tariff 1988–2002

Year	Number
1988	4
1989	1
1990	4
1992	2
1993	5
1994	4
1995	5
1996	12
1997	15
1998	26
1999	67
2000	45
2001	37
2002 (end September)	23

Mr Morgan is the director of pharmaceutical public health, North Wales Health Authority

dermal layer in contact with the wound bed.

Skin substitutes are used for burns and more difficult recalcitrant wounds. They promote wound healing by stimulating the host to produce a variety of cytokines. The condition of the wound bed will affect product efficacy. The advantages of using skin substitutes are that they are readily available, do not require painful and invasive procedures and may be used for outpatients. Their disadvantages are high cost, potential disease transmission and limited viability (they do not survive indefinitely).

— SILICONES

Silicone dressings consist of chemically inert, transparent and conformable silicone gel. Available products include: Cica-Care, Mepiform, Mepilex, Mepitel, N-A Ultra, Silgel. They are used to reduce hypertrophic and keloid scarring, resulting in flattening of scar tissue, increased elasticity and reduced discoloration regardless of degree, site or age. This makes the scar more cosmetically acceptable. Currently, it is believed that silicone gel works by promoting hydration of the scar. Gel sheets can be sterilised in an autoclave; the sheets are reusable and can be washed in warm water or mild antiseptic solution.

— COLLAGENS

Collagen is the fibre-forming protein of mammalian connective tissue (skin, tendons, bones and cartilage) accounting for approximately 30 per cent of the total body protein in mammals. It is the major component of the extracellular matrix forming an organised structure bridging the basal cells of the epidermis with the adjacent connective tissue matrix. At least 10 different types of collagen have been identified.

Collagen is used as a haemostat, an absorbable suture material, artificial skin, bone filling material and as wound dressings. Products to consider for a formulary include Oasis, Opraskin, Promogran and Suprasorb C.

There is a risk of antigenicity, although this is usually low. Collagen contributes to all phases of the wound healing process by:

- | Binding blood clotting factors XII and XIII
- | Causing natural wound cleansing
- | Attracting granulocytes and fibroblasts into the wound
- | Reducing wound contraction and enhancing deposition of oriented, organised collagen fibres

Panel 1: Characteristics of ideal dressings

The ideal dressing should:

- | Maintain moist environment at the wound dressing interface
- | Provide thermal insulation
- | Have low or non-adherence
- | Require infrequent changing
- | Provide mechanical protection
- | Be free from particulate contaminants
- | Be safe to use (non-toxic, non-sensitising, non-allergenic)
- | Be conformable and mouldable
- | Have good absorption characteristics (for exuding wounds)
- | Be impermeable to micro-organisms
- | Be acceptable to the patient, eg, provide pain relief
- | Be cost effective
- | Be sterile
- | Be available in a suitable range of forms and sizes

— TISSUE ADHESIVES

Tissue adhesives contain cyanoacrylate compounds, including bucrylate, enbucrylate and mecrylate, which polymerise in an exothermic reaction on contact with a fluid or basic substance, forming a strong, flexible, waterproof bond; in rare cases, the heat may burn. Examples of tissue adhesives are Dermabond, Epiglu, Indermil and Liquiband. They are used for simple lacerations that otherwise might require the use of fine sutures, staples or skin strips producing similar cosmetic results to suturing. This is a needleless and, except in the rare instances mentioned when the heat may burn, painless method of wound repair which does not require follow-up visits for suture removal.

In minutes,
adhesives provide the strength of
approximated healed tissue seen at seven
days

In minutes, adhesives provide the strength of approximated, healed tissue seen at seven days. Special care is required to ensure that the wound edges are well apposed so that no adhesive passes between the wound edges; after application, wound edges are held together for at least 30 seconds. In the event of accidental adhesion of the skin or lips, the bonded surfaces should be immersed in warm soapy water, the surfaces peeled or rolled apart with the aid of a spatula, and the adhesive removed from the skin with soap and water. There have been no reports of toxicity or carcinogenicity when used topically. Adhesives should not be used on hands or over joints

because repetitive movement or washing will cause the adhesive to peel off.

