Australian Government

Department of Veterans' Affairs

Wound Care Module

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DVA Wound Care Module

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Disclaimer:

Information contained on the website, chart and module are advisory only. Any suggestions should be used in conjunction with clinical knowledge and skills.

NB: The products listed in the website, chart and module are examples only and are listed on the Repatriation Schedule of Pharmaceutical Benefits at the time of publication. For more information see www.pbs.gov.au/browse/rpbs.

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1.Introduction

1.1 What is wound care?

Wound care is “the provision of the appropriate environment for healing by both direct and indirect methods together with the prevention of skin breakdown”[1]. In other words, wound care means more than just putting a dressing onto a wound. It means looking into the patient’s general health, lifestyle and factors that might slow healing down.

1.2 What is a wound?

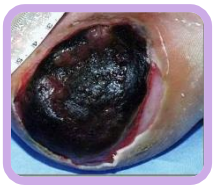
A wound is a physical injury to the body consisting of:

- a laceration or breaking of the skin or mucous membrane;
- an opening made in the skin; or
- a membrane of the body incidental to a surgical operation or procedure.

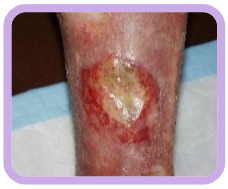
Wounds may be acute or chronic trauma resulting from an injury where, because of a number of factors, the injury does not heal. Acute wounds may be a planned or unplanned event, and healing typically proceeds in an orderly and timely fashion. Examples of acute wounds include a cut, graze or burn. Examples of chronic wounds include leg ulcers, pressure injuries and diabetic wounds.

1.3 Common types of wounds

NON-DIABETIC BLACK NECROTIC WOUND



YELLOW NECROTIC WOUND WITH HIGH EXUDATE



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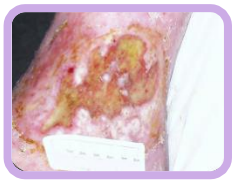
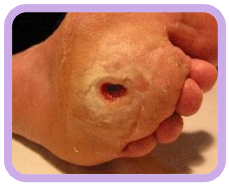
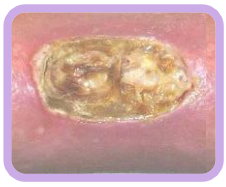


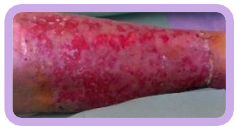
CAVITY WOUND WITH HIGH EXUDATE



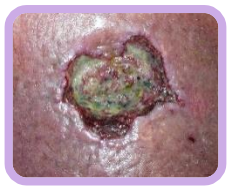
EXUDATING WOUND WITH SLOUGH AND CLINICAL SIGNS OF INFECTION



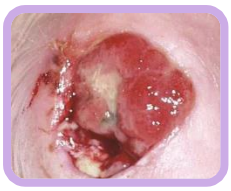
SUPERFICIAL WOUND WITH CLINICAL SIGNS OF INFECTION



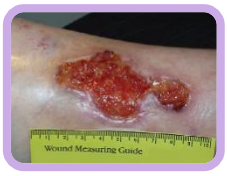
MALODOROUS WOUNDS



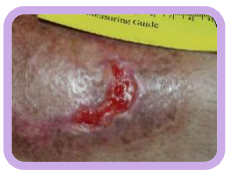
CAVITY WOUND WITH LOW EXUDATE



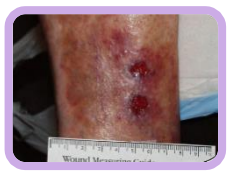
SUPERFICIAL GRANULATING WOUND WITH HIGH EXUDATE



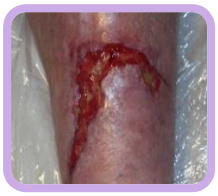
SUPERFICIAL GRANULATING WOUND WITH LOW EXUDATE



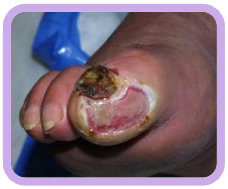
EPITHELIALISING



SKIN TEARS

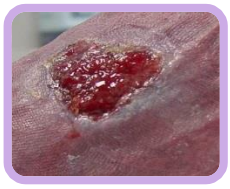


NEUROPATHIC DIABETIC WOUND



ISCHAEMIC DIABETIC WOUND

HYPERGRANULATING WOUND



This dressing selection chart is a guide only and does not replace clinical judgement or constitute endorsement of any dressing, product or organisation.

For specific instructions regarding use of dressings, always refer to manufacturer's guidelines.

2. General overview of wounds

2.1 Acute wounds

Acute wounds show the following characteristics:

- higher risk of infection if there is debris in the wound
- inflammation
- healing by primary intention
- may require antiseptic use if wound contaminated

2.2 Chronic wounds

Chronic wounds show the following characteristics:

- lower risk of infection with the exception of diabetic wounds
- symptom of an underlying condition
- healing by secondary intention
- not sterile
- devitalised tissue.

2.3 Complex and chronic wounds

A large proportion of wounds seen in clinical practice are chronic in nature. Epidemiological studies indicate one percent of the population has a chronic wound, and of that group some twenty percent have had the wound for more than two years. Further studies indicate the level of chronic wounds in older patients is considerably higher 2.

Chronic wounds may be classified into the following groups:

- Leg ulcers
- Pressure Injury
- Neoplasia (Cancer)
- Chronic infected wounds
- Diabetic wounds

The difficulty in the management of any chronic wound is that there is always an underlying physiological cause of the wound which must be treated, but many patients have multi-factorial issues and co-morbidities. For best results the basic cause of the problem must be addressed, and any negative factors altered.

It must be understood that some patients may never heal due to the basic pathophysiology of the disease process and the inability to alter some or all of the major factors influencing the non-healing wound. However, even in the most extreme cases, effective wound care can assist in minimising the worst effects of such chronic wounds.

3. Healing

3.1 How does the body heal?

There are three phases of wound healing:

- inflammatory (destructive)
- proliferative (regenerative)
- maturation (reparative)

During these phases there are a number of cells essential to the process of healing including platelets, neutrophils, macrophages and fibroblasts.

Some of the cells are present from the beginning of the wound healing process, through to the ultimate healing of the wound.

The phases of healing are a continuum. Each phase continues in a steady process merging with the next phase. In fact, one wound may be in more than one phase at one time.

3.2 Phases of healing

3.2.1 The inflammatory phase

When a wound is created (through surgical, traumatic or other means), an inflammatory response takes place. This phase is the shortest and involves:

- bleeding
- clot formation by platelets
- haemostasis from the clotting process
- production of wound exudate

Wound exudate has an important role in wound healing. It nourishes the tissues and flushes out foreign debris and necrotic tissue from the wound. It is also a support medium for antibodies and enzymes, which destroy non-viable tissue and cleanse the wound, and growth factors which are important to the healing cascade.

Notably, during this phase the wound can be red, hot, sore and swollen. This does not always indicate infection, and can represent the inflammatory process itself. It is not always necessary to apply topical antiseptics or antibiotics during this phase.

If the inflammatory phase is impaired or prolonged, it can prevent the onset of the proliferative and maturation phases. In turn, this may lead to fibrosed tissue. Factors that can slow the inflammatory phase are:

- presence of foreign material
- necrotic tissue
- clinical infection
- excessive antimicrobial use
- continued disruption of the wound
- skin dryness
- poor blood supply
- thermal shock

3.2.2 The proliferative phase

During the proliferative phase a new vascular bed is formed to provide oxygenated blood to the wound, and the wound fills with granular tissue. The proliferative phase consists of:

- Granulation

  Granulation tissue, which in part contains fibroblasts, forms in the wound. The fibroblasts lay down collagen, which is the essential framework for the connective tissue. Collagen is produced over a period of weeks, after which time no new collagen is produced.

- Contraction

  As the connective tissue fills the wound, contractile cells (myofibroblasts) pull the wound margins together.

- Epithelialisation

  Once the wound has filled with granulation tissue and contracted, epidermal cells grow and cover the surface of the wound. This process is most efficiently completed in a moist, clean environment.

3.2.3 The maturation phase

The maturation phase is the final stage of healing. During this stage the fibroblasts decrease in number and vascularisation decreases. The existing collagen then realigns itself by cross-linking, which importantly increases the tensile strength of the wound. At this stage the wound may have achieved surface closure; however, its tensile strength may take up to 12 months to develop. Wounds that are lacking in tensile strength, have an increased risk of breakdown.

3.2.4 Moist wound management

Traditionally, it has been thought that wounds should be kept clean and dry, through exposure to air and sunlight. Another theory was that wounds with a tissue cavity should be packed with dry gauze and covered with a dry dressing. However, the disadvantages of this method are:

- Scab formation

  Scabs create a physical barrier to healing because the epidermal cells cannot move through the formed scab.

