WOUND CARE TODAY

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For what matters in practice

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Is dressing choice getting in the way of patient care?

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It's time for a different type of wound care journal

Sometimes in the merry-go-round of conferences, symposia, journals and wound product launches, it can be easy to forget who actually treats the patients. That's why, we wanted to launch a different kind of wound care journal — a journal that looks at wound care from the perspective of the clinician, not the editor; a journal that considers the best way to treat a wound, not always the most cost-effective way; a journal that debates the issues that matter to you.

Our first issue covers the wound care bases with articles that take a practical look at wound assessment, pressure ulcers, leg ulcers, compression therapy, exudate management, infection and skin tears, offering a complete toolkit for any clinician who has to deal with wounds on a day-to-day basis. We have also produced a series of fact-based posters, which tell you how to treat different wound types at a glance.

Here at *Wound Care Today* we believe that although dressings and innovative products are vital, what patients really need is a workforce of well-educated clinicians who understand how to put a patient on the path to a healed wound. That's why we've produced a journal packed full of practice-based articles written by expert clinicians, as well as seeking out opinion pieces from people working on the ground today. We launched this journal because dressings alone don't heal wounds — clinicians are vital too. And this journal is for you.

Jason Beckford-Ball, editor, *Wound Care Today*

WOUND CARE TODAY & wound care alliance UK moving forward together

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An important part of any specialist nurses' role is to share knowledge and skills. Educating and empowering clinicians to effectively assess and treat patients with a wound ensures positive clinical outcomes and continuity in care. This new journal aims to reach all healthcare professionals caring for patients with wounds and inform clinical practice.
Lorraine Grothier

It is an exciting time seeing the *Wound Care Today* journal being launched. This journal provides wound care knowledge from evidence-based practice faced in daily nursing. I hope the journal will enable clinicians to share and enrich practical knowledge in caring for individuals with wounds and improve patient outcomes.
Julie Evans

Wound care and tissue viability can be challenging. As a member of the editorial board, I am committed to help produce a journal which is researched-based, relevant, clinically useful and educational and, in addition, very readable for those looking for support.
Jackie Griffin

It is recognised that healthcare assistants have an important role to play in the delivery of wound care, particularly in the primary care setting. It is hoped that articles published in this journal will enhance the care they give through the provision of appropriate education and support.
Menna Lloyd-Jones

Wound Care Today is aimed at a wide range of practitioners and we are confident that you will find the articles both interesting and reflective of contemporary evidence-based practice. Our aim is to provide you with the knowledge you require to deliver high quality care for individuals with, or at risk of, a breakdown in the integrity of their skin.
Louise Toner

The Wound Care Alliance UK are confident that readers will find the *Wound Care Today* journal a valuable resource for clinicians involved in wound care. The articles are written by experienced authors, providing up-to-date information that reflects and debates current changes within care delivery.
Michelle Greenwood

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A new journal informed by clinical need

Welcome to this first issue of *Wound Care Today*, a joint initiative between the Wound Care Alliance UK (WCAUK) and Wound Care People. The WCAUK was formed when the Wound Care Society and the Tissue Viability Nurses' Association merged in 2010 and its focus is on spreading evidence-based wound care knowledge. To this end, the WCAUK is not restricted to specialists, nor is it an elitist club — while some patients might benefit from seeing a specialist, most will be treated by generalists and it is essential that these nurses are well-informed and motivated to deliver the best care possible.

As the cornerstone of the WCAUK's remit is to provide accessible wound care knowledge, the charity has joined forces with Wound Care People to publish a genuinely innovative journal with articles written by a combination of WCAUK trustees and other experts in tissue viability. We are confident that you will find the articles relevant to the everyday practitioner, and we have taken a consistent approach to each topic — including prevention, assessment and management — to ensure that the fundamental aspects of wound care are covered. The journal also includes informed debate and opinion pieces to keep you up to date with the latest issues in wound care.

To further the WCAUK's aim of providing targeted wound care knowledge, it will soon be launching an online questionnaire through its website (http://www.wcauk.org). We want to find out the biggest challenges you face 'on the ground', and what your key suggestions would be to improve clinical outcomes for patients. All questionnaires will be analysed and with the support of our trustees we hope to provide some useful feedback — don't miss this opportunity to have your say. We will also be holding an event later in the year (26 November, 2014), which will focus on the care home sector, including hands-on workshops led by trustees.

Finally, as Chair of the WCAUK, I will be exploring how we can work more closely with industry. We are really pleased to have so many sponsors on board and they are essential if the charity is to achieve its objectives. All that is left to say is that I hope you enjoy the journal, and we will keep you informed of any developments through the WCAUK website...

Jackie Stephen-Haynes, Chair of the Wound Care Alliance
April, 2014

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In each issue of *Wound Care Today* we investigate a hot topic currently affecting our readers. In this issue...

Is dressing choice getting in the way of patient care?

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Here is a challenge for you. How many different types of wound dressing can you name without really thinking? Foams, hydrogels, hydrocolloids, superabsorbers, alginates, films, silicone... the drug tariff list is extensive. The list then drills down into the different formulations of dressings in each category — do you want your dressing to be adhesive, non-adhesive, bordered, or antimicrobial? Then there are the different shapes on offer, sacral, heel, circular, triangular or square? Then comes size...

The last decade has been a golden period for wound care with more dressings and wound technology available than ever before. In addition to the traditional dressings there are debridement pads to remove slough; wound checkers that can assess the protease levels in a wound; and negative pressure wound therapy (NPWT) to encourage healing and manage exudate.

But, as wonderful as it is to have access to all of this new wound care technology — sometimes too much choice is not necessarily a good thing. The problem with the explosion of wound technology is whether clinicians actually know how to use it all? Can you, hand on heart, be confident that you have always chosen the right product or technique for your patient, or that there isn't something better out there?