— BARRIER FILMS

Barrier films, such as Cavilon, Comfeel skin care and Superskin, are protective polymers dissolved in a fast-drying carrier solvent which, ideally, should be non-cytotoxic, be pain-free on application to broken skin, protect skin from moisture and urine, protect from skin stripping, and be compatible with clothing. Following application, the solvent quickly evaporates, leaving the polymer on the skin. All of the newer barriers are considerably more expensive than the traditional barriers such as Conotrane, Sudocrem, Drapolene, Metanium (it is doubtful if traditional barriers are more effective than traditional zinc ointments).

— SILVER DRESSINGS

Silver metal and its salts have antibacterial properties and are found within different groups of dressings, such as deodorisers, films, foams and antimicrobials. Possible reasons for the antibacterial effects of silver are:

- | Interference with bacterial electron transport
- | Binding to DNA of bacteria and their spores, thus increasing the stability of the double helix and impairing cell replication
- | Cell membrane interaction — structural and receptor function damage
- | Formation of insoluble and, by implication, metabolically ineffective compounds⁶

The ideal silver dressing will contain a concentration of silver to exert an effective antibacterial effect with limited opportunity for systemic absorption. Silver compounds may react with environmental pollutants to form black silver sulphide, giving the skin a general grey discoloration (argyria) which is largely a cosmetic problem.⁷ Prolonged use of silver nitrate solutions are more likely to cause this than silver dressings. There are no reports of argyria caused by modern wound dressings containing silver.

Silver dressings include Acticoat products, Actisorb Silver 220, Arglaes, Avance products and Flamazine, as well as silver nitrate solution itself.

— DEODORISERS

Odour-absorbing dressings (deodorisers) are suitable for discharging, purulent and contaminated wounds complicated by bacterial infection and offensive odour. Most of the traditional deodorisers contain activated charcoal, which reduces the offensive odour. Actisorb is the only activated charcoal product containing silver that is available in the Drug Tariff. The silver component inhibits bacterial growth in the dressing. A list of odour-absorbing dressings can be seen in Panel 2.

Metrotop gel is a clear, colourless gel containing metronidazole 0.8 per cent w/v in an aqueous hypromellose base. Anabact contains metronidazole 0.75 per cent. They are indicated for the treatment of malodorous fungating tumours, gravitational ulcers and pressure sores because they are active against anaerobic bacteria associated with the pungent smell. They are used once or twice daily as necessary. There is a possibility that the use of topical metronidazole may induce antibiotic resistance. Thus, topical use should be restricted to malodorous fungating tumours until more experience is gained in its use. The switch from oral to topical metronidazole in the treatment of malodorous wounds seems to have occurred on the basis of few reliable data.⁸ Metronidazole gel has not been compared with tablets for efficacy, speed of action or patient preference.⁹

Metrogel, Noritate, Rozex and Zyomet are licensed for treating acute inflammatory exacerbation of acne rosacea and not for deodorising wounds. These products are considerably more expensive and should be prescribed using brand names.

Sugar pastes are also effective in deodorising wounds. They are made from caster sugar, icing sugar (additive free), polyethylene glycol and hydrogen peroxide. Thin sugar paste can be instilled into wounds with small openings, using a syringe and quill. Thick sugar paste can be packed into wounds with large openings. Twice daily (or more frequent) packing of wounds is necessary. Sugar may exert its antibacterial effect by competing for the water present in the cells of bacteria.

FOAMS

Panel 2: Deodorisers

Actisorb Silver 220
Anabact
Carboflex
Carbonet
Carbopad VC
Clinisorb
Denidor
Lyof foam C
Metrotop Gel
Sugar paste

Panel 3: Foams

Allewyn range
Avance range
Biatain
Cavi-Care
Flexipore
Lyof foam range
Lyosheet
Spyrosorb
Tielle range
Transorbent
Trufoam

Foams consist of polyurethane foam or polyurethane foam film with or without adhesive borders. Examples are shown in Panel 3. Most are suitable for use on light to medium exuding wounds except Tielle Lite which is for lightly exuding to non-exuding wounds. Many foams can be left in place for about seven days depending on exudate volume. Foams are not recommended for dry superficial wounds. Besides the usual range of sizes, anatomically shaped dressings are available for the sacrum (Allewyn, Lyof foam Extra, Tielle) and heel (Allewyn).