- Air exposure

  Exposure to air reduces the surface temperature of the wound causing peripheral vasoconstriction, which reduces blood flow (carrying oxygen and nutrients) to the wound and delays healing.

- Wound packing with dry gauze

  This can impair healing as the dressing adheres to the surface of the wound causing it to dry out.

- Covering the wound with a dry dressing

  Wounds covered by dry dressings may traumatise the surface of the wound on removal.

The current practice is to allow wounds to heal under moist conditions. The advantages of moist wound healing are:

- Prevention of scab formation

  Wounds covered by an occlusive dressing do not form a scab, so epidermal cells are able to move rapidly over the surface of the dermis through the exudate which collects at the wound/dressing interface.

- Hydrating environment

  The application of a totally occlusive or semi-permeable dressing to the wound can also prevent secondary damage as a result of dehydration.

- Presence of exudate

  Exudate found in moist wounds has now been shown to assist with the autolytic debridement of wounds. It carries a number of growth factors essential to the healing of wounds, protects granulation and encourages epithelialisation of wounds.

3.3 Control factors affecting healing

Most wounds heal readily whereas others are slow or remain unhealed for a considerable length of time. There are a number of factors which affect the healing of a wound, and these factors are both intrinsic and extrinsic.

3.3.1 Intrinsic factors

Health status

Good circulation, both arterial and venous, is essential for good wound healing. Anaemia, regardless of type, reduces the capacity of the blood to provide oxygen to the tissues, since haemoglobin transports oxygen to the cells.

Immune function

Normal immune system function is required for the inflammatory phase of healing. A reduction in immune function slows the cleansing of the wound bed and reduces the ability of the body to fight invading pathogens. This is likely to be due to a reduction of the number and activity of the white blood cells.

Diabetes

Diabetes is one of the major problems for chronic wounds. Diabetic patients have a delayed capillary response to injury, reduced cellular function at the injury site, and defects in collagen synthesis and wound strength. Hyperglycaemia caused by reduced insulin availability and increased insulin resistance appears to be a major predisposing factor in delaying healing in diabetic patients.

Age factors

As we age our skin and tissues change. We lose the sensory cells, as well as the secretory cells which are so essential for the maintenance of skin moisture and flexibility. We lose vasculature within the skin, and hair follicles. The skin becomes thinner, dryer, and far more prone to destruction – whether by physical or by chemical means.

Body build

Because of the adipose tissue being poorly vascularised, an obese patient will have a great deal of trouble healing due to the inability to deliver oxygen and nutrients to the wound site. Underweight individuals may also experience difficulties in the healing process.

Nutritional status

Nutrition is one of the most important factors in the healing of wounds. Proteins, carbohydrates, fats, vitamins, trace elements and fluids all play a vital role in wound repair. Research has shown that amino acids (e.g. arginine), when given as a supplement, will improve the rate of wound healing.

Psychological Status

Psychosocial factors are now believed to be a significant component in wound healing. Depression reduces self-care behaviour and poor self-care has a detrimental effect on wound healing.

3.3.2 Extrinsic factors

Mechanical stress

When a patient is immobile and pressure is exerted locally, localised microvascular ischaemia will occur. This occurs particularly when pressure is exerted over a bony prominence for more than two hours, at a pressure exceeding 30 mm of mercury. This will ultimately lead to tissue destruction both at the surface and deeper into the wound, leading eventually to a pressure sore. Equally, shearing forces and friction occur when the tissue below the skin is forced to move while the skin itself is restrained by contact to a surface, such as the bed sheet. This is particularly evident in the patient's heels.

Debris

Debris –whether slough, eschar, scab, wound dressing residue, gauze fibres or sutures– will impede wound healing. Their presence will prolong the inflammatory phase, as well as predisposing the wound to infection. Debris should be removed, either surgically or by the use of hydrogels, proteolytic enzymes or hydrocolloids.

Temperature

The optimum temperature for the growth of human cells is 37 degrees centigrade. It is therefore essential to maintain the wound environment at body temperature. A drop in body temperature will lead to peripheral vasoconstriction- affecting the flow of blood through the wound- and will markedly reduce the activity of growth factors and proteases.

Desiccation

If a wound dries, healing is either delayed, or will cease. Exposed, dry wounds are more inflamed, painful, itchy, and have more scab material during the early stages of wound healing.

Maceration

Maceration may be due to incontinence, perspiration or excessive exudation. Maceration will cause the destruction of tissue and slow the healing process. It is essential to maintain the moist environment without excessive exudation.

Infection

All wounds will have some level of bacterial colonisation; however, this does not mean the wound is infected. The presence of erythema, discharge, fever, pain with elevated white blood cell count, and sometimes odour, is evidence that the wound is infected. If clinical signs of infection are present, the use of systemic antibiotics is mandatory. If there are no clinical signs of infection, there is little reason to use either systemic or topical antibiotics. An exception to this may be the use of very specific topical antibiotics in very specific cases to reduce the level of bacteria in wounds of compromised patients (e.g. the use of topical metronidazole in anaerobic colonised wounds). In general swabs will provide very little help in establishing if a wound is infected leading to overuse of antibiotics.

Chemical stress

Iodine, peroxide, chlorhexidine, alcohols, hypochlorites and acetic acid are commonly used antiseptics and cleansing agents. Use of these agents is often responsible for delayed healing, since they are non-selective in their activity and will kill healthy cells as well as bacteria. It is preferable to avoid the prolonged use of these products on a granulating wound. Their use in infected wounds is somewhat dubious. Research has shown that although they may reduce the surface load of bacteria in an infected wound, they do not penetrate below the surface. Therefore, they have no real effect on the infection in the tissue itself. They may be of use in dilute forms when applied to some chronic wounds and left in place for no more than five minutes before washing off.

Systemic medications

The effects of systemic medications on the healing wound vary greatly. We commonly see medicines prescribed for a condition which is unrelated to the wound, but may have side effects which could either inhibit or stimulate healing. Medications can therefore be divided into two groups: stimulatory drugs and inhibitory drugs. Stimulatory drugs affect the inflammatory response, epithelialisation, fibroblast activity, fibrinolysis, and cell stimulation; whereas inhibitory medications affect tensile strength, cell activity, capillary proliferation, and fibroplasia.

Lifestyle Factors

Alcohol

Excessive and/or chronic alcohol intake can lead to health problems affecting wound healing. Alcohol-induced digestive problems may lead to malnutrition and anaemia. Liver damage can result in chronic disturbances due to a reduction in platelet levels, and subsequent circulatory damage that may reduce the blood flow that is required for wound healing.

Smoking

The adverse effects of smoking and the potentiation of cancer in various parts of the body have been understood for many years. However, it is clear that the toxic constituents of smoking such as nicotine, carbon monoxide and cyanide have a dramatic and inhibiting effect on healing. Nicotine will diminish red blood cells, fibroblasts and macrophages, and increase platelet adhesiveness. This will produce cutaneous vasoconstriction. Carbon monoxide has an affinity for haemoglobin 200 times greater than that of oxygen. This will have a major effect on the oxygen-carrying capacity of the blood and may potentially lead to ischaemia. Hydrogen cyanide inhibits the enzyme-systems necessary for oxygen transport at the cellular level, as well as oxidative metabolism. Smoking can therefore be a major cause of the non-healing of wounds.

4.Wounds

4.1 Acute wounds

4.1.1 Skin tears

The ageing process will impact on most of the structures of skin. Skin loses hair follicles, sebaceous glands that supply natural moisture to the skin, receptors, blood supply and sweat glands. The result of these tissue changes is that the skin becomes thinner, brittle, avascular and more prone to injury. Skin integrity reduces with age, dermal thickness is reduced, and there is a weakened dermal-epidermal junction. The level of vitamin D, collagen and moisture is reduced. Migration of capillary epithelial cells, epidermal turnover is reduced and fragility of capillaries is increased.

The major acute wound in the ageing population are skin tears. The main causative factor is trauma from manual handling e.g. transferring from bed to chair, removing adhesive tapes, falls, cot sides and wheel chair foot plates. Identification of risk factors and the introduction of prevention strategies is essential. In particular, there is good evidence that the use of a moisturising lotion twice a day will reduce the incidence of skin tears by 50 percent. Skin tears may be classified by the Star System or Payne Martin classification.

Prevention of Skin tears

Skin tears are a very common acute wound in older patients or people with fragile skin. It is essential to identify risk factors for development of skin tears such as:

- History of previous skin tears
- Dry skin
- Dependent in activities of daily living and ageing
- Paper-thin skin.

