



Healing wounds in older people

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Key points

- Wounds may heal more slowly in older people.
- Monitor for infection/ bacterial burden; swab only when infection is suspected.
- Vascular assessment is usually helpful.
- Maintain moisture balance by correct dressing choice.
- Provide post-healing management to prevent recurrence.
- Recognise when extra help is required.
- Wound management requires a systematic approach and a team approach is best.

Wound healing usually slows as people age. Maintaining moisture balance by correct dressing choice and allowing sufficient time for healing to occur before considering changing treatment are important aspects in managing wounds in older people.

More than 270,000 people in Australia have a problematic wound, and most of these people are over the age of 65 years. Skin tears (acute wounds) and pressure and venous ulcers (chronic wounds) are the predominant wounds among older people, and cause significant suffering, loss of independence and changes in lifestyle. Some 70% of ulcers are on the lower limbs, with venous leg ulcers, arterial ulcers and diabetes-related ulcers being the most common. The incidence of leg ulcers (predominantly venous ulcers) in the community is around 1% per year.¹ In the hospital setting, skin tears are the most common wound, but around 20% of these inpatients

also have a pressure ulcer. Incidence rates of pressure ulcers in acute care range from around 5 to 15%; these ulcers are rare in the community.^{2,3}

Healing is usually slower as people age, and wound healing can be challenging even to the most experienced health professional. However, if the principles of assessment and a systematic approach to management (with collaboration between several health professionals) are followed, most of wounds can be healed and recurrence prevented. Most wounds are managed in the community, with the general practitioner and community nurse pivotal to the healing of these wounds in older people.

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SKIN CHANGES ASSOCIATED WITH AGEING

- Thinner dermis, and weakened dermal/epidermal junction
- Less elastin
- Less water/higher fat content (both the dermis and epidermis)
- Small blood vessels are more fragile
- Reduced capillary endothelial cell migration
- Reduced inflammatory response
- Reduced dermal immune function



Figure 1. A stage IV pressure ulcer in the gluteal/sacral region. A suitable dressing would be hydrofibre with silver, covered with foam for extra absorption and padding, and secured with tape.

This article will review the impact of ageing on wounds, the main types of wounds in older people and the diagnosis of chronic wounds and their management, including the newer wound dressings and products.

WOUND HEALING AND AGEING

Although ageing itself is not an illness, older skin is more prone to wounding

and usually heals more slowly. Skin changes associated with ageing are summarised in the upper box on this page. Many of these changes have impacts on wound risk and healing.

RISK FACTORS FOR WOUNDS

Older people more often have comorbidities and many of these can impact on wound healing. The more common risk factors are listed in the lower box on this page.

Medications can both cause wounds and delay wound healing. Frequently used medications that can cause wounds include corticosteroids (mainly via skin fragility), hydroxyurea (directly causes skin ulceration in some individuals), allopurinol (via the serious skin reaction, toxic epidermolysis) and warfarin (can cause localised skin necrosis). Medications that can delay wound healing include corticosteroids, cytotoxic drugs, colchicine and NSAIDs.

Health practitioners need to have good awareness of all the medications a patient with a chronic wound is taking, and the potential link between these and wound healing.

COMMON WOUNDS IN OLDER PEOPLE

Skin tears

Skin tears, can become chronic ulcers. They usually occur on the forearms and

legs. Knocks and poor physical handling of people with more fragile skin are the usual causes.

Prevention is possible through careful patient handling, removal of sharp edges/surfaces from the patient's environment and protection of fragile skin (e.g. with woollen tubular protectors).

Pressure ulcers

Pressure ulcers are commonly associated with hospitalisation or residential care but also occur in the community. Many patients who develop them in hospital require ongoing community care.

Although the main risk factors for pressure ulcers are poor mobility and age, most of the other risk factors for wounds are risk factors for pressure ulcers. The pathogenesis consists of pressure and shearing forces deforming or occluding blood vessels, and friction damaging skin. They are most common over bony prominences that may rest against a surface, such as heels, hips, ankles, back, shoulders, sacrum and elbows.