Similarly, are you ever in danger of letting the dressing do the thinking for you? Although these products are great, they can't assess wound conditions or tell you when they need to be changed. In short, having the latest dressing, doesn't mean we can absolve our clinical responsibility.

Take compression therapy, for example, a difficult enough procedure to get right and one that already has a raft of different

The key to appropriate dressing selection is a detailed assessment that includes the wound, periwound and general skin health. The cause of the wound is often a good clue to management and always remember that dressings do not heal the wound, they support the body to heal by managing symptoms. Similarly, there isn't one perfect dressing to use — stay focused on what the objective of wound management is and select dressings that will help you to achieve this.

Jackie Stephen-Haynes, Professor in tissue viability, Birmingham City University and consultant nurse, Worcestershire Health and Care Trust

bandaging and hosiery options. A recent article in the *Journal of Community Nursing* (www.jcn.co.uk) highlighted that nurses are struggling to cope with the basics of compression therapy, let alone deal with all the new technology that has appeared in the last 20 years.

However, we are in danger of being a little negative. Rather than bemoaning the confusing array of new products, what we actually need is a greater focus on the education of nurses and other clinicians in the basics of wound healing. After all, we can put as many different dressing products on a wound as we like, but if we don't understand the basics of moist wound healing or bioburden, for example, all the technology in the world isn't going to help us and a dressing certainly isn't.

While we all welcome the significant investment in product research and design, what we really need is a workforce that is confident in identifying the causes of a wound, knowing what is needed to provide the optimum healing environment, and how to deliver this using the right dressings and technology. It is also important to recognise that as the wound conditions change, so too must the dressing to meet the new circumstances. This can only come from understanding how to monitor the wound's progress and react accordingly.

Technology is important, but without the basics it really doesn't matter whether you use a medically-treated honey, a bovine-derived skin graft, or a PHMB dressing. The end result will be exactly the same — and your patients might not thank you for it. WCT

Advances in wound care technology have provided more choice and increasingly positive wound healing outcomes. Of course, nurses are aware of the wound healing process, assessment and management. However, our biggest challenge lies in choosing the correct dressing — wider choice equals more confusion. Are we confident in the advantages and disadvantages of using each dressing? Training in dressing choice is vital, otherwise we risk making inappropriate dressing choices, providing inadequate care and increasing costs.

Julie Evans, Tissue viability nurse, Abertawe Bro Morgannwg University Health Board, Swansea

Advances in technology mean that health professionals providing wound care are exposed to a plethora of dressings. However, having access to such a wide range of products can also cause confusion and lead to poor wound management. Health professionals have the potential to change a person's life and significantly improve their wellbeing. Therefore, the decisions they make must be based on a clear understanding of the wound healing process, the science behind the dressing, but most importantly, the needs of their patient. Working in partnership with the patient promotes concordance and prevents wastage of products and poor clinical outcomes.

Lorraine Grothier
Clinical nurse specialist tissue viability, lymphoedema manager, Provide, St Peter's Hospital, Maldon, Essex

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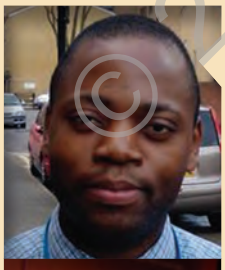
The state of wound care today

Health care is changing faster than ever before — at least that's what we are constantly being told from above. The government's agenda aims to put patients first, with a renewed focus on quality (particularly in the domains of safety, effectiveness and patient experience), with clinicians delivering this quality through innovation, productivity and prevention (QIPP). Of course, you have to do all of this while also achieving the best healthcare outcomes in the world (Department of Health [DH], 2010) and working within tight financial constraints. If this sounds like a lot to think about on top of your everyday workload, that's because it is.

So, where to start? With an aging population and care being increasingly delivered in people's own homes rather than in hospital, it is becoming more important for those delivering care to listen to what their patient's want as well as ensuring that they have a positive clinical 'experience'. But what does all this policy actually mean for nurses, healthcare assistants and other clinicians working in wound care? Do you necessarily understand what all these changes mean for you? And are you equipped with the skills to actually carry out the changes?

In this first Wound Care Today discussion, we ask two expert wound care practitioners, Edwin Chamanga and Jeanette Milne, for their views on the state of wound care provision today, whether clinicians have the right skills to deliver the government's vision and, if not, what they need in the future. The results make for interesting reading...



Edwin Chamanga, *tissue viability service lead, Ipswich Hospital NHS Trust*

Jeanette Milne, *tissue viability specialist, South Tyneside Foundation Trust; Chair, North East Tissue Viability Professional Forum*

WHAT DO YOU THINK IS THE CURRENT STATE OF WOUND CARE PROVISION IN THE COMMUNITY

Having worked for different community healthcare providers, it is evident that the provision of community wound care services varies from one trust to another. Some offer better services than others, depending on the patients they are serving, their level of affluence, the trust's demographics and local population comorbidities. Better provision can be seen in those communities where the integration of acute and community services has been implemented successfully, helping to facilitate patient follow-up. From my experience of working in London, and reading reports and discussions of what is happening across the country, in general, the provision of wound care in the community is fragmented. **EC**

Like all aspects of the health service, there are areas/localities and people that excel, those that provide an adequate service, and services that are failing to meet the required standards. The challenge is to celebrate good practice, while encouraging continuous improvement and balancing that with the ability to challenge poor practice **JM**