It is essential to institute prevention programs to include:

- Choosing appropriate dressing products; silicone coated dressings are the best choice.
- Educating staff, family care-givers, and home healthcare assistants on the importance of maintaining adequate hydration and nutrition.
- Adequately hydrating dry skin with moisturising agents. Note: try to use lotions twice a day on dry skin areas and extremities.
- Dressings should be removed gently and with the use of a no sting adhesive remover if required.

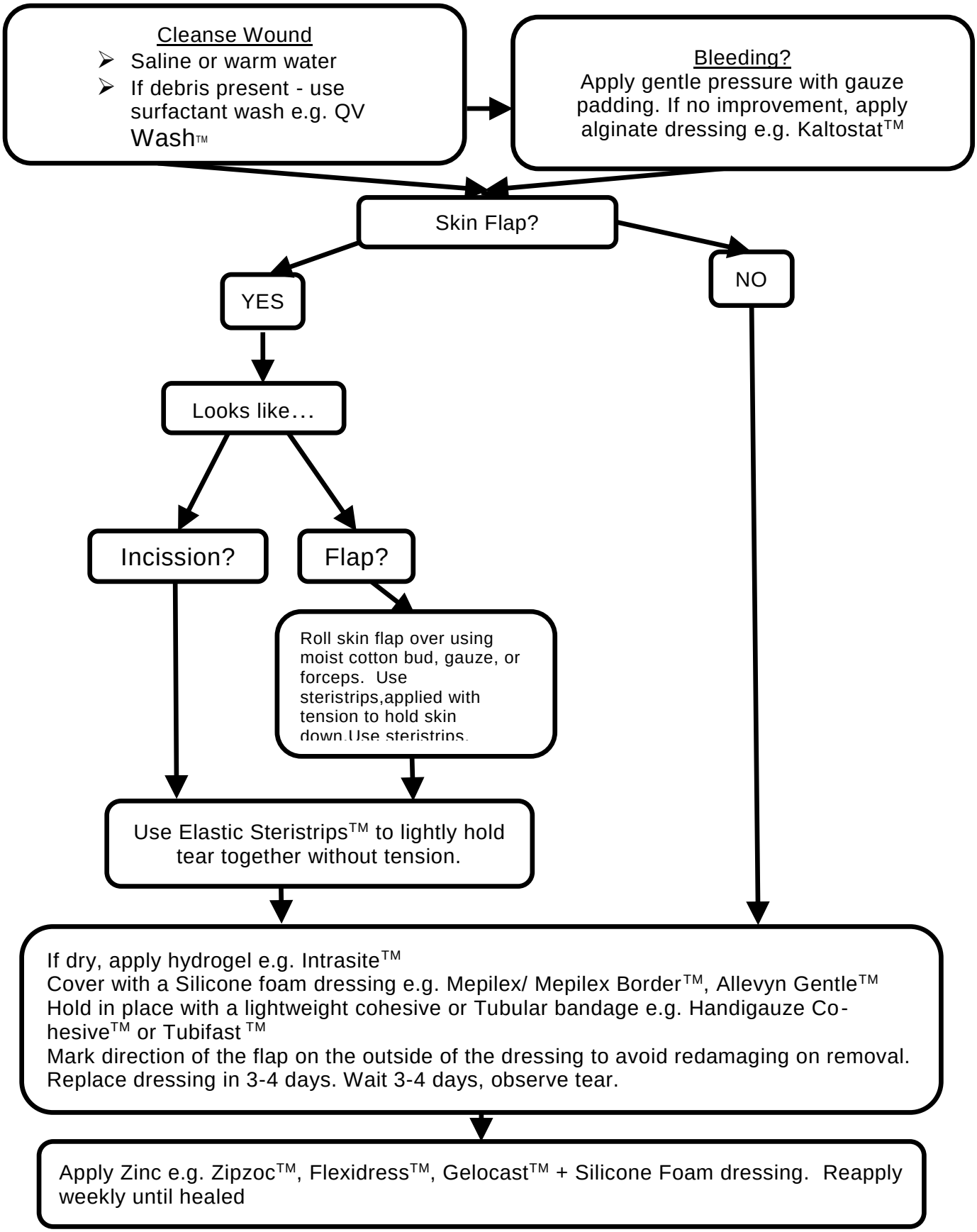
Use of emollient liquid soaps (soft, soothing, moisturising) not bar soap as they are alkaline and will further damage the skin. As a general rule do not use any adhesive products on fragile skin.

Protocol for wound management of skin tears

- Clean the wound with water or saline. If there is contamination, use a surfactant wash product (e.g. QV Wash™) to help remove any debris.
- If bleeding, apply gentle pressure with a piece of gauze padding, if unsuccessful then apply a haemostatic alginate dressing (e.g. Kaltostat®) to aid in haemostasis.
- If there is major separation of the skin edges, apply an elastic sterile strip, preferably 3-4mm in width to several parts of the skin tear to hold the skin flap in place.
- If injury occurred with contamination apply a low strength povidone iodine solution to the wound, leave in place for 3 minutes and then wash off.
- Apply a small amount of an amorphous hydrogel (e.g. IntraSite Gel™) to the peri wound.
- Cover with a foam dressing, silicone coated are best. Draw the direction of the flap on the outside of the dressing to prevent reinjury on removal (e.g. Lyofoam Max™, Allevyn™, Mepilex®).
- Hold in place with a light weight cohesive bandage, or light weight tubular bandage

This system is left in place for 4 to 5 days at which time the dressing is removed, the wound cleaned and the system replaced. After the next 4-5 days the dressing is removed and replaced with a patch of non-preserved zinc paste bandage (e.g. Gelocast®, ZipZoc™). This is then covered with foam and held in place with a lightweight cohesive bandage (e.g. Handygauze cohesive ™) and left for seven days. Upon removal the wound should be healed. If not, then repeat the zinc paste patch dressing system for a further seven days.

Flow Chart Skin Tear Management



4.1.2 Difficult wounds (i.e. animal or insect bites)

- Clean
- Decontaminate
- Dress

NB. May need systemic antibiotics as infection may be due to atypical micro-organisms.

4.1.3 Post-operative wounds

- Dress over sutures with a film or thin hydrocolloid. Leave in place for 2-3 days or remove if exudate is high or bleeding, or pain or odour is present.
- If exudating apply an island film or an island foam dressing.
- For an open cavity wound, pack lightly with alginates or alginate alternate and/or foam.
- Use strips covered with a film dressing over the incision once sutures or clips are removed. If a hypertrophic scar is observed, then apply a silicone dressing or gel.

4.1.4 Burns

- For sunburn, apply cold running water for 20 to 30 minutes then amorphous or sheet hydrogels.
- For simple burns and scalds of partial thickness, apply cold running water for 20-30 minutes then hydrogels (either sheet or amorphous). Once burn is close to healed, apply a retention tape (e.g. Fixomull® or Hypafix®).
- In general, simple burns do not require silver dressings. If a silver dressing is considered, then use a silver impregnated dressing not a cream as creams will cause a mucilaginous film to form on the surface of the wound.

4.2 Chronic wounds

4.2.1 Ulcers

Ulcers have a number of different causes, including venous insufficiency, arterial disease, diabetes mellitus, vascular complication of auto-immune disease (such as rheumatoid arthritis), malignant disease, trauma and deliberate self-injury.

Venous ulcers

Venous ulcers result from the breakdown of the venous circulation of the leg. They are associated with the inability of the leg to force the passage of blood through the various connecting veins via the bicuspid valves by muscular contraction. Deep veins are supported by thick connective tissue and their surrounding muscle mass. Superficial veins dilate easily under sustained back pressure. Communicating veins connect the two systems. Valves, usually bicuspid, are found in all three systems and they may become damaged, thickened or may degenerate with age. Thrombosis can cause their destruction.

General features of venous ulcers

Venous ulcers are mostly found in the lower third of leg, in the gaiter area. They are usually irregular in shape, can be painful, and oedema of the lower leg is often present. The skin is often stained around the ulcer area due to hemosiderin deposition. Part of the underlying cause can be due to past fractures, trauma or a possible silent deep vein thrombosis (DVT). Skin changes such as eczema and atrophy blanche (white stippled scars on the skin) are often present. Ankle flare (distended small veins on the medial aspect of the foot) may also be seen. There may also be a history of varicose veins. The main feature is a lack of venous return caused by a malfunction of the valve system either in the deep or the peripheral system. There is often a history of obesity, past DVT, and/or poor mobility resulting in venous stasis. Venous leg ulcers are usually painless, irregular in shape, and may have copious exudate.

The treatment for venous incompetence includes surgery in some cases; however, the main stay of treatment is the application of compression therapy- toe to knee 30-40mmHg at the ankle. It is, however, essential to exclude arterial involvement. Exercise should be encouraged and occupational factors such as long periods of standing which leads to venous stasis, should be avoided.