Pressure ulcers are staged by depth into the four stages, or grades, below:

- stage I – a non-blanchable erythema without skin loss
- stage II – a loss of epidermis
- stage III – full thickness skin loss exposing subcutaneous fat
- stage IV – exposed muscle, bone, tendons and ligaments (Figure 1).

RISK FACTORS FOR WOUNDS AND POOR WOUND HEALING

- Venous insufficiency
- Arterial insufficiency
- Lymphoedema
- Diabetes
- Poor nutrition
- Dehydration
- Impaired cognition
- Reduced mobility, falls
- Sensory loss (peripheral, vision)
- Cancer
- Cardiac failure
- Renal failure
- Incontinence (urinary, faecal)
- Connective tissue disease
- Medications
- Socioeconomic deprivation

There are two additional categories:

- deep tissue injury – the unbroken skin is discoloured (usually maroon or purple) and there is underlying tissue damage that often progresses rapidly to a stage III or IV pressure ulcer
- unstageable pressure ulcer – the ulcer is covered with slough, eschar (scab) or necrotic debris that disallows visualisation of the wound base.

Further information on pressure ulcer stages is provided in the 'International Pressure Ulcer Guidelines', the joint guidelines of the European and US National Pressure Ulcer Advisory Panels (see the box, 'Useful resources', on page 50).^{4,5}

Moisture lesions, which occur in the gluteal/sacral region and are usually associated with incontinence, are really stage II pressure ulcers.⁴

Prevention of pressure ulcers includes identification of patients at risk (by clinical assessment) and determination of their degree of risk using a validated risk assessment tool such as the Braden Scale or the Norton Scale. Risk factors should be actively addressed.

Regular repositioning of patients who are unable to do so themselves is vital in the prevention of pressure ulcers, as is protection of bony prominences through pressure-relieving surfaces or application of padding to the region. The most common cause of failure of a pressure ulcer to heal or its recurrence is inadequate response to these risk factors – not just an inappropriate choice of wound dressing. Healing may be delayed if there is underlying osteomyelitis.

Venous leg ulcers

Venous leg ulcers are usually shallow and irregular in shape and occur most frequently around the ankle and lower leg – the 'gaiter region' (Figure 2). They are due to venous insufficiency (venous hypertension), which can result from previous deep venous thrombosis, obesity, congestive cardiac failure or severe



Figure 2. A venous leg ulcer, showing the typical shallow and irregular wound. A suitable dressing would be cadexomer iodine antiseptic covered with foam for extra absorption, and compression applied with a three-layer straight tubular stocking.

trauma to the leg. Visible changes include hemosiderin staining, dermatitis, dermatosclerosis ('inverted champagne bottle'-shaped leg) and local skin ischemia ('atrophie blanche'). Lymphoedematous changes often coexist. There may also be arterial insufficiency ('mixed ulceration') but it is vital to recognise and address the venous component.

The differential diagnoses include pyoderma gangrenosum, vasculitic ulcers and neoplastic ulcers. As with all ulcers, healing may be delayed if there is underlying osteomyelitis. The base of a venous ulcer is usually red, although it may be covered in part or fully with slough. There is often abundant exudate.

Arterial ulcers

Arterial ulcers result from the restriction or occlusion of arterial blood flow. They usually occur on the feet or distal leg and have a discrete 'punched out' edge. The base is usually pale and, in the absence of infection or coexisting venous disease, exudate is minimal. As with venous ulcers, minimal trauma may precipitate the ulcer and may lead to the incorrect diagnosis of a traumatic ulcer.

Prevention of trauma and correction of arterial insufficiency are the main ways to reduce the risk of these ulcers.

Diabetic and neuropathic ulcers

People with diabetes are prone to chronic ulcers, mainly in the legs and feet, due to any combination of arterial insufficiency,

loss of peripheral sensation, autonomic dysfunction, infection and foot deformities (motor neuropathy, e.g. Charcot's foot). Co-existing venous insufficiency is common. The ulcers usually occur at sites of pressure or repeated trauma (Figure 3).