WHERE THERE ARE GAPS IN KNOWLEDGE/PROVISION, WHAT DO YOU THINK HAS CAUSED THESE

In some places the gaps are a result of local healthcare needs' prioritisation, where wound care is not considered to be on top of the service provider's agenda. This can be a direct result of changes in service provision across the country, with some community services being run or provided by security companies, for example. In some local areas, this has impacted hugely on the patient/community nurse ratio; yet, the amount of time it takes to holistically assess a patient with wound care needs has not changed. On the other hand, it is also the lack of knowledge of frontline staff. From a personal interview with frontline staff, it was highlighted that their training or study days had been cut back due to financial constraints within the organisation. In addition, as nursing/care homes are private entities, they are expected to provide their own wound care expertise, which, in many cases, simply does not happen. **EC**

The gaps in knowledge and skills are variable and depend on a multitude of factors, which can be as broad as organisational restrictions on access to education and training, staff motivation — be this from a personal or cultural point of view — and/or time-constraints, due to competing/conflicting interests and requirements. Community teams responsible for wound care also look after other aspects of care, e.g. palliative and other long-term conditions, such as diabetes. In many areas, while wound care represents the largest percentage in

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terms of visits and time spent, staff are seldom allowed to specialise in this area alone.

The aging population and care closer to home have led to increasing demands on community healthcare teams, causing an increased number of daily calls per nurse as a result of financial constraints. In addition, the skill mix in community teams has changed and a greater number of junior staff are taking up community roles. These staff can and do offer excellent care to patients, however, the ability to influence change in the teams can be difficult if those in hierarchical positions are resistant. In turn, the introduction of these junior roles has led to experienced district nurses becoming office-based coordinators of care, as opposed to seeing patients. The number of daily visits often leads to a task mentality to enable the nurse to survive the day so to speak, as they have little or no time to reflect or plan next steps of care. Time to stop and think is essential. This is further reinforced by the target-driven litigious healthcare system, with documentation being key. However, the amount is ever-increasing and I would question its correlation to improved care. **JM**

WHAT ARE THE MAIN CARE AREAS THAT ARE MISSING OUT (PRESSURE ULCERS, LEG ULCERS, ETC)

Leg ulcer care has been missing out for years, with the government not acknowledging that it is a chronic condition for many of its sufferers, affecting a significant proportion of the population. Pressure ulcers recently gained attention, being seen as 'never events' and indicators of the quality of care given. Straightaway that shifted the focus from any other form of wound care to pressure ulcers. With zero tolerance and CQUIN targets on pressure ulcers from the commissioners, it is only fair to assume that clinicians become much more focused on treatment and avoidance of pressure ulcers than any other wound types. **EC**

Most wound care services are based on reactive as opposed to proactive models of care. For example, how many of us offer preventative leg ulcer screening services? Much focus has been placed on surgical site infection (SSI) reduction and preoperative screening, and high risk patient identification and interventional wound management to avoid complications, as opposed to dealing with the consequences of care. Lessons could be learnt from this approach in other areas of wound care. **JM**

WHAT IS THE MAIN DRIVER FOR ENSURING THAT ADEQUATE WOUND CARE IS PROVIDED IN THE COMMUNITY?

Highlighting that cancer wounds, leg ulcers, burns and any other form of wounds can be as emotionally, socially, financially expensive and debilitating as pressure ulcers. **EC**

We have conflicting drivers and therein lies the problem. As suggested above, alongside an aging population, we are reducing budgets in real terms with an increasingly target-driven system and an aging workforce. To address this, we need to look at roles and responsibilities across the board. What is the role of the tissue viability service, how does this link with other services, what is the role of the nurse, GP, and professionals allied to medicine (PAM). For example, access to community physiotherapy, dietetics and enablement teams for housebound patients is a precious but limited resource, which is essential to prevent pressure ulcers and ensure function. In addition, engaging GPs and other stakeholders in the adoption of a proactive as opposed to reactive service that specialises in wound care. Patients should be triaged into the right service at the right time.

We also need to explore what is reasonable in respect to patient responsibility, with regard to self-care and concordance, or conversely, if they refuse treatment, what responsibility do the staff looking after them have? When is it ok to withdraw services and allow self-care of chronic long-term conditions with minimal support. **JM**

IN THE FUTURE, WHAT ONE THING DO YOU THINK COULD BE DONE TO ENSURE THAT PATIENTS WITH WOUNDS RECEIVE THE CARE THEY NEED

Lobby the government to consider the fact that all wounds can be debilitating and impact on patients' quality of life, irrespective of their nature and origin. **EC**

The key to success is consistency of messaging to staff, patients and other key stakeholders. This requires the use of clear, concise teaching, aide memoires/reference guides, and patient information, which are adopted regionally, nationally and internationally that demystify wound management and embrace technology and patients' ability to self-care and access information. While some would criticise this 'cook book' approach to wound care, it ensures a basic level of care from which to build. In addition, it avoids clinicians reinventing the wheel, and also helps build the body of evidence, as it enables comparison of real life data, which can be used to monitor patient outcomes in a meaningful way. **JM**

REFERENCE

Department of Health (2010) *White Paper: Equity and Excellence: Liberating the NHS*. DH, London

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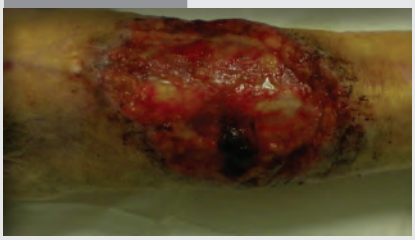
Wound management can seem complicated...

... with so many wound types, dressings and products, that when you are confronted with an actual wound it can be hard to know where to start. However, there are some fundamental principles that every clinician needs to know when assessing and managing wounds, and these can form the basis of your decision-making. This article provides an overview of these key areas.

Wound definitions

Acute wounds



Acute wounds heal without complications in an expected timeframe, following the normal wound healing process of haemostasis, inflammation, proliferation, and maturation. Such wounds usually result from surgery or trauma.