Allewyn cavity wound dressing is designed to overcome the problems associated with dressing deep wounds and is available in circular and tubular shapes. It can remain in place for up to five days. Avance is a silver impregnated polyurethane foam film dressing. Lyof foam can be used as a non-traumatic method of reducing hypergranulation tissue.¹⁰

ALGINATES

Algisite M, Algosteril, Melgisorb and Sorbalgon are the most recent additions to the alginate group. SeaSorb was formerly called Comfeel; SeaSorb and Tegagen was formerly called Tegagel. A recent innovation is the addition of cavity dressings such as packing (Melgisorb, Sorbsan), rope (Algisite M, Algosteril, Kaltostat, Sorbalgon T, Tegagen), ribbon (Sorbsan) and filler (SeaSorb).

Alginate dressings are manufactured from different varieties of seaweed. Alginic acid consists of a polymer containing mannuronic and guluronic residues. Alginates rich in mannuronic acid (like Sorbsan) form soft, flexible gels, whereas those that are rich in guluronic acid (like Kaltostat) form firmer gels. Some dressings contain calcium alginate fibre (Algisite M, Sorbsan and Tegagen) and others contain sodium-calcium alginate fibre (Melgisorb, Seasorb and Kaltostat). Comfeel Plus consists of a calcium alginate/hydrocolloid mixture. Nu-Gel and Purilon are alginate/hydrogel mixtures.

Alginates are suitable for use on medium to heavily exuding wounds and cavities.^{11, 12} They are not the dressings of choice for

infected wounds and should not be applied to dry or drying wounds, eg, necrotic tissue. Most alginates (except Comfeel Plus and Sorbsan Plus) require a secondary dressing.

HYDROGELS

Hydrogel dressings contain a large proportion of water — often more than 70 to 90 per cent. They have many of the characteristics of an "ideal" dressing. A selection of hydrogel dressings is shown in Panel 4.

They can cool the surface of the wound and this is said to be the cause of the marked reduction in pain that is reported in patients using these dressings. Most hydrogels require covering with a secondary dressing. A recent innovation has been an extension to the range of gel formulations available (marked * in the panel). Other hydrogels are available as sheet dressings. Nu-Gel and Purilon are hydrogel/alginate combinations.

Hydrogels are suitable for use on dry "sloughy" or necrotic wounds and for lightly exuding wounds. They are suitable for use at all stages of wound healing except for infected or heavily-exuding wounds. Hydrogels are an excellent alternative to chlorinated solutions, such as Eusol, for desloughing wounds.

HYDROCOLLOIDS

Hydrocolloid dressings are more complicated than hydrogels because they contain a variety of constituents such as methylcellulose, pectin, gelatin and polyisobutylene. Comfeel Plus is a hydrocolloid/alginate combination dressing. When in contact with the wound exudate, hydrocolloids slowly absorb fluid, leading to a change in the physical state of the dressing and the formation of a gel covering the wound. Thus, they are called "interactive" dressings. Hydrocolloids promote the formation of granulation tissue and provide pain relief by covering nerve endings with gel and exudate. Examples are shown in Panel 5.

Panel 4: Hydrogels

AquaForm*
Geliperm*
GranuGel*
Hydrosorb range
Intrasite Conformable
Intrasite Gel*
Novogel
Nu-Gel*
Primskin
Purilon Gel*
Sterigel*

* Gel formulation

Panel 5: Hydrocolloids

Aquacel
Askina Biofilm Transparent
Combiderm range
Comfeel range
Cutinova range
DuoDERM Extra Thin
Granuflex range
Hydrocoll range
Replicare Ultra
Tegasorb range
Urgotul
Versiva

The selection of dressings is becoming more technical as semi-permeable, thin semi-permeable and fibrous forms of hydrocolloids are marketed with or without adhesive borders. Depending on the choice of product, hydrocolloids are suitable for the treatment of acute and chronic wounds, for desloughing, and for light to medium or medium to heavily exuding wounds. They are not suitable for infected wounds. Initially, dressings may need to be changed daily but once the exudate has diminished, dressings may be left in place for up to seven days. Except for Aquacel and Urgotul, the hydrocolloids are waterproof and require no secondary dressings, thus allowing patients to bathe or shower.

VAPOUR-PERMEABLE FILMS

Vapour-permeable films (formerly known as semi-permeable films) are sterile, thin films allowing the passage of vapour through them. Examples of vapour-permeable films are shown in Panel 6. Most products in this group are coated with hypoallergenic adhesive. They are the most flexible of the products because they can mould around elbows, heels and sacral areas. The products differ in terms of vapour permeability, adhesiveness, conformability and extensibility. Some products are transparent and tend to cool the surface of the wound, which may not be desirable. Excessive exudate may accumulate as a bubble under the film.