Prevention is vital, considering 60% of nontraumatic lower limb amputations are diabetes-related. People with diabetes should never walk barefoot and should check their feet regularly, wear comfortable well-fitting shoes and have good toenail and other podiatry care. Pressure off-loading is vital for ulcers in people with diabetes. Other risk factors, including arterial insufficiency, need aggressive management. Surprisingly, there is little evidence that tight glucose control assists healing of ulcers in diabetes.

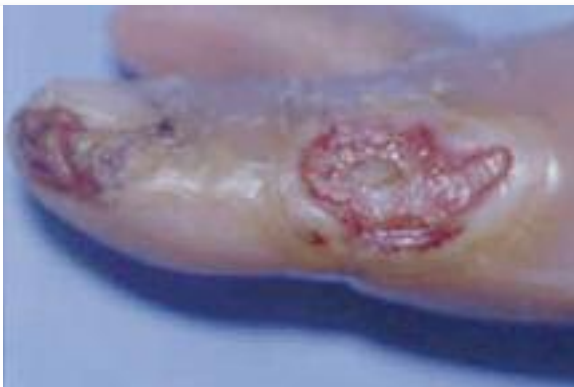
Other neuropathic conditions in people without diabetes are also associated with increased risk of ulceration, and the same general management issues apply.

DIAGNOSIS OF CHRONIC WOUNDS

Most wounds can be accurately diagnosed by consideration of the clinical features described above. A full history and examination is essential and should include details of risk factors for arterial disease and a full list of current and recent medications as well as cognitive, functional and socioeconomic status.

Assessment of the wound should include past episodes, wound location,

Figure 3. An ulcer at a site of pressure on the foot of a person with diabetic neuropathy. Note also the changes to the toenail, a result of repeated trauma and diabetic neuropathy. A suitable dressing would be a foam with silver, secured with tape.



wound edge and base, wound shape and the amount of exudate. For leg ulcers, peripheral sensation and arterial supply should be objectively evaluated using, respectively, a monofilament and a hand-held Doppler (to evaluate the ankle-brachial pressure index [ABPI]). On occasions other investigations may be needed, including biopsy (for histology and microbiology), assessment of osteomyelitis (bone scan or MRI are most accurate) and blood tests (for comorbidity such as anaemia, poor nutrition and renal disease) as well as specific tests relevant to wound diagnosis, including tests for connective tissue disease and cryoglobulins, where clinically indicated.

Wound swabs are often unhelpful – all chronic wounds are colonised and the bacteria revealed by a swab may not be affecting wound healing. Swabs may be useful if clinical features of infection are present.

Venous and arterial duplex scanning may help with diagnosis but can be technically challenging in the presence of a wound. This imaging is sometimes better delayed until after wound healing, when it can be used to guide preventative approaches.

PRINCIPLES OF WOUND MANAGEMENT

The most important principle of wound management is to formulate a management plan and adhere to it for a sufficient time. Frequent changes of dressing types and overall approach add confusion and can culminate in a wound that fails to

heal after many months yet with no clear idea about what has failed and what was working. However, the wound and its management do need to be re-evaluated if healing is suboptimal, as indicated by, for example, less than 25% of surface area reduction over four weeks.⁶ Major considerations in treating a chronic wound include bacterial burden, necrotic tissue and moisture balance.

Bacterial burden

Bacteria and other micro-organisms usually do not delay wound healing. If colonisation progresses to excess burden and then to infection, reduction of burden is required. Bacteria can be very difficult to control as they rapidly form a biofilm that protects against the actions of topical or systemic antibiotics. Signs indicating excess bacterial burden are listed in the box on this page.

Bacterial burden can be reduced by removal of necrotic tissue and use of topical antiseptics and systemic antibiotics.

Examples of topical antiseptics include chlorhexidine, citric and acetic acids (both effective against *Pseudomonas*), dilute iodine and silver. Strong antiseptics such as hydrogen peroxide and stronger concentrations of iodine can damage new tissue and should thus be avoided.