Chronic wounds

Chronic wounds do not follow the normal healing process but become stuck in one of the stages, resulting in delayed healing or a failure to heal. A wound that has been present for more than one month is generally regarded as chronic. Such wounds include diabetic foot ulcers, pressure ulcers, leg ulcers, and malignant wounds.

Wound types

Surgical wounds

Surgical wounds are created by incisions and excisions in a sterile environment, so have minimal tissue damage, are usually clean, and in areas that avoid blood vessels and nerves.

However, if the injury is caused before the surgical procedure, i.e. in a traffic accident or stabbing, the risks of infection are higher.

Trauma wounds

Trauma wounds occur when an object penetrates the skin. Their seriousness will depend on the extent of the force that caused the injury, and so can range from minor abrasions to serious, life-threatening injuries, including skin tears, grazes, lacerations and penetration wounds.

Diabetic foot wounds

Three factors are usually the cause of diabetic foot wounds: peripheral neuropathy, peripheral arterial disease, and abnormalities of the foot. Their management can be challenging due to these inter-related causes, and should involve the multidisciplinary team. They are a major cause of limb amputations.

Pressure ulcers

These are localised areas of damage to the skin and underlying tissue as a result of pressure, friction or shear, or a combination of these factors. They usually occur over bony prominences, such as the sacrum, heels and hips. The majority are preventable, so risk assessment is essential.

Leg ulcers

These usually occur as a result of an underlying disease process, such as venous, arterial or a mixture of venous/arterial disease. Chronic oedema — swelling greater than three months — can develop if leg ulcers of venous origin are left untreated, along with other irreversible skin changes.

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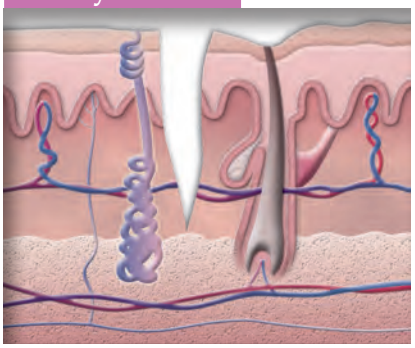
The truth about moist wound healing

Did you know that a moist wound environment has long been recognised as the best condition for wound healing?
Myths such as letting the air get to wounds, leaving them to dry out, or leaving scabs in place, makes healing take longer and puts the wound at risk of infection...

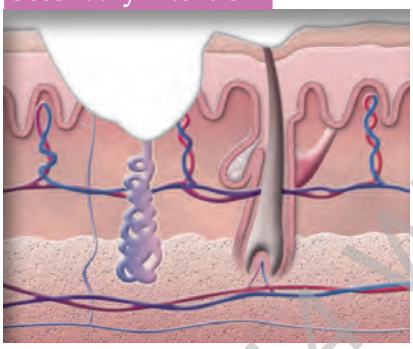
Wound healing

Primary intention



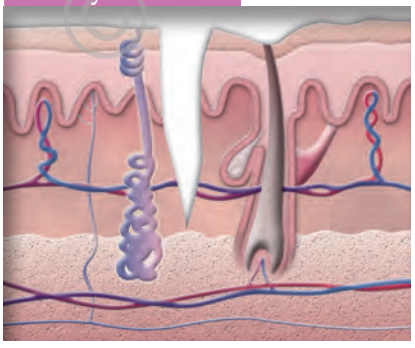
Wound edges are approximated and closed at the time of surgery with sutures, staples, tissue adhesives, for example.

Secondary intention



The wound is left open following surgery, and allowed to heal gradually through granulation, contraction and epithelialisation.

Tertiary intention



The wound is left open for a short time following surgery, and then the edges are approximated and the wound closed.

Tissue types

Black

Dead (devitalised, necrotic) dehydrated tissue (eschar). It cannot regenerate itself, and provides an environment for bacteria to develop. It can also hide the wound bed, thus hindering wound assessment.

Yellow

This sloughy tissue is made up of dead cells and wound debris. It can be fibrous and will not wash off the wound bed. As with necrotic tissue, it can delay the healing process.

Remove from the wound bed

Red

This tissue indicates that healing is taking place. It is moist, bright red and slightly bumpy in appearance. It can be damaged or dry out, as it is not covered with epithelium.

Pink

This indicates the final stages of healing as new epidermis forms.

Protect on the wound bed

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WOUND CARE TODAY

Pressure ulcer prevention

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About pressure ulcers

- Pressure ulcers (PUs) are areas of localised tissue damage caused by unrelieved pressure, or exposure to friction or shear forces.
- They commonly occur over bony prominences, such as the heel or sacrum.
- They range in severity from categories 1 to 4[1]. The majority of PUs are avoidable.
- Avoidable pressure ulcers are considered to be indicative of the quality of care given, with their prevention/reduction being cited as one of the Department of Health's [DH] high-impact actions [2].

Risk factors for pressure ulceration

- Individuals with certain conditions or who are exposed to particular external environments are known to be at an increased risk of developing PUs.
- These risk factors are known as intrinsic and extrinsic risk factors, respectively, and include:
  Intrinsic: immobility, sensory impairment, age, nutritional status/hydration, incontinence and chronic illness
  Extrinsic: pressure, shear, friction, moisture, medication, poor handling techniques.
- To prevent the development of avoidable pressure ulcers, these risk factors must be identified and, where possible, removed.