Ischaemia, or arterial ulcers

The death of skin automatically follows occlusion of its arterial blood supply unless this occlusion is gradual enough to allow a collateral blood supply to be established. Atheroma (thickening) is the most common cause of arterial ulcers of an ischaemic nature. The loss of arterial circulation may be due to extramural strangulation. Scar tissue or other factors may cause strangulation of the arterioles, or fibrosis resulting from longstanding, chronic oedema. Chronic infection may also obstruct arterial flow. Arterial ulcers can result from mural and intramural changes to the vessel walls:

- Mural changes: Atherosclerosis, or plaque formation reduces the blood flow until thrombosis; embolism or infection cause complete closure.
- Intramural changes: Occlusion of small vessels by changes in blood viscosity, platelet adhesiveness or fibrinogenesis, (especially in small painful ulcers of the feet and ankles).

General features of arterial ulcers

Arterial ulcers are very painful, especially at night. This is as marked in small ulcers as in larger ulcers. Their edges are sharply defined, and the ulcer is 'punched out'. The base is often covered with slough, which may deepen to bare the tendons. There is often a history of intermittent claudication (pain on exercise), dependent foot (dusky foot) white on elevation, a history of peripheral vascular disease, lower Ankle Brachial Pressure Index (ABPI), weak/absent pulses, and sluggish/poor capillary refill. The ulcer site is usually below the ankles to the toes. The skin is often shiny and friable. Uncontrolled diabetes and smoking are significant factors causing arterial insufficiency. Healing is often slow and may depend on control of the underlying cause.

Some examples of arterial ulcers are:

- traumatic ulcers on the shin and ankles
- ulcers following fractures
- ulcers caused by ill-fitting calipers or braces
- post-burn ulcers
- ulcers caused by intra-lesional injections (in an area with an already impoverished blood supply).

Treatment of arterial ulcers may involve a surgical intervention - angioplasty, stenting, bypass, grafting and ultimately amputation. Pain control is an important aspect of the management of arterial ulcers.

Venous/Arterial (mixed ulcers)

It is important to note between 10 and 15 percent of leg ulcers are of mixed aetiology. These ulcers are often hard to heal due to associated oedema, cellulitis, thrombophlebitis, diabetes or underlying vascular disease, rheumatoid diseases especially in bed-ridden patients, and general conditions of the skin in elderly patients which are often associated with malnourishment.

Other causes of ulcers

In addition to the more common forms of ulceration, there are a number of less familiar causes. Vasculitic ulcers may develop as a result of other medical conditions, such as those that affect the immune system (e.g. rheumatoid arthritis, lupus and polyarthritis).

Infections of the skin can produce ulcers especially if necrotising bacteria are involved. Other potential causes of ulcers are:

- Haematological problems such as thalassemia or leukaemia.
- Polycythaemia and skin conditions like pyoderma gangrenosum and epidermolysis bullosa.
- Neoplasia: Some ulcers may be as a result of neoplasia (cancer) which may develop into non-healing ulcers. The most common of these are squamous cell and basal cell carcinomas.
- Lymphoedema ulcers may also form in patients with lymphoedema, caused by a reduction in the function of the lymph vessels to drain extracellular fluid. The resultant oedema will place the patient at risk of ulcer development as a result of minor trauma and by the hyperkeratotic nature of the skin.

4.2.2 Wounds in diabetics

The prevalence of diabetes in Australia is on the rise with estimates of 4 to 6 percent of the population currently having diabetes[5]. The trend is of concern as the number of people diagnosed with diabetes, as of 2015, is 2,000 people every week. Data from 2010 shows that only half of Australians with diabetes were achieving adequate control of their blood glucose levels. Poor control of blood glucose means a higher risk of developing diabetes complications.

This constitutes a very large number of people in this country and many health professionals will be confronted by patients with the problem of diabetic foot ulcers. Many diabetics may have small and minor skin breakdowns which they may not consider important; however, due to their disease, these minor wounds have the potential of becoming serious.

The diabetic patient's foot is subject to neuropathy, ischemia, and infection. There are two major wound types, neuropathic where there is a loss of sensory perception and ischaemic where there is a loss of arterial blood supply. Preventing the diabetic foot should be the first priority. This can be achieved by identifying the high-risk individuals, such as those with peripheral neuropathy, peripheral vascular disease, foot deformities, and presence of callus. The management of the diabetic limb wound is multifaceted with the application of wound products being only one aspect of patient treatment.

Wound management principles are:

- cleansing with minimal trauma
- removal of slough/necrosis where it is safe to do so
- adequately absorption of exudate, prevent/reduce contamination/infection
- protection of damaged/healing tissue and
- off-loading to remove any pressure.

How does diabetes affect wound healing?

Patients with diabetes are prone to have:

- Impaired inflammatory response
- Association of atherosclerosis (small vessel disease)
- Damaged nerves which diminish pain sensation and nerve response
- Up to a fivefold risk of infection.

4.2.3 Risk factors in diabetes

Peripheral vascular disease

A major consequence of diabetes is the damage to both macro-vascular and micro-vascular systems. The resultant reduction in perfusion will contribute to the development of ulcers and also to a delay in wound healing.

Peripheral neuropathy

The lack of feeling or diabetic peripheral sensory neuropathy is the major risk factor for foot ulceration. The fact that the diabetic patient is unable to detect even minor injuries or discomfort in the feet will often place the patient at risk of developing a small wound. Due to the lack of sensation, the patient is unaware of the tissue damage and the wound will progress and only be noticed when it is larger in size. The other indicator may be the presence of odour which may indicate an infected wound. In addition to sensory neuropathies there may be autonomic and motor neuropathies present.

Callus formation

The development of excess callus will elevate plantar dynamic pressure and when combined with peripheral neuropathy, may lead to ulcer development.

Limited joint mobility

This will increase foot pressures and therefore increase the risk of ulcer development.

Bony deformity

Deformities of the ankle, feet, bunions and toes will all increase the risk of ulcers forming.

4.2.4 Pressure injury

Pressure injuries are the most preventable of all of the chronic wounds. Pressure injuries may be as simple as the blister most of us may have experienced over the years from footwear, to the extensive pressure injury experienced by bedridden patients suffering from:

- stroke
- spinal injury
- multiple sclerosis
- dementia.

It has been estimated that between six to twelve percent of all patients treated in hospital develop a pressure injury, but sadly, this number increases to about 30 percent in the elderly.

A pressure injury develops when the capillary blood flow to the skin and tissue over a bony prominence is decreased for a sufficient period of time.

The capillary pressure in the arterial blood system is some 32mm of mercury. It therefore requires a pressure of only about 30mm of mercury to restrict the arterial blood flow. The consequence of this restricted blood supply is a reduction in oxygen supply and nutrition to the tissue, accompanied by the problem of waste products not being removed from the site.

The result of this is hypoxia, tissue acidosis, increased capillary permeability (which allows intravascular fluid to escape causing oedema), and cell death. The main causes of pressure injury are:

- pressure
- friction
- shear

Pressure

Direct pressure on tissue over a bony prominence in excess of 30mm of mercury will cause ischaemia in the surrounding tissue. This will occur not only from a patient being in bed, but also on a trolley or sitting in a chair. The extent of tissue damage will depend on the intensity of the pressure, and the length of time the pressure remains unrelieved. The tissue can tolerate pressure for short periods of time; however, even low pressure over a long period of time will have some detrimental effect.

Friction

Friction occurs when the top layers of skin are worn away by continued rubbing against an external surface. This can manifest itself in a simple blister or tissue oedema, or an open pressure injury. This can be caused by ill-fitting footwear, or even bed linen.

Shearing forces

Shear is when the skin remains in place, usually unable to move against the surface it is in contact with, while the underlying bone and tissue are forced to move. This force will contribute to the destruction of microvasculature in a manner similar to direct pressure. This type of pressure injury is seen in patients left sitting up in bed or on a chair, while gravity causes the patient to slide down with the skin adhering to the bed linen or the surface of the chair.

4.2.5 Incontinence associated dermatitis and skin injury (IAD)

IAD is now the accepted term for skin damage caused by exposure to stool or urine. Elderly adults, and especially those in long-term care facilities, are at risk for urinary or faecal incontinence and IAD. It is sometimes confused with stage 1 or 2 pressure injury.

Current clinical consensus supports the following as key components of an effective program for IAD prevention: gentle cleansing with a no-rinse cleanser with pH range similar to normal skin. Moisturisation to maintain normal levels of intercellular lipids and the skin's normal barrier function. Application of moisture barrier product (petrolatum-based, dimethicone-based, zinc oxide–based, or liquid film-forming acrylates).[18]

4.2.6 Neoplasia

Neoplasia may be the cause of skin damage resulting in a wound or skin lesion requiring surgical removal. Wounds may also result from post cancer surgery with active cancer. Neoplasia may also develop in non-healing leg ulcers e.g. marjolin ulcer. Most commonly out of all the neoplasms, squamous cell carcinomas may develop in chronic non-healing venous ulcers.