Films are only considered suitable for relatively shallow wounds. Films are also used prophylactically to prevent pressure ulcers, as retention dressings, eg, for cannulas and for operative surgery as sterile drapes. Some dressings incorporate a grid system on the upper layer of the film which can be used for mapping wound size and producing a permanent record.

LOW-ADHERENT DRESSINGS

Examples of low-adherent dressings are shown in Panel 7. Some low-adherent dressings are claimed to be non-adherent. Most are suitable for use on dry wounds or

on lightly exuding wounds, and need to be secured with bandages or adhesive tapes. A secondary dressing is required when low-adherent dressings are used on medium to heavily exuding wounds. Some dressings are suitable for medium to heavily exuding wounds, eg, Mepitel, Mesorb and Mepore.

Low-adherent dressings are the modern alternative to traditional dressings such as cotton wool, gauze, and lint which fail to meet many of the characteristics of an "ideal" dressing. This is because they allow strike through, shed fibres into the wound, adhere to the wound base and dehydrate the wound. Traditional dressings should only be used on clean, dry wounds or as secondary dressings for their absorbent and protective functions.

POLYSACCHARIDES

Polysaccharides are found in Debrisan, Iodosorb and Iodoflex products.

Debrisan products are suitable for sloughy, exuding wound cavities. Debrisan beads consists of sterile, spherical beads of dextranomer, which are not biodegradable. Rinsing away the soiled beads can be difficult and the advised method of application of the paste is cumbersome.

Iodosorb powder and ointment contain hydrophilic beads of cadexomer impregnated with elemental iodine and are suitable for infected, exuding cavities. Cadexomer is a modified starch hydrogel, which is biodegradable. Dressings should be changed frequently when saturated with exudate, indicated by a loss of colour of the iodine. The powder should be changed daily and the ointment three times per week.

Iodoflex consists of sterile cadexomer iodine paste sandwiched in protective gauze. This is changed two or three times per week or when there is a loss of colour.

Generally, ointments and pastes are more convenient to use than powders, beads or granules which can be difficult to contain within certain types of wounds.

PASTE BANDAGES

Paste bandages are suitable for treating skin conditions associated with leg ulcers, eg, eczema, inflammation. They act as a buffer between fragile, inflamed skin and

Panel 6: Vapour-permeable

Alldress
Arglaes
Bioclusive
C-View
Cutifilm
Hydrofilm
Mefilm
OpSite Flexigrid range
Tegaderm

Panel 7: Low-adherent dress-

Absorbent, perforated plastic film-faced dressings:
Cutilin
Interpose
Melolin
Release
Skintact
Solvaline N
Telfa

Absorbent, perforated dressing with adhesive border:
Cosmopor E
Medipore + Pads
Mepore (Ultra)
Primapore
Sterifix
Telfa Island

Knitted viscose primary dressing:
N-A (Ultra)
Paratex
Primary
Setoprime
Tricotex

Other dressings:
Cuticerin
Cutiplast
Drisorb
Ete
Melolite
Mesorb
Metalline

compression bandages, and are able to absorb exudate and deslough wounds. However, many patients are sensitive to some of the constituents of paste bandages, such as parabens preservatives, so it is advisable to patch test the patient with a small strip of bandage over at least 48 hours.

Zinc paste bandages (Steripaste, Viscopaste PB and Zincaband) are protective, soothing applications for reddened, irritated skin. Steripaste has a preservative-free formulation. Zipzoc is a rayon stocking impregnated with a preservative-free zinc oxide ointment.

Ichthammol bandages (Ichthopaste, Ichtaband) can be used to soothe irritated skin when tar is not tolerated. Coal tar bandages (Coltapaste, Tarband) are useful for their anti-inflammatory and mild antiseptic properties. Calaband (containing calamine) is emollient and soothes irritated fragile skin, while Quinaband contains both calamine and clioquinol and acts as an antibacterial and deodorant.