Topical antibiotics are generally contraindicated as they can rapidly select resistant organisms if used repeatedly. Also, some actually inhibit the stages of wound healing. Discussion of the choice of antibiotic to be used for soft tissue infections is beyond the scope of this article.

CLINICAL SIGNS OF EXCESS MICROBIAL BURDEN IN WOUNDS

- Increased pain or tenderness at wound site
- Increased exudate
- Change in exudate colour (to green or yellow)
- Change in wound base colour (to red)
- Wound bleeding
- Wound odour
- Signs of spreading infection (redness, warmth)
- Delayed wound healing

Necrotic tissue

Even when it is not associated with bacterial burden, necrotic tissue impedes healing and should be removed. In fact, the very origin of modern wound management in the 1960s came from demonstration that wounds healed more rapidly when kept moist and eschar free.

Some wound dressings (hydrogels, films and hydrocolloids) soften necrotic tissue and facilitate removal. However, curettage and sharp debridement may be necessary, and this is best performed by practitioners with experience in the procedure. Debriding techniques are listed in Table 1. Debridement of the black eschar on a dry wound, including pressure ulcers in ischaemic areas, increases the risk of infection and is the one time debridement is contraindicated – it essentially converts dry gangrene to wet gangrene.

Moisture balance

Although moist wound management avoids moisture deficiency and facilitates healing, too much moisture can delay wound healing. The exudates of chronic wounds contain high concentrations of proteinases that degrade growth factors and wound matrix components essential for wound healing. Signs of excess exudate include maceration of the wound edge, saturated

dressings and increasing wound size.

If there is excess exudate, a more absorptive dressing may be all that is required. Often, however, greater compression and treatment of infection or comorbid cardiac or renal failure are also required.

WOUND DRESSINGS AND OTHER TREATMENTS

The vast array of modern wound dressings can be perplexing and even intimidating to all but the most specialised wound clinician, and probably contributes to some general practitioners delegating wound management to others (e.g. practice nurses) or retreating to older and potentially less effective approaches. However, a knowledge of the relatively few major dressing classes, including a few examples of products in each class, is easily achievable.

There are many ways to cut the dressing cake but one approach is based on dressings either decreasing or increasing moisture (Tables 2 and 3). Additional properties such as being antiseptic (silver and iodine dressings) or absorbing

TABLE 1. DEBRIDING TECHNIQUES FOR WOUNDS

Debridement method	Comments
Sharp debridement	Adequate analgesia needed Operator must be skilled
Autolytic	Achieved with some wound dressings (e.g. TenderWet) and some other hydrating products, including cadexomer iodine paste
Enzymatic	Collagenase and elastase are examples Not available in Australia
Mechanical	Achieved with wet-to-dry dressings, but painful and may increase healing time Ultrasound and water jet devices increasingly used
Larval	Maggots of green bottle fly, applied directly or in bags

odour (charcoal-containing dressings) can be of value with products in these classes. Other dressings and products that may be useful in certain situations are shown in Tables 4 and 5. Gauze dressings provide non-moist conditions for wound healing and their use is therefore generally not recommended now.

A further approach that general practitioners should have some familiarity

with is the use of compression. This is essential for the healing of venous or mixed venous/other leg ulcers. Crepe and antiembolic stockings do not provide adequate compression, and have no role in wound management itself, although they can help reduce deep vein thromboses in partially immobilised patients. The main types of compression are shown in Table 6.