Risk assessment

- The patient's risk of developing an avoidable PU should be assessed within 2–6 hours of presentation by a qualified healthcare professional.
- Risk assessment tools can be helpful, although clinical judgement should always be employed and local policy followed.
- As part of holistic patient assessment, risk assessment should consider:

Mobility	Nutrition/hydration	Incontinence	Skin	General health
❯ Can the patient move to relieve pressure, or do they need repositioning? ❯ If so, are they being handled correctly? ❯ How are they sitting/lying? ❯ Is poor posture	❯ Is the patient losing weight (are their clothes or rings loose)? ❯ Does the patient have difficulties with chewing/swallowing? ❯ Is the patient	❯ Is the patient incontinent? ❯ Urinary incontinence raises skin pH making it ideal for bacterial growth[3] ❯ Faeces contain enzymes which degrade the skin[3] ❯ Urine and faecal incontinence result in more skin damage in combination	❯ Is the skin moist (from sweat, wound exudate, incontinence)? ❯ Increased moisture on skin makes it more vulnerable to pressure damage[3] ❯ Is the skin dry? ❯ Is the skin fragile? ❯ Is non-blanching erythema	❯ Does the patient have any conditions which may affect blood supply, such as diabetes? ❯ Does the patient have acute, chronic, or terminal illness? ❯ Is patient cognitively able to recognise risk?

leading to pressure?
- Is the patient immobile, e.g. spinal injury or cast?

hydrated?

than either alone[3]
- Increased washing of skin exposes it to friction[3]

(the skin does not change colour on application of light finger pressure) present?

- Is the patient on any medications?
- Does the patient have sensory impairment?

Skin care

- Good skin care to maintain integrity and reduce vulnerability to pressure, friction and shear is paramount for pressure ulcer prevention:
  - Always clean the skin after an episode of incontinence
  - Use soap substitutes/emollients for washing, rather than soaps, which can dry out the skin
  - Gently pat the skin dry, rather than rubbing, which can damage vulnerable skin
  - Apply barrier creams to help protect and moisturise dry skin.

Pressure relief

- Relieving pressure is essential for patients with, or at risk of pressure ulcers. This can be achieved by:
  - Encouraging patients to reposition themselves if they are able
  - Repositioning them at regular intervals, if they are unable to move themselves. Care should be taken to avoid dragging, as this can cause tissue damage through friction and shear
  - Using pressure-reducing/relieving equipment or products to help remove/reduce pressure and provide comfort. These include mattresses, cushions, and positioning products. The latter are especially helpful to relieve/reduce pressure, friction and shear, which in turn reduces harm and costs, in specific at-risk anatomical locations, such as the heel[4].

Review and reassess

- Regularly reassess patients, e.g. whenever washing and dressing, and at dressing changes, as pressure ulcers can develop rapidly.
- Timely intervention and management is essential to reduce incidence and ensure patient wellbeing.

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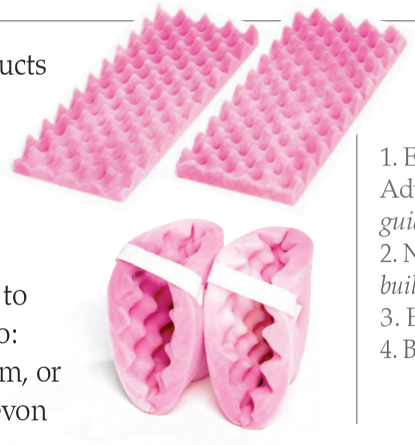

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IN BRIEF

- It is estimated that 95% of all pressure ulcers are preventable.
- Development of avoidable pressure ulcers is seen as an indicator of poor nursing care.
- Trusts who fail to prevent avoidable pressure ulcers can incur financial penalties.
- This article discusses the cost and incidence of pressure ulcers, and the use of care bundles in preventing their development.

KEYWORDS:

- Pressure ulcer prevention
- Risk assessment
- Avoidable and unavoidable pressure ulcers
- Care bundles

Pressure ulcer prevention: a priority

Menna Lloyd-Jones

According to the Declaration of Rio (2011), pressure ulcers are a major health problem affecting millions of people worldwide. They are attributed to deteriorating patient health and quality of life, and can eventually lead to disability and/or death.

Pressure ulcers are categorised using the European Pressure Ulcer Advisory Panel/National Pressure Ulcer Advisory Panel (EPUAP/NPUAP, 2009) category system (*Table 1*). Pressure ulcers most commonly occur on the sacrum and heel, but can be found over any bony prominence and, although more prevalent in the elderly, can affect patients of any age, in any care setting (EPUAP/NPUAP 2009).

INCIDENCE

In the UK, the incidence in acute care varies between 4% and 21.9% (Posnett and Franks, 2007; Vanderwee et al, 2007). In 1999/2000, the incidence of pressure ulcers in acute medical and surgical specialities within the UK was reported as 4%. Excluding mental illness, learning disability and obstetric admission, there were 7.95 million admissions during those 12 months. Working on a 4% incidence of pressure ulcers, a total of 320,000 patients would have developed pressure ulcers during that time period (Posnett and Franks, 2007). The National Patient Safety Agency (NPSA, 2010) claimed that pressure ulcers were not only a problem among the old and ill, but can occur in any age and in any location. Indeed, since 2005, they had received around 100 patient safety incidents of women developing pressure ulcers in maternity wards having given birth. Furthermore, with an increasing elderly population, the problem is inevitably set to increase (Costa, 2013).

Figure 1. *Category 1 pressure ulcer.*

Pressure ulcers are not only detrimental to patients, they are also costly for the NHS. An estimated annual national cost of pressure ulcer care in the UK is up to £4 billion, with the cost of treating the most severe pressure ulcers ranging from £11,000 to £40,000 per person (NPSA, 2010). However, the majority of pressure ulcers are avoidable (Clark, 2007), with the NPSA (2010) highlighting

THE SCIENCE

A pressure ulcer is defined as localised injury to the skin and underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear. A number of contributing or confounding factors are also associated with pressure ulcers, although significance of these is yet to be elucidated (EPUAP/NPUAP, 2009).