These traditional bandages have the advantage that they can be left in situ for one to two weeks before a dressing change is required. When used on legs, paste bandages are applied loosely from the base of the

Table 2: Some multi-layer compression bandaging kits

Kit	Components	Description
K-Four	K-Four 1 (K-Soft)	Subcompression wadding bandage
	K-Four 2 (K-Lite)	Knitted elastomer and viscose bandage with light support
	K-Four 3 (K-Plus)	Knitted elastomer and viscose bandage with light compression
	K-Four 4 (Ko-Flex)	Cohesive bandage
Profore	Tricotex	Knitted viscose primary dressing for wound contact
	Profore 1 (Soffban Natural)	Subcompression wadding bandage
	Profore 2 (Soffcrepe)	Cotton, polyamide and elastane bandage
	Profore 3 (Litepress)	Knitted elastomer and viscose bandage
	Profore 4 (Co-Plus)	Cohesive bandage
	Profore Plus (Tensopress)	Viscose, elastane and cotton high compression bandage
Profore Lite	Low compression bandage	
System 4	Setoprime	Knitted viscose primary dressing for wound contact
	System 4 1 (Softexe)	Subcompression wadding bandage
	System 4 2 (Setocrepe)	Cotton, polyamide and elastane bandage
	System 4 3 (Elset)	Knitted elastomer and viscose bandage
	System 4 4 (Coban)	Cohesive bandage
Ultra Four	Ultra Four 1 (Sohfast)	Subcompression wadding bandage
	Ultra Four 2 (K-Lite)	Knitted elastomer and viscose bandage with light support
	Ultra Four 3 (K-Plus)	Knitted elastomer and viscose bandage with light compression
	Ultra Four 4 (Cohfast)	Cohesive bandage

toes to below the knee or applied in short strips. They are not compression bandages but are usually applied between a wound con-

tact dressing and a compression bandage (for venous ulceration).

— TULLES

Advertisement

Non-medicated tulle can be used for clean, superficial wounds, such as dermabrasion or partial thickness burns. Tulle (except Atrauman) contain different weights of paraffin per unit area and can be described as either light loaded (Paranet, Paratulle, Unitulle) or normal loaded (Jelonet). Paraffin reduces the adherence of the dressing to the wound. Atrauman does not contain paraffins. The dressings require frequent changes in order to avoid drying out and incorporation into granulation tissue. Secondary dressings are always required.

Medicated tulle dressings (Sofra-Tulle, Serotulle and Bactigras) have been used for infected, superficial wounds but are not now generally recommended. The use of Sofra-Tulle, which contains lanolin and the antibiotic, framycetin, is declining in wound care because there is a risk of skin sensitisation and absorption which can lead to systemic toxicity.

Bactigras and Serotulle are similar products and contain 0.5 per cent chlorhexidine. Their antibacterial efficacy has not been established.

MULTI-LAYER BANDAGES

Multi-layer compression bandaging kits are used to apply compression in the treatment of venous ulceration. Examples are shown in Table 2 (p265). Typically, components of a multi-layer bandaging system are applied over a wound contact layer (primary dressing) and consist of:

First layer The first layer typically consists of a natural wool layer which is a subcompression wadding bandage and which is used to absorb exudate and redistribute pressure around the ankle. This layer is applied in a loose spiral, eg, Soffban, Softex or Soffast.

Second layer The second layer is usually a crepe bandage which increases absorbency and smoothes the orthopaedic wool layer. It is applied in a spiral, eg, K-Lite, Setocrepe or Soffcrepe.

Third layer The third layer is typically a light compression bandage, eg, Elset, K-Plus or Litepress.

Fourth layer The fourth layer is usually an elastic, cohesive bandage which keeps the four layers in place, eg, Coban, Cohfast or Coplus.

There are specific systems designed for ankle circumferences less than 18cm, 18 to 25cm, 25 to 30cm and greater than 30cm. The four-layer systems can be left in place for up to a week. Multi-layer bandaging systems are a suitable option for patients with venous ulcers but all patients require a thorough assessment. They are widely used but there is

no randomised, controlled trial information available comparing two-layer, three-layer and four-layer systems. However, the routine application of layered compression therapy can improve healing rates for venous leg ulcers. An "Effective health care bulletin" summarises the results of research on the effectiveness and cost-effectiveness of different forms of compression in the treatment of venous ulceration, on interventions to prevent recurrence, and on methods of diagnosing venous ulceration.¹³

MISCELLANEOUS PRODUCTS

The most useful miscellaneous products are solutions of normal saline, eg, Irriclen, Normasol, and Steripod Saline. These are used to cleanse and irrigate wounds as alternatives to topical antiseptics and antibiotics. Api-Ban is a manuka honey dressing. Wound drainage pouches are useful to drain exudate — ConvaTec for high volumes of exudate and Oakmed for low volumes. Vacutex is a highly absorbent, capillary dressing used to manage high levels of exudate. Regranex Gel is the first preparation containing growth factor to be licensed as an adjunctive treatment for diabetic ulcers. It contains becaplermin (recombinant human platelet-derived growth factor).