TABLE 2. WOUND DRESSINGS THAT RETAIN OR INCREASE MOISTURE

Wound dressing class	Properties and comments	Commonly used examples
Transparent films	No absorption May be vapour permeable Can withstand showering	Op-Site Tegaderm transparent dressings
Hydrocolloids	Form a gel when exposed to wound exudate Some transmit moisture, others retain it Most sheet forms are water-resistant so can withstand showering Useful for debridement Contraindicated in diabetic wounds (as occlusive)	Comfeel dressings and paste DuoDERM CGF dressings DuoDERM paste Tegasorb
Hydrogels	Gels (in a tube) or sheet dressings Assist debridement Reduce pain in burns	AquaClear (sheet) DuoDERM gel IntraSite NuGel Purilon gel SoloSite Solugel

TABLE 3. WOUND DRESSINGS THAT REDUCE MOISTURE

Wound dressing class	Properties and comments	Commonly used examples
Calcium alginate	Sodium in wound exchanges for calcium in alginate creating hydrophilic gel Easily removed unless insufficient exudate Some are haemostatic Sheet or rope forms, and some with charcoal	Algisite M Carboflex (with charcoal) Curasorb Kaltostat Sorbsan
Foams	Porous polyurethane Cushioning Some with low-adherent silicone backing Adherent (to skin) and nonadherent versions	Allevyn Allevyn Gentle Lyof foam Mepilex
Hydrofibres	Highly absorbent sodium carboxymethyl cellulose Form a gel when in contact with exudate No lateral spread of fluid so protects peri-ulcer skin Sheet or rope forms	Aquacel Versiva
Hydroactive	Fluid trapped within product itself	Allevyn Thin, Cavity, Compression Biatain Cutinova Hydro
Secondary absorbent padding	Absorb excess moisture to prevent infection/skin damage	Absorb Plus Combine Exu-Dry Mesorb Zetuvit Plus

TABLE 4. WOUND DRESSINGS FOR PARTICULAR CLINICAL SITUATIONS

Clinical situation	Dressing properties	Commonly used examples
Excess bacterial burden	Antiseptic – Gel-like calcium alginate with antiseptic component – Iodine (cadexomer iodine) – Iodine (povidone-iodine) – Silver	Flaminal Iodosorb (paste, powder) Inadine Acticoat (polyethylene) Acticoat Absorbent (alginate) Acticoat Moisture Control (foam) Allevyn Ag (foam) Aquacel Ag (hydrofibre) Atrauman Ag (tulle) Biatain Ag (hydroactive) Mepilex Ag (foam)
Hypergranulation	Hypertonic saline	Curasalt Mesalt
Superficial venous ulceration/venous eczema	Zinc oxide bandage (tubular)	Flexidress Gelocast Steripaste Zip Zoc (tubular)

Other approaches to wound healing include topical negative pressure (also known as vacuum-assisted closure, or VAC), the use of matrix or skin substitutes and the application of growth factors. These require specialist knowledge and skill, and can be very expensive. Occasionally skin grafting or other plastic surgery is required.

THE MULTIDISCIPLINARY TEAM

Wound management is not the domain of a single practitioner: the best approach is collaboration between several health professionals, a general practitioner and a nurse at the least. Others that are routinely required include a geriatrician, vascular surgeon, plastic surgeon, dermatologist, endocrinologist, infectious disease physician, podiatrist, pharmacist, occupational therapist, dietitian and orthotist.

Tips for rural general practitioners are provided in the box on page 50.

WOUND MANAGEMENT IN CARE FACILITIES

People with wounds may be in residential or palliative care. Staff in these care facilities do not always have the skill levels or access to products required to best manage wounds, and may require assistance from specialists in wound care. The Australian Wound Management Association has produced a list of basic wound dressings that should be available in such care settings, and indeed are needed for accreditation (www.awma.com.au/publications/2010_awma_product_list_aged_care_v4.pdf).

WHEN TO REFER

Most patients with chronic wounds can be managed in the community without specialist input but it is important to recognise when extra advice and therapy is required. Signs that a wound is not progressing, or is unlikely to heal without extra advice, are shown in the box on page 50.

KEEPING WOUNDS HEALED

Relapse of wound healing is common, especially with venous leg ulcers, and it is vital to educate and manage the patient to prevent this. Ongoing compression,

TABLE 5. MISCELLANEOUS WOUND PRODUCTS

Product	Properties/comments	Commonly used examples
Coverings	Low-adherent absorbent pads	Cutilin Melolin
Contact layers	Low-adherent mesh or silicone dressings Some impregnated with soft paraffin or hydrocolloid	Adaptic Atrauman Hydrotul Mepitel Urgotul
Retentive bandages	Secure dressings without use of adhesive	Tubifast Tubiform
Tapes	Fix dressings	Fixomull Hypafix Mefix

skin care, foot inspection, adequate nutrition, increased physical activity and revascularisations may all have a role in preventing recurrence.