Sunlight can cause premature ageing of the skin. Moles can be induced by sunlight. Solar keratosis is a form of dysplasia of keratinocytes. Skin cancers include basal cell carcinoma, squamous cell carcinoma and melanoma. It is important if skin cancer is suspected to perform a biopsy to either confirm or exclude cancer.

5.Wound Dressings and Bandages

5.1 Introduction

The history of the development and use of dressings has seen an evolution through many centuries from inert and passive products such as gauze, lint and fibre products to a comprehensive range of modern moist wound dressings.

The range of dressings increases every year and is often a source of confusion when attempting to differentiate between both similar and different dressings. The simplest way of classifying dressings is by their functionality.

Wound products can be divided into two broad groups:

- Passive products
- Interactive products

Within these two groups, the passive dressings can be sub-classified into absorbing and non-absorbing dressings; whereas, the interactive dressings can be sub-classified as absorbing, non- absorbing and moisture donating. The interactive group has six different dressing types.

Turner[7] has defined the following as the properties of the ideal wound dressing:

- Removes excessive exudate from the wound without allowing the wound to dry out thereby maintaining a moist environment
- Allows gaseous exchange so that oxygen, water vapour and CO_2 may pass in and out of the dressing
- Is thermally insulating so as to maintain the wound core temperature at approximately 37 degrees centigrade
- Is impermeable to micro-organisms in order to minimise contamination of the wound from outside the wound itself
- Is free from either particulate or toxic contamination
- Is non-traumatic and does not adhere to the wound, so that at dressing change it will not damage granulating tissue.

5.2 Passive dressings

For many years the products used were of the 'passive' or the 'plug and conceal' concept and included gauze, lint, non-stick dressings, and tulle dressings. Passive dressings fulfil very few of the properties of an ideal dressing and have very limited (if any) use as a primary dressing; however, some are useful as secondary dressings.

It is clear there are a number of negative aspects in the use of gauze:

- Being a fibrous material, tends to shed very readily and will contaminate the wound.
- It is highly absorbent and as a primary dressing will tend to dry the surface of the wound rapidly.
- It is permeable to bacteria and moist gauze tends to be an environment ideal for the growth of bacteria. This may increase the risk of penetration and contamination of the wound.
- Is also adherent and will further traumatise the wound on removal, risking damage to granulating tissue and causing pain.

In addition to gauze, lint and cotton dressings, other simple modified absorbent pads covered with a perforated plastic film to prevent adhering to a wound (such products include Melolin™, Cutilin™ and Telfa®) are used both as primary and secondary dressings. They are used in minor and low exudating wounds.

5.2.1 A modern inert absorbent dressing

Exudry™ Zetuvit™ and Mesorb® are examples of products with a highly absorbent pad and a non-stick, non-shear surface. They can be used as a secondary dressing over moderate to highly exudating wounds and over hydrocolloid paste, cadexomer iodine, alginate and other primary dressings.

5.2.2 The non-absorbent tulle passive dressings

Non-absorbent passive dressings such as paraffin gauze (tulle) dressings, are among the earliest modern dressings. Many variations have been developed over the years by changing the loading of paraffin in the base. In general, these dressings produce a waterproof paraffin cover over the wound which may lead to maceration in that water vapour and exudation may not pass through and so become trapped within the wound. These products:

- are permeable to bacteria
- are known to adhere to the wound causing trauma on removal
- require a secondary dressing.

Their use is limited to simple, clean, superficial wounds and minor burns. They are also used as a primary dressing over skin grafts. There are modern alternative dressings composed of synthetic fibres tightly meshed and impregnated with materials that allow moisture to pass through and thus minimise any maceration of the wound and tissues. Examples include Adaptic™, Cuticerin™ and Atrauman®. For patients with fragile skin, Mepitlel™ and Melitel One™ are excellent examples of non-fibre tulle coated with a non-stick Silicone coating.

5.3 Interactive dressings

Interactive dressings help to control the micro-environment by combining with the exudate to form either a hydrophilic gel; or by means of semipermeable membranes, controlling the flow of exudate from the wound into the dressing. They may also stimulate activity in the healing cascade and speed up the healing process.

There are six classes of interactive dressings which are classified according to their functionality.

5.3.1 Non-absorbing dressings

Film dressings (for wounds with no to low exudate)

Film dressings consist of a thin, poly-urethane membrane coated with a layer of acrylic adhesive and:

- are waterproof
- are gas/vapour permeable
- are flexible
- protect from shear, friction, chemicals and microbes
- are transparent
- spread tension forces.

They are particularly useful in superficial, clean wounds and in the prevention of breakdown and pre-ulcers in pressure injuries. They are also used as a post-operative dressing over sutures and to reduce sub-tissue tension over a closed sutured wound after removal of the sutures or clips. Film dressings should not be used for infected wounds or fragile skin.

BRAND	TYPE
Opsite™	Plain film, Island Film Flexigrid Flexi Fix {continuous rolls} IV 3000 {high MVTR*} Post-op {island dressing}
Tegaderm™	Plain film HP* {high MVTR} with absorbent pad Island dressing
Biofilm™	Plain film
Polyskin™ II Aqua Protect® Hydrofilm®	Plain film MR* {high MVTR} Plain film Island Film Plain film
Mepitel Film	Silicone Coated Film

*MVTR = Moisture Vapour Transmission Rate
i.e. the level of passage of water vapour or exudate through the surface of the dressing.
*HP = Holding Power *MR = Moisture Responsive

5.3.2 Absorbent dressings

Hydrocolloid dressings (for wounds with low to moderate exudate)

Hydrocolloids are a combination of polymers held in a fine suspension, and often contain polysaccharides, proteins and adhesives. When placed on a wound, the polymers combine with the exudate and form a soft, moist gel-like mass. They also encourage autolysis to aid in the removal of slough from a wound. Hydrocolloids:

- are flexible and waterproof
- provide a physical barrier
- form a gel with exudate
- aid in debriding
- need no secondary dressing
- are available in a thin form (transparent).

The early forms of hydrocolloids are occlusive, so as to make them impermeable to gases and water vapour. They do, however, act as a barrier to external bacteria and are waterproof enabling the patient to shower. The thin, transparent hydrocolloids have a polyurethane film backing and are non-occlusive, thereby allowing the passage of water vapour and gases.

Hydrocolloids should be applied over the wound with at least 3-4 cm extra product greater than the size of the wound. The skin should be dry and free from creams, ointments or oil to ensure good adhesion. The dressing should be placed 1/3 above the wound and 2/3 below the wound, as this will prolong the wear time of the dressing. The dressing can remain in place for up to 7 days with removal dependent on the level of exudate and when 'strikethrough' has occurred (i.e. the exudate has migrated to the edge of the dressing).

Hydrocolloid products are used in low to moderately exudating wounds – including ulcers, donor sites (after haemostasis) and granulating wounds. They may also be used in conjunction with a paste or powder form. The paste or powder is used in a deeper ulcer or cavity. These convert to the same hydrophilic gel and are covered with the normal hydrocolloid wafer contraindicated in diabetic wounds.

BRAND	TYPE
Comfeel Ulcer Dressing™ Comfeel Powder™ Comfeel Plus Transparent™	Multiple Sizes Single pack Pack Multiple Sizes
DuoDerm CGF® DuoDerm Border® DuoDerm ExtraThin® DuoDerm Paste®	Multiple Sizes Multiple Shapes and Sizes Multiple Shapes and Sizes Tube
Replicare™	Multiple Sizes
Ultec™	Multiple Shapes and Sizes
Hydrocoll® Hydrocoll Thin®	Multiple Sizes Multiple Sizes
Tegaderm Hydrocolloid™ Tegaderm Hydrocolloid Thin™	Multiple Shapes and Sizes Multiple Shapes and Sizes

Foam dressings (for wounds with medium to high exudate)

Foam dressings are soft, open-celled hydrophobic/hydrophilic non-adherent dressings that may be single or multiple layered and meet many of the properties of an ideal dressing.

Foam dressings:

- allow the passage of exudate through the non-adherent surface to be absorbed in the main body of the product
- are absorbent
- maintain a moist environment
- are thermally insulating
- are cushioning
- are non-adherent
- are non-residual.

Foams are mainly used in moderately to heavily exudating wounds – including ulcers, donor sites and minor burns, and acts as a secondary dressing, particularly as a covering with the use of amorphous hydrogels. In addition to standard and waterproof foams, there are also shaped cavity devices which may be inserted into cavity wounds or dehisced surgical wounds.