FUTURE DEVELOPMENTS

Inevitably, new products will continue to become available in hospitals and in the Drug Tariff, offering a larger range of sizes and shapes, eg, shaped sacral and heel products. Many products will be made available with and without borders, bevelled edges and adhesive. There will be extensions to the present range of products, eg, collagens, membranes and skin substitutes; some existing products may be deleted for wound care, eg, antiseptic and antibacterial products. There will be an increased interest in biosurgical research using leeches and maggots (see Panel 8). It should only be a matter of time before they are added to the Drug Tariff.

Finally, more research and clinical trials are needed. After a thorough assessment of the patient and wound type, the best existing advice is to select the cheapest product having the most ideal characteristics. At present, it is impossible to select, for example, the best hydrocolloid, alginate or hydrogel, or to state that a particular dressing in one group is better than one in another for a particular wound type. Thus, there is a need for evidence-based information to aid selection of the most appropriate wound management product. This is particularly important for nurse prescribers¹⁴ because most wound management products are in the nurses' formulary.

Panel 8: Further reading

Morgan DA. Formulary of wound management products, 8th ed. September 2000 (booklet). Available from Euromed Communications, Old Surgery, Liphook Road, Haslemere, Surrey DU 27 1NL (tel: 01428 656665) at £7.95 (include p&p). Updates to this edition are regularly posted on the Euromed website: www.euromed.uk.com/formulary
Surgical Materials Testing Laboratory website: <http://www.smtl.co.uk> (Accessed 17 September 2002.)
Biosurgical Research website: <http://www.smtl.co.uk/WMPRC/BioSurgery/index.html> (Accessed 17 September 2002.)

REFERENCES

1. Department of Health and National Assembly for Wales. Drug Tariff. London: Stationery Office, September 2002.
2. British National Formulary. London: British Medical Association and the Royal Pharmaceutical Society of Great Britain. September 2002.
3. Morgan DA. Formulary of wound management products, 8th ed. (booklet). Haslemere: Euromed Communications, September 2000.
4. Singer AJ, Clark RAF. Cutaneous wound healing. *New Engl J Med* 1999;341:738-46.
5. Mulder GT. The role of tissue engineering in wound care. *J Wound Care* 1999;8:21-4.
6. Thurman RB, Gerba CP. The molecular mechanisms of copper and silver ion disinfection of bacteria and viruses. *Critical reviews in environmental control* 1989;18:295-315.
7. Payne CMER, Bladin C, Colchester ACF, Bland J, Lapworth R, Lane D. Argyria from excessive use of topical silver sulphadiazine. *Lancet* 1992;340:126 (letter).
8. Hampson JP. The use of metronidazole in the treatment of malodorous wounds. *J Wound Care* 1996;5:421-6.
9. Metronidazole gel for smelly tumours. *Drug Ther Bull* 1992;30:18-9.
10. Harris A, Rolstad BS. Hypergranulation tissue: a non-traumatic method of management. In: Harding KG, Cherry G, Dealey C, Turner TD, editors. Proceedings of the 2nd European conference on advances in wound management; 1992 Oct; Harrogate. London: Macmillan Magazines Ltd, 1993:35-7.
11. Morgan DA. Alginate dressings. Part 1: Historical aspects. *J Tissue Viabil* 1997;7:4-9.
12. Morgan DA. Alginate dressings. Part 2: Product guide. *J Tissue Viabil* 1997;7: 9-14.
13. NHS Centre for reviews and dissemination, University of York. Compression therapy for venous leg ulcers. *Effective Health Care Bulletin* 1997; 3:1-12.
14. National Prescribing Centre. Modern wound management dressings. *Prescribing Nurse Bulletin* 1999;1:5-8.