Menna Lloyd-Jones, retired senior nurse, tissue viability, North Wales

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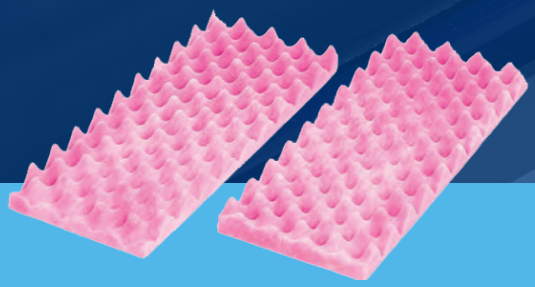

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pressure ulcer prevention as a priority for healthcare staff across all areas of the NHS and urging NHS organisations in England and Wales to work towards zero tolerance for all avoidable pressure ulcers within hospital and community settings.

For the purpose of this article, only category 1 pressure damage will be explained (*Figure 1*), as these ulcers are the most commonly seen by non-wound care experts.

CATEGORY I: NON-BLANCHABLE ERYTHEMA

Non-blanching erythema is detected by applying light finger tip pressure to the reddened area for around 10 seconds. The pressure is then released and if the area is white and returns to its original colour, there is good blood supply and the patient has a normal reaction to pressure. However, if on release of pressure there is no change in colour, this indicates the beginning of pressure damage and should be recorded as a category 1 pressure ulcer (Cooper, 2006). For patients with darkly pigmented skin, the skin needs to be checked for indications of localised heat, or where there is damage, coolness, localised oedema and induration (EPUAP/NPUAP, 2009).

Wound facts...

Avoidable pressure ulcers:

The person receiving care developed a pressure ulcer and the provider of care did not do one of the following:

- Evaluate the person's clinical condition and pressure ulcer risk factors
- Plan and implement interventions that are consistent with the person's needs and goals, and recognised standards of practice
- Monitor and evaluate the impact of the interventions; or revise the interventions, as appropriate.

(NPSA, 2010)

Table 1: Pressure ulcer categories (EPUAP/NPUAP, 2009)

Category	Description
Category 1: Non-blanchable erythema	› Intact skin with non-blanchable redness in a localised area, usually over a bony prominence › Darkly pigmented skin may not have visible blanching; its colour may differ from the surrounding area. The area may be painful, firm, soft, warmer or cooler, as compared to adjacent tissue
Category 2: Partial-thickness skin loss	› Loss of dermis presents as a shallow open ulcer with a red pink wound bed, without sloughy tissue › May also present as an intact or open/ruptured serum-filled or sero-sanguinous filled blister › Shiny or dry shallow ulcer without slough or bruising (a sign of deep tissue injury)
Category 3: Full-thickness skin loss	› Subcutaneous fat may be visible but bone, tendon or muscle are not exposed › Sloughy tissue may be present but does not obscure depth of tissue loss › May include undermining and tunnelling › Depth of pressure ulcer varies depending on its anatomical location. The bridge of the nose, ear, occiput and malleolus do not have (adipose) subcutaneous tissue and category 3 ulcers can be shallow
Category 4: Full-thickness tissue loss	› Full-thickness tissue loss with exposed bone, tendon or muscle › Slough or eschar may be present › Often includes undermining and tunnelling › Depth of pressure ulcer varies depending on its anatomical location. The bridge of the nose, ear, occiput and malleolus do not have (adipose) subcutaneous tissue and these ulcers can be shallow › Can extend into muscle and/or supporting structures (e.g. fascia, tendon or joint capsule), making osteomyelitis or osteitis likely to occur › Exposed bone/muscle is visible or directly palpable
Additional US categories that are now being used in the UK	
Unstageable	› Full-thickness tissue loss where the depth of the ulcer is hidden by slough and/or eschar in the wound bed › Until enough slough and/or eschar are removed to expose the base of the wound, the depth cannot be determined (it will be either a category 3 or 4 pressure ulcer)
Suspected deep tissue injury (SDTI)	› Purple or maroon localised area of discolored intact skin or blood-filled blister, as a result of damage to underlying soft tissue from pressure and or shear › May be difficult to detect in individuals with darkly-pigmented skin › A thin blister may develop over the dark wound bed and the wound may become covered with thin eschar

PREVENTING AVOIDABLE PRESSURE ULCERS

Risk assessment

The first step in preventing pressure ulcers is identifying those patients at risk. The National Institute for Health and Clinical Excellence (NICE, 2005) recommends that every patient should have a risk assessment undertaken by a healthcare professional who has had the appropriate training within six hours of admission (local policy should also be considered, as many areas now put this between two and six hours of admission), or at first assessment in the community. This assessment should be undertaken using a risk assessment tool to support professional judgement.

Risk assessment tools

There are several risk assessment tools available depending on the organisation and patient setting. Each includes many of the risk factors associated with pressure ulcer development, namely:

- Mobility
- Activity
- Nutritional status
- Age
- Compromised vascular supply
- Medical conditions, i.e. diabetes

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- Moisture, including incontinence of urine and/or faeces, and excessive perspiration
- Medication
- Sensory perception
- Friction and shear.

The aim of any risk assessment tool is to identify risk factors and implement care interventions that will correct or reduce the deficits and help to prevent pressure ulcer development (Guy, 2012).

PLAN OF CARE AND CARE BUNDLES

Once identified as being at risk of developing a pressure ulcer, patients need to have a plan of care and care bundle for pressure ulcer prevention initiated. Care bundles are a popular method of delivering structured care. They are a small set of evidence-based interventions/recommendations for a defined patient population within a specific setting. When implemented together, the outcomes are significantly better than when implemented alone (Institute for Healthcare Improvements, 2011).