BRAND	TYPE
Allevyn Sheet™	Multiple layer
Allevyn Gentle™	Multiple layer Silicone
Allevyn Adhesive™	Multiple layer waterproof
Allevyn Cavity™	Dual layer cavity insert
Allevyn Life	Multiple layer Silicone
Cavicare™	Conforming Foam
Curafoam™	Single layer
Hydrasorb™	Single layer
Lyofoam Max™	Multiple layer
Permafoam®	Multiple layer waterproof
Mepilex®	Multiple layer Silicone
Mepilex Lite®	Thin Multiple layer Silicone
Mepilex Border	Multiple layer Silicone waterproof

Alginate dressings (for wounds with medium to high exudate)

Alginates are the calcium or sodium/calcium salts of alginic acid, composed of manuronic and guluronic acids obtained from seaweed. When applied to a wound, the sodium salts present in the wound exchanges with the calcium in the alginate to form sodium alginate which is a hydrophilic gel. This gel has the ability to absorb exudate into itself while maintaining a moist environment at the interface between the dressing and the tissue.

Alginate dressings:

- are highly absorbent
- form a gel with exudate
- create a moist interface
- are easily removed
- are haemostatic.

Alginates are used on donor sites, bleeding sites, exudating leg ulcers and cavities. They are not considered to be of value in low exudating wounds or dry wounds with eschar. They come in a number of different forms, including sheets, packing rope and in combination with charcoal for exudating malodorous wounds.

Sheet alginates should be cut to the shape of the wound, placed on the wound and covered with a suitable secondary dressing (e.g. foam and non-stick dressings). They should then be held in place with tape, a cohesive or tubular bandage. If the wound is highly exudating then an outer absorbent pad may be added. In the case of a wet cavity wound, the rope or packing ribbon is gently placed into the cavity taking care not to pack the material tightly into the space. In general, alginates should be changed when they have fully converted to a gel, this will vary from 1 to 3 days depending on the level of exudate in the wound. When used on a donor site, the material is placed over the area after skin harvesting and covered with a film or a foam dressing, which can remain in place for up to 7 days.

BRAND	TYPE
Algoderm® Kaltostat® Carboflex(with charcoal)™	Surface sheet {firm gel} Cavity Rope {firm gel} Surface sheet{firm gel} Cavity rope {firm gel} Surface sheet
Seasorb Alginate™ Seasorb Alginate™	Cavity Rope {soft gel} Surface sheet {firm gel}
Curasorb™	Surface sheet {firm gel} Cavity rope {firm gel}
Sorbsan™	Surface sheet {soft gel} Cavity rope {soft gel}
Tegaderm Alginate™ Algisite M™	Surface sheet and rope Surface sheet {firm gel} Cavity rope {firm gel}

Hydrofibre dressings

Hydrofibre dressings have some of the properties of alginates in that they are a fibre rope or dressing that forms a firm gel in contact with fluid.

Hydrofibre dressings:

- are composed of a synthetic fibrous mat
- form a firm gel in contact with exudate
- are highly absorbent
- have no lateral wicking - protects peri-skin

Examples of this product are Aquacel®, Aquacel Extra® and Aquacel Foam ®

Hydroactive dressings (for wounds with medium to high exudate)

Hydroactive dressings are multi-layered highly absorbent polymer dressings with a surface adhesive and a waterproof outer layer are similar to hydrocolloids, however, instead of forming a gel in contact with exudate, the fluid is trapped within the product itself, to maintain a moist environment.

Hydroactive dressings are:

- highly absorbent polymer dressings
- waterproof
- non-residual
- semi-permeable

These dressings are indicated for use in highly exudating surface and cavity wounds including leg ulcers, pressure wounds and minor burns. They are particularly useful over joints such as elbows, knees, fingers and toes due to their ability to expand and contract without causing constriction. Hydroactive dressings are not indicated for dry or lightly exudating wounds.

BRAND	TYPE
Cutinova Hydro™	Surface sheet thick
Tielle™	Surface sheet
Biatain™	Surface sheet Cavity dressing
PolyMem®	Surface sheet and Cavity Dressing

Hydrogels (for dry or sloughy wounds)

Hydrogels are a group of complex organic polymers having a high water content ranging between 30 to 90 percent. This broad class of polymers swells extensively in water, but does not dissolve in water. They have the properties of both rehydrating dry tissue, and absorb certain amounts of fluid into themselves. They are provided as either amorphous gels or sheet gels. These products are used to help re-hydrate sloughy wounds and necrotic tissue to aid in the autolytic debridement of wounds. They are also used in the management of burns, including sunburn, scalds and other partial thickness burns. Amorphous hydrogels have also been used in the management of chicken pox and shingles, applied to the eruptions three to four times a day. They provide a moist environment and relieve the discomfort of the lesion, and also reduce the probability of scarring.

Hydrogels are also available in sheet form consisting of a cross-linked polymer and water held in a backing. These products are particularly useful in the management of burns, and also aid the removal of necrotic tissue in pressure wounds.

BRAND	TYPE
DuoDERM Gel®	Amorphous non-preserved
Safgel®	Amorphous preserved
Intrasite gel™	Amorphous non-preserved
Intrasite gel conformable™	Impregnated amorphous
Solosite™	Amorphous preserved
Curafil gel™	Amorphous preserved
Curafil Impregnated gauze™ Curagel™	Impregnated amorphous Sheet Gel
Purilon gel™	Amorphous non-preserved
Solugel™ Nu-gel™ Hydrosorb™	Amorphous both preserved and non-preserved Sheet Gel Sheet Gel adhesive and non-adhesive

5.3.3 Miscellaneous Dressings

Iodine

Povidone Iodine

Povidone Iodine, is a chemical complex made up of iodine and povidone (a polymer that slowly releases the iodine). Iodine has a broad spectrum of activity against bacteria, mycobacteria, fungi, protozoas and viruses. There is no evidence of resistance to Iodine. It is a good skin antiseptic. On acute wounds apply for 3-4 minutes and wash off. For chronic wounds dilute to 0.5-1%.

Inadine

Inadine Dressing consists of a low adherent knitted viscose fabric impregnated with a polyethylene glycol (PEG) base containing 10% Povidone Iodine; equivalent to 1.0% available iodine. It is indicated for the management of ulcerative wounds and may also be used for the prevention of infection in minor traumatic skin loss injuries.

Cadexomer iodine dressings (Iodosorb™)

This is a non-toxic iodophor that combines iodine with a polysaccharide polymer. When applied to the wound, the exudate combines with the polymer and is absorbed at the same time as the iodine is released- over a period of 72 hours at a low strength.

Cadexomer Iodine was developed in the 1980's and consists of cadexomer polysaccharide polymer and iodine 0.9%. The iodine is cross-linked into the structure of the polymer. Upon contact with a wound, this dressing:

- is absorbent – forms a gel with exudate
- releases iodine as gel forms
- pulses iodine at 0.1% (not cytotoxic)
- is used for sloughy/infected wounds, diabetic wounds, recalcitrant wounds
- may stimulate growth factors.

Examples of products are Iodosorb ™ Comes as a Paste, Powder and a Dressing.

Silver

Silver has been used for many years, and has proven antimicrobial activity. It is broad spectrum and inactivates almost all known bacteria, including methicillin-resistant staphylococcus aureus (MRSA) and vancomycin-resistant enterococci (VRE). No cases of bacterial resistance have been documented. Silver has been used in the treatment of burns as a silver sulfadiazine cream, and this cream has also been applied to some wounds. The difficulty in applying a cream to a mucous surface is that it will cause the development of mucilaginous slough. The development of a range of modern silver dressings overcomes this difficulty by delivering varying levels of silver directly from the dressing. The base dressings include hydrocolloids, alginates, tulles, hydroactives, foams, gels and polyethylene mats. The amount of silver and the method of action vary greatly between these dressings. Some release silver into the wound and some maintain the silver within the dressing and kill bacteria as they are absorbed into the dressing.

Silver Product Type	Trade name
High Density Polyethylene dressings	Acticoat™
Foam Dressing	Mepliex Ag™
Alginate Dressing	Acticoat Absorbent™
Foam	Acticoat Moisture Control
Hydroactive Dressing	Biatain Ag™
Hydrofibre Dressing	Aquacel Ag®
Tulle Dressing	AtraumanAg®

Fatty acid coated antibacterial fibre

This is a simple fibre coated with dialkylcarbamoylchloride (DACC) a fatty acid. Its mode of action is based on a physical process which make two hydrophobic (water-repellent) particles bind together when in contact, utilising the binding force of surrounding water molecules. The vast majority of pathogenic microorganisms are hydrophobic, and bind to the unique surface. The product is available as a ribbon for cavity use, a surface pad, a foam, a hydrogel and an adhesive dressing. It is used on infected wounds and also as a prophylactic treatment to prevent fungal infections of the toes and under the breasts.