The Royal District Nursing Service in Victoria is developing a program ('Forever Healed') that addresses some of these issues. It should soon be generally available.

FURTHER INFORMATION

The website addresses of several associations, societies and other sources of further information on wound management

are listed in the box on 'Useful resources' on page 50.

CONCLUSION

A person's skin changes with ageing and older skin is more prone to wounding and usually heals more slowly, especially if the person has comorbidities known to impact on wound healing. Most wounds are managed in the community and can be healed, although achieving this and preventing recurrence can be challenging. A systematic approach

TABLE 6. COMPRESSION BANDAGES AND STOCKINGS FOR WOUNDS

Compression type	Properties and comments	Commonly used examples
Short stretch bandages	Low resting pressure, high to very high working pressure – work when patient upright/walking	Comprilan (single layer) Profore/Profore Lite (multilayer) Coban 2/Coban Lite (two layers) Veno 4 (multilayer)
High stretch bandages	Medium to high resting pressure – best for oedema control	Tensopress Surepress Setopress
Tubular stockings	Easier to apply than bandages Compression determined by number of layers used Also one-layer shaped version	Tubigrip straight (up to three layers) Tubigrip shaped (one layer) Tubular Form
Compression stockings	Class 1 (18 to 24 mmHg compression), Class 2 (25 to 35 mmHg), Class 3 (35 to 45 mmHg)	Jobst stockings Venosan compression stockings

TIPS FOR RURAL GPs

- Most wound management does not require specialist input
- For refractory wounds, a photo of the wound and clinical details sent to a specialist will often enable advice to be given without the patient needing to travel
- Some chronic wounds may be more common in rural settings – e.g. Bairnsdale ulcer (also known as Buruli ulcer and Daintree ulcer; caused by *Mycobacterium ulcerans*)

SIGNS THAT REFERRAL IS NEEDED FOR WOUNDS

- Failure of wound to decrease in size (e.g. reduction of less than 25% at four weeks)
- Increasing wound depth (but may reflect removal of necrotic tissue)
- Exposure of bone or tendon
- Signs of infection and not responding to appropriate antibiotics
- Increasingly painful wound
- Unusual wound appearance
- Very large wounds

involving a multidisciplinary team and sufficient time on a treatment option to allow healing is required. Appropriate wound dressings keep the wound moist (but not too wet) and eschar free, the best environment for rapid healing. **MT**

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USEFUL RESOURCES

Websites

- **Australian Wound Management Association**
www.awma.com.au
- **World Union of Wound Healing Societies**
www.wuwhs.org
- **WoundsWest**
www.health.wa.gov.au/WoundsWest
- **European Wound Management Association**
www.ewma.org
- **National Pressure Ulcer Advisory Panel (in the USA)**
www.npuap.org
- **Wound Management Practice Resource Centre (Surgical Materials Testing Laboratory)**
www.smtl.co.uk

Guidelines

- International Pressure Ulcer Guidelines – the joint guidelines of the European and US National Pressure Ulcer Advisory Panels (EPUAP and NPUAP).

The quick reference versions of both the pressure ulcer prevention and pressure ulcer treatment guidelines are freely available on the EPUAP website:

(http://www.epuap.org/guidelines/Final_Quick_Prevention.pdf

http://www.epuap.org/guidelines/Final_Quick_Treatment.pdf).

The full clinical practice guidelines are available for purchase through the NPUAP website (www.npuap.org).

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FURTHER READING

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COMPETING INTERESTS: Associate Professor Woodward has received honoraria from 3M for speaking at a meeting and from various pharmaceutical and other companies for his participation in several research trials on new wound products, with the funding paid to the Austin Hospital, Melbourne, Vic.

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