The care bundle for the prevention of pressure ulcers is the 'SKIN or SSKIN Bundles' (Institute for Healthcare Improvements, 2011). SKIN OR SSKIN represents:

- Skin inspection
- Surface
- Keep moving
- Incontinence/moisture
- Nutrition and hydration.

Skin inspection (assessment)

Skin inspection is undertaken and documented as part of the initial risk assessment (EPUAP/NPUAP, 2009). It is an integral part of pressure ulcer care and should be undertaken to:

- Identify any existing skin or pressure damage
- Assess the patient's overall skin condition
- Devise a plan of care.

Top tip:

Pressure ulcer prevention care is an essential component of care for all patients.

For example, moist or dry, undernourished and fragile/aged skin is more prone to pressure damage, so early identification of these factors and appropriate skin care can reduce the risk of pressure ulcer development (Wilson, 2012).

The frequency of any subsequent skin inspection is determined in response to the initial skin and risk assessment, and also to changes in the individual's condition. However, patients at risk, or those with existing pressure damage, should have a skin assessment undertaken as per care bundle, or at least once per shift (NICE, 2005; Wilson, 2012).

Surface

The surface includes pressure-reducing equipment which may be required. This may include one or a combination of the following:

- Mattresses
- Cushions
- Redistributing equipment, such as aids that will lift the patient's heel off the bed.

NICE (2005) recommends that all patients at risk, or with a category 1 or 2 pressure ulcer should, as a minimum, be issued with a high specification foam mattress for their bed. As sitting out of bed puts the patient at the same if not higher risk of pressure ulcer development, NICE (2005) recommends that these patients should be issued with a high specification cushion. NICE (2005) goes on to state that patients at high risk, or with pressure damage, should have periods of sitting in a chair restricted to no more than two hours.

It is also important to ensure that incorrect equipment is not used, such as sheepskin products and water-filled gloves (NICE, 2005). Where possible, the use of equipment should be discussed and agreed with the patient. If they decline pressure-reducing equipment, this should be documented.

Keep moving

Keeping patients mobile is important to reduce pressure. Where possible, they should be encouraged to move themselves to maintain their independence (NICE, 2005; EPUAP/NPUAP, 2009). However, if the patient is immobile or has cognitive impairment, and does not understand the importance of keeping mobile, they will have to be repositioned. If possible, this should be agreed with the patient.

Did you know:

The longer pressure is exerted over a bony prominence, the higher it becomes and the more likely the patient is to develop pressure ulcers.

Incontinence/moisture

Incontinence has been identified as a risk factor in the development of pressure ulcers, so good skin care is important to prevent pressure damage. The normal pH of the skin is between 4.0 and 5.5. To keep the skin intact it is essential to maintain the acidic pH of the skin. With incontinence, ammonia is produced as a result of the breakdown of urinary urea and aggravated by faecal urease, resulting in an increase in the pH of the skin. The skin becomes more permeable when the pH rises, which is exacerbated by excessive moisture and eventually causes invisible breaches on the skin's surface. Once the barrier function of the skin has been breached, it is more vulnerable to bacteria, which leads to the development of moisture lesions, increasing the risk of pressure damage (Beldon, 2008; Costa, 2013).

Thus, it is important to remove any urine or faeces from the skin's surface as soon as possible.

Washing with soap and water can change the pH of the skin from acidic to alkaline, which, in turn, can lead to the skin drying out and cracking. In the same way, washing with soap can remove the natural lipids which help to maintain barrier function and also reduce the thickness of the outer layer of the epidermis (Best Practice Statement, 2012; Voegeli 2007).

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Top tip:

Be careful not to mistake pressure ulcers for other types of skin damage, such as moisture lesions as a result of incontinence or sweat.

The recommendations are to wash the skin using a non soap cleanser or low pH soap. The skin should be patted dry and protected with an appropriate barrier cream, which is compatible with any incontinence products used (Voegeli, 2007; Beldon, 2008).

Nutrition and hydration

Nutrition is an important factor in both the prevention and treatment of pressure ulcers (Johnston, 2007), and NICE (2005) recommends that all patients should have a nutritional assessment as part of their initial risk assessment. Nutritional screening should be in place in all healthcare settings (NICE, 2006).

There are several screening tools to aid assessment and help identify those patients with, or at risk of malnutrition, for example the Malnutrition Universal Screening Tool (MUST, British Association for Parenteral and Enteral Nutrition [BAPEN]). Those identified at high risk, will need nutritional support/ supplementation based on:

- Nutritional assessment
- Overall health condition
- Preference
- Expert advice from, for example, a dietician (NICE, 2006).

Wound facts...

Unavoidable pressure ulcers:

The person receiving care developed a pressure ulcer, although the care provider:

- Evaluated the person's clinical condition and pressure ulcer risk factors
- Planned and implemented interventions that are consistent with the person's needs and goals and recognised standards of practice
- Monitored and evaluated the impact of the interventions; or revised the interventions as appropriate.

Or:

- The individual person refused to adhere to prevention strategies despite being educated about the consequences of non-adherence.

(NPSA, 2010; Sibbald et al, 2010; BPS, 2012)

UNAVOIDABLE PRESSURE ULCERS

It has been recognised that despite providing appropriate risk assessment and pressure ulcer prevention strategies, patients can still develop pressure damage (Sibbald et al, 2010). This can be frustrating for healthcare professionals who care for these patients and has, on occasion, been mistaken for poor care resulting in complaints and litigation. It is, therefore, vitally important that all aspects of care given, equipment provided or declined, are documented and that patients are referred appropriately.

Furthermore, in some vulnerable groups of patients, particularly those at the end of their lives, despite the implementation of an appropriate package of care, pressure damage is unavoidable. Again, healthcare professionals should document all care and information given to the patient.