Unlike traditional antimicrobial dressings, this product does not contain any chemically or pharmacologically active substances and relies on a physical mode of action using a hydrophobic coating made from dialkylcarbamoylchloride (DACC) to reduce the bacterial load in a wound. When two hydrophobic particles come in direct contact they bind together with the binding force of the surrounding water molecules. The product Sorbact® comes in many forms including: Tulle-like – Foam - Hydrogel – Absorbent – Ribbon - Post Op Dressing.

5.4 Antiseptics

The role of topical antiseptics in chronic wounds is not as clear as in the case of acute wounds. There is a group of patients with long standing, non-healing leg ulcers. There are some clinicians who believe that one of the reasons for non-healing of these wounds is the presence of large numbers of colonised bacteria, especially in those patients who may be malnourished, diabetic or immuno-compromised. In some of these patients, the use of a short course of dilute topical antiseptics may help reduce the surface flora and speed the process of wound healing. The decision should be made for the individual patient, taking into consideration all of the benefits and risks.

WOUND TYPE	MANAGEMENT
CUT/ LACERATION	Clean the area with water or saline. If there is any contamination, use a surfactant antiseptic (e.g. Savlon® or Povidone Iodine scrub) to remove any foreign material that may be a focus for infection. Cover with a simple dressing (e.g. a film dressing or island film).
GRAZE	Due to the presence in most grazes of dirt, gravel and other material, scrub the area with a surfactant antiseptic e.g. Savlon® or Povidone Iodine scrub. Apply an antiseptic to the wound but wash off after 4 minutes and cover with either an island film dressing, thin hydrocolloid or foam.
BURN	Most minor burns do not require the use of a topical antiseptic. Their use will depend on the depth of the burn and if there is damaged and necrotic tissue present. If there is, then the use of a silver dressing is considered appropriate in the early management. If the burn is minor and there is little tissue damage (e.g. minor blisters) then apply an amorphous or sheet hydrogel.
CHRONIC WOUNDS e.g. Leg Ulcers and Pressure Injury	If the level of colonised bacteria is high, the short term use of Povidone Iodine Solution is the most effective antiseptic to use. The recommendation is to use a low strength (e.g. 1%) solution and to apply for 3 to 5 minutes and then wash the product off. Within this time the product will have significantly reduced the numbers of surface bacteria. The other option is the use of Iodosorb™ being non-toxic.

5.4.1 Honey

Medicinal honey has an antibacterial and antifungal effect. Its action is bacteriostatic and produces hydrogen peroxide in “slow-release” form, but much of this is inactivated by the enzyme catalase Manuka honey, the activity is due to methylglyoxal which is not inactivated. Honey is a saturated solution of sugars with a strong interaction with water molecules, which inhibits the growth of microorganisms. Some patients experience pain with its use. Honey also has a low pH and may reduce odour. Not all forms of honey have effective antimicrobial activity. The only forms of honey that should be used on wounds are medicinal honey; the Manuka honey in the pantry is not suitable. The frequency of dressing changes will vary depending on the level of exudate in the wound.

There is high quality evidence that honey heals partial thickness burns around 4 to 5 days more quickly than conventional dressings. There is moderate quality evidence that honey is an effective antiseptic. The possible side effects of honey are:

- allergic reaction, especially in people who are allergic to bees
- risk of a rise in blood sugar

5.5 Hypertonic Saline

Hypergranulation is generally treated with topical silver nitrate, an alternative, and less toxic method of application of a hypertonic saline dressing. These are applied to the hypergranulation and covered with a foam dressing and a compression bandage. The dressing is changed daily. Examples of this dressing are Mesalt which is available in a sheet or ribbon, and Cursalt which only comes in a sheet.

5.6 Burns dressings

Once the burn has healed, retention tape for example Fixomull® and Hypafix®, may be applied directly to the skin to protect the new epithelium. The tape, once applied, remains in place for seven days at a time. It is removed by dissolving the adhesive in a fixed oil or citrus oil, allowing the tape to be easily removed without damaging the new epithelium. These retention tapes are permeable, allow exudate to flow through their surface, are flexible and although not waterproof may be washed after the first 48 hours of application and they will dry and remain in place.

It is also important to cover the dressing with a cohesive bandage to apply some compression to the skin.

5.7 Keloid and hypertrophic scar management

A topical method for treatment of keloid and hypertrophic scars is the use of a silicone dressing. The dressing is applied to the scar initially for 4 hours and then progressively increasing the contact to 24 hours. The scar may gradually reduce in depth and colour. This will however, be a slow process requiring application for six months or more. Examples of this type of dressing are Cica Care™ and Mepiform®. There are also Silicone gels e.g. Stratamed gel. To prevent hypertrophic scaring when sutures or clips are removed place strips across the incision line and cover with a film dressing. This is changed every 7 to 10 days, and continued for 8 weeks. Following this, remove strips over the next few dressing changes and continue with film for 4 to 6 weeks.

5.8 General rules for sheet dressing use

- Attend to the patient first, not the wound
- Allow 2-3cm of dressing greater than wound size
- Place the dressing 1/3 above & 2/3 below the wound to allow more capacity to absorb exudate, which increases wear time
- Remove when strike-through occurs (this is when exudate is close to the edge of the dressing)
- Remove with care, particularly in patients with fragile skin
- In some circumstances, the dressing can be safely and conveniently removed under the shower
- Do not pre-moisten alginate dressings
- Promote recovery and rehabilitation

5.9 Frequency of dressing changes

Dressings may be left intact for up to 7 days. The decision to change them will depend on the wound type and location, assessment of the wound bed and patient, the volume of exudate and the ability of the dressing or device to promote healing and protect the surrounding skin. Disturbances to wound temperature and granulating tissue is minimised by less frequent dressing changes.

5.10 Bandages

The use of material to bind a wound is as ancient as medicine itself. Techniques and material have changed little over the centuries, but in the past fifteen years there has been an explosion in the type of bandages available.

When choosing and applying a bandage it is important to differentiate between the traditional and the ritual and what is best and most cost effective for the patient.

The bandage may be needed for keeping a dressing in place, supporting an injured joint or assisting venous return.

5.10.1 Retention bandages

The role of retention bandages is to hold a dressing in place. They are of particular use where a patient has very fine and very friable skin that is easily damaged if the dressing was held in place with any type of adhesive tape or other adhesive product. For many years, the purpose of cotton crepe bandages have been used to hold dressings in place. However, today there are a number of more effective and appropriate bandages that may be used.

The first is the lightweight conforming cohesive bandage. This bandage is a lightweight crepe coated with a thin latex. As a result of this coating the bandage sticks to itself but not to skin, hair or clothing. Only a very small length is required to hold the dressing in place, compared with using a complete roll of a standard crepe bandage. This type of bandage comes in widths that are appropriate for fingers, toes, and limbs and larger sizes for the head. The other advantage is that the same amount is not required to hold the dressing in place compared with using a standard crepe bandage. This makes this type of bandage less bulky and very cost effective.

Examples of this type of bandage are Handigauze Cohesive®, Easy Fix Cohesive® and Peha-Haft®.

The other type of product is the elasticised tubular bandage available in a light weight form that may be cut to the required size and placed over the dressing, again holding it in place. An example of this is Tubi Fast™.

5.10.2 Support bandages

Support bandages are of a heavier construction and are made from both natural and synthetic fibres. They achieve their stretch by the use of high twist yarns and the heavier construction. The main role of strong support bandages is the support of joints in strains and also in the management of muscular injuries. Strong support bandages can be used singularly or in combination to restrict movement, help reduce some of the oedema and act as a mechanism of support following soft tissue injury. Examples of this type of bandage are the heavy duty crepe bandage such as Elastocrepe® and Handycrepe®, and the heavier weight cohesive bandage (e.g. Coban™, Coplus®, Handygrip®). Single layers of the heavier weight tubular bandage may also be used for this purpose (e.g. Tubi Grip™, Handyplast Tubular® or Tensogrip®).

5.10.3 Other Bandages

Bandage Type	Description & Use	Brand Name
Crepe	This bandage is not considered appropriate for the management of leg ulcers of venous disease. Has little use as a retention bandage as it is bulky.	Handycrepe® Elastolite Crepe®
Light Cohesive Retention Bandage	Light weight cohesive bandages are the most appropriate as they stick to themselves and not to the skin and only require two layers so there is no bulk. Helpful for patients with friable skin.	Esifix Cohesive ® Handygauze cohesive® Peha-haft®
Tubular stocking bandages	Tubular stocking bandages are conforming and require only one layer. Also helpful for patients with friable skin.	Tubifast® Tubular Band®
Tubular Support Bandages	A bandage with some compression however uniform in nature. They can be used for musculoskeletal support. Each layer provides 8mm of mercury.	TubiGrip® Tensogrip® Tubular Form®
Elasticated Support Bandages	Support bandages are of a heavier construction containing elastomers, combined with natural and/or synthetic fibres. These maintain a pressure level nearer to that immediately following the application than with an elasticated bandage. Strong support bandages can be used singularly or in combination to restrict movement, prevent oedema or act as a mechanism of support following soft tissue repair or injury.	Coban® CoPlus®

5.10.4 Compression bandages

The action of compression bandages is to provide pressure firm enough to compress the pathologically distended veins thus enabling the valves to remain tightly against the wall of the vessel, increasing velocity of the venous blood stream and normalising the returned flow of blood to the heart.

Accumulated fluid and waste products are removed from the affected tissue by the accelerated rate of flow resulting from application of a pressure bandage.

Effective therapeutic compression starts with a sub-bandage pressure of 18mm of mercury at the ankle. Anything giving a lower value may be appropriate for support, but is not considered appropriate in the treatment of venous leg ulcers.

The primary aim of compression is to reduce pressure in the superficial veins in order to encourage venous return to the heart. This is performed by increasing the velocity of flow in the deep veins and discouraging oedema by reducing the pressure difference between the capillaries and the tissues. The most effective method is to apply graduated compression from the toes to the knee. The highest pressure should be exerted at the ankle, gradually falling to 50 percent at the knee. Anti-embolic stockings should only be used for the prevention of deep vein thrombosis in hospitalised patients. The stockings provide a pressure of between 12mm and 18mm of mercury.

The hazards of compression bandages

Care must be exercised when applying compression bandages to ensure there is adequate arterial blood flow. The application of compression can cause skin necrosis, trauma, ulceration, or even amputation (this may result from damage caused by lack of arterial blood in the area). If arterial supply is uncertain then order an Ankle Brachial Pressure Index Test (ABPI).

An alternate method of applying graduated pressure to the leg is through the use of compression stockings. Stockings may be used as part of the treatment of venous leg ulcers, as an ongoing management modality of venous disease, and/or for the prevention of venous stasis.

The use of compression stockings both as a preventive measure and to minimise the risks of venous stasis is common. The difficulty is that there is considerable confusion as to the appropriate type of stocking to use and the level of compression necessary for best treatment.

For the prevention of Deep Vein Thrombosis in patients undergoing surgery, systemic medication (e.g. Low Molecular Weight Heparin) is used with calf stimulation. The use of anti-embolic stockings is no longer recommended. Class one compression stockings can be worn by non-ambulatory patients in hospital pre and post-surgery to help prevent DVTs in combination with Low Molecular Weight Heparin. It should be noted that anti-embolic stockings are not suitable for the treatment or management of venous disease.

Compression stockings have a major role to play in the prevention of venous stasis. They should also be worn when travelling long distances to minimise oedema and thrombosis development. For compression to be effective it must be at least 18mmHg.

Compression bandages are divided into two types: high stretch compression and short stretch:

High-stretch compression bandages

High-stretch compression bandages have an extension from 130 percent to 200 percent, high elasticity, medium to high resting pressure, and medium to high working pressure. They exert their effects superficially, working in combination with the muscles. They are indicated for venous oedema and the management of venous ulcers and may be left in place for 24 hours. Examples include Tensopress®, Setopress™, Surepress® and Eloflex®.

Low-stretch compression bandages

Low-stretch compression bandages have an extension of 30 percent to 90 percent, low elasticity, low to slight resting pressure, but high to very high working pressure. They exert their main effects deep within the limb and are indicated for venous oedema and lymphoedema and may be left in place for 24 hours. Examples of this type of bandage are Comprilan®, Lastolan® and Tensolan®.

Application methods include the simple spiral method which is performed by applying the bandage with a figure eight at the ankle, and continuing up the limb in a spiral application covering 50 percent of the previously bandaged area. The application is generally undertaken with the high stretch type of bandage.

A continuous figure eight method of application is performed by overlapping as the bandage is wound up the leg so that it is applied in one direction and then in the opposite direction, producing a V shape in the bandage. This method is used particularly with low stretch compression bandages.

A development in bandaging has been the introduction of the Charing Cross 4 layer system. This combines an orthopaedic wool, crepe, elastic and cohesive bandage in multiple layers. This achieves 40 mm of mercury at the ankle, graduating to 17mm of mercury at the knee. A number of published studies have shown good healing rates in 12 weeks with this particular system[9]. The commercial brands of this type of bandage system are Profore™, Profore Lite™, Coban 2™ and Veno-4™.

If it has been clearly demonstrated by Doppler and/or Duplex scanning that if a true venous pathology exists, compression bandaging is then used in combination with management of the wound by appropriate dressings, using either a high or low stretch compression bandage.

Where there is some indication of minimal arterial involvement, compression is provided by the use of a straight tubular bandage. Where more significant arterial disease is present, no compression is applied over the dressing.

Types of Compression Bandages

Bandage Type	Description & Use	Brand Name
High Stretch Elastic bandage	These have high elasticity containing elastomers, medium to high resting pressure and medium to high working pressure. They exert their effects mainly superficially veins working in combination with the muscles.	SurePress® Tensopress® Setopress®
Inelastic Low Stretch/ High stiffness bandage	These have a low elasticity, low to slight resting pressure but high to very high working pressure. They exert their effects mainly deep within the limb. They are indicated for venous oedema and lymphoedema**.**	Lastolan® Comprilan® Acrylastic®
Multi-layer bandage	Uses 2 tor 4 layers of bandages to build up the compression level. Combination of elastic and inelastic bandages and padding.	Coban 2™ Profore™ Veno4®
Hosiery	Stockings are available ready-made or custom made. They come as single or double layer. There are 3 classes: Class 1. 18-24mmHg Class 2 25-35mmHg Class 3 35-435mmHg The decision on stocking type will depend on the patient and the level of varices, oedema and previous DVT. Please note anti-embolic stockings are **NOT** compression stockings	JOBST® VENOSAN® SIGVARIS
Multi Length Tubular Bandages	3 layers of straight tubular elasticated bandage cut at different lengths placed over each other: 1. Full-length toe to knee, 2. Toe to mid-calf 3.Toe to 4cm above ankle bone Each layer provides 8mmHg x3 =24mmHg. There is also a shaped single layer tubular bandage providing 18-24mmHg.	TubiGrip® Tensogrip® Tubular Form® Tubigrip shaped support bandage® Tubular Form SSB®

5.11 Zinc paste bandages

Zinc has been used in medicine for hundreds of years, even though very little published data of its pharmacology is available. Zinc is an important trace element in many functions of the body. In wound healing it is essential for cell proliferation and tissue regeneration, and is also involved in collagen synthesis and epithelialisation.

There are a number of commercial zinc paste bandages available on the Australian market. These include: Zincaband™ and Viscopaste™ and ZipZoc™ , and Gelocast®.

The bandage can be applied to the limb, as a patch over the wound or as a full length bandage. A water-based zinc paste bandage with no preservatives is beneficial in the management of chronic venous leg ulcers, particularly where venous eczema is present and when used in conjunction with appropriate compression bandaging.

6.General Rules

6.1 Acute wounds

General rules for acute wounds:

- Clean and decontaminate
- Stop the bleeding (alginates/pressure)
- Wound closure (closure strips/film dressings)
- Dressing film, island film or island dressing
- Bandage (simple cohesive).

6.2 Chronic wounds

General rules for chronic wounds:

- Confirm underlying cause i.e. venous/arterial etc
- Dressing is dependent on wound type and the level of exudate
- If true venous-pathology exists, graduated compression should be used.

6.3 Management plan

The final aspect of wound care is a plan for management. Once the wound is healed, it is important to investigate and examine the intrinsic and extrinsic factors. Once identified, try to alter environmental aspects such as nutrition, exercise, use of compression stockings, and environmental issues such as standing for long periods of time leading to venous stasis. These actions may well prevent redevelopment of the wound.

6.4 The Department of Veterans' Affairs - Veterans' Affairs Pharmaceutical Advisory Centre (VAPAC)

Some complex wounds require technical dressing and specialist supervision to manage them e.g. topical negative pressure wound dressings and Promogran. For more specialised wound care options, where approval is required for non-scheduled wound care items, the specialist may contact VAPAC to request prior approval. Consideration of these requests is based on clinical need.

VAPAC is open 24 hours a day, seven days a week and can be contacted on 1800 552 580.

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