Patients and the public also have a responsibility to understand how pressure ulcers develop and how they can help to prevent them for themselves and/or members of their family. The Your Turn Campaign is one way of educating the public (www.your-turn.org.uk/).

CONCLUSION

The majority of pressure ulcers are avoidable and healthcare professionals in any care setting have a responsibility to prevent their occurrence. In recent years, a small set of evidence-based interventions called care bundles have been used to provide effective evidence-based care. WCT

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IN BRIEF

- The prevalence of leg ulcers means that they represent a significant management challenge as well as an added pressure on resources.
- Although lower limb ulceration increases with age, it should not be seen as a condition that primarily affects elderly people.
- Many young patients now present with lower limb problems, meaning a lifetime of skin care and compression therapy.
- This article looks at the management of venous leg ulcers, the most common form of lower limb ulceration.

KEYWORDS:

- Venous leg ulcers
- Oedema
- Compression
- Concordance
- Vascular assessment
- Skin care

Assessment and management of venous leg ulcers

Jackie Griffin

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Approximately 70% of all leg ulcers seen in clinical practice are caused by underlying venous disease, with the remaining 30% made up of ulcers resulting from arterial disease, mixed venous/arterial disease, or conditions such as diabetes and rheumatoid arthritis (Ravaghi et al, 2006). Thus, when a patient presents at clinic with a non-healing leg wound that they report as being originally caused by a dog bite or being hit by a supermarket trolley, it is most likely to be a venous leg ulcer. In many cases, until an accident occurs resulting in wounding, the underlying nature of the problem has not yet manifested itself. In other words, the ulcer is a symptom of an, as yet, untreated and unrecognised medical problem. Treatment of the ulcer should begin with management of the underlying condition.

WHAT CAUSES VENOUS LEG ULCERS?

Normal venous return

In a healthy venous system, deoxygenated blood in the lower limbs has to return to the heart against gravity. Blood is propelled from the lower limbs to the heart, mainly by the calf muscle pump. As the leg moves, the calf muscle contracts to become shorter and thicker, and compresses the deep vein it surrounds. This increases the pressure within the vein, forcing blood up the leg towards the heart and preventing it flowing back into the superficial veins near the surface of the skin. One-way valves in the leg close to prevent the backflow of blood. When the muscle relaxes, the deep vein refills, draining blood from the superficial veins. This action is enhanced by the foot pump, which is triggered by walking and standing.

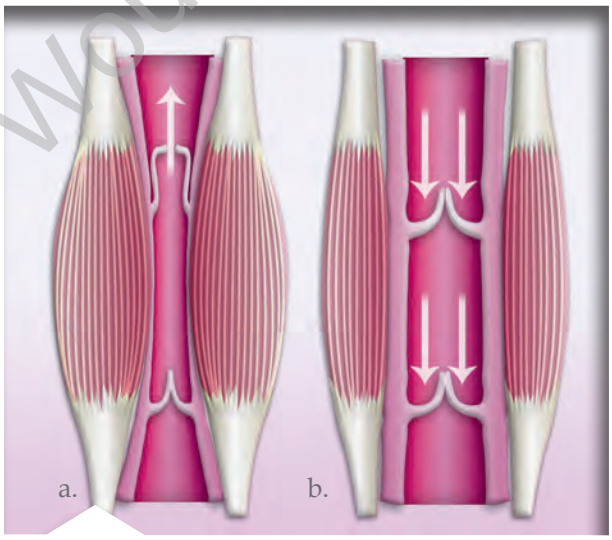

Figure 1. a. *On movement, the calf muscle contracts and squeezes the deep vein, opening the valves so blood can return to the heart.* b. *When the calf muscle relaxes, the valves close to prevent venous backflow.*

Venous hypertension

If damage occurs to the valves in the deep veins, e.g. because of deep vein thrombosis (DVT), surgery or trauma, loss of function of the valves can result in the backflow of venous blood into the veins, known as venous reflux. This increase in blood volume in the vein leads to increased blood pressure or venous hypertension. As the walls of the veins stretch, fluid, red cells and protein leak out into the tissue, resulting in the early signs of venous disease, such as mild swelling, aching limbs and spider veins (Timmons and Bianchi, 2008).

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All these signs relate to poor venous return. An early symptom can be swelling around the ankles, often associated with pain when standing for a long time. Known as pitting oedema, this localised swelling can hold the imprint of a finger before refilling. Scaly, dry, itchy skin and discolouration to the calves and ankles, known as hyperkeratosis, is also a common sign of venous disease. With time, prolonged leakage triggers inflammation, which ultimately results in leg ulceration and oedema.

ASSESSMENT

It is crucial to correctly diagnose the underlying cause of a leg ulcer, as treatment differs depending on the disease process involved. A full clinical history, physical examination and holistic assessment should always be undertaken on patients presenting with their first, or a recurrent leg ulcer, with continuous assessment thereafter to track progress or deterioration of the wound (Royal College of Nursing [RCN], 2006; Newton, 2011). Assessment should be approached systematically so that all factors contributing to ulceration are considered, and the correct investigations instigated. This, in turn, will result in the correct diagnosis being reached and, ultimately, the most appropriate plan of care being put in place to offer the best opportunity for healing.

First, a full history should be taken, including why the patient has sought help, and if there is any family history of ulceration. Any factors which may contribute to venous disease, such as a history of DVT or previous trauma to the limb should be recorded. Other factors relating to the patient's lifestyle, which may result in ulceration, such as smoking, alcohol consumption, 'recreational' drug use, obesity, and occupation, should also be considered.

Physical examination

A full examination of the limb, the skin and the ulcer itself should be carried out.

Wound assessment

The appearance and location of the wound in combination with patient history may help to indicate the underlying cause of the leg ulcer.

Venous ulceration tends to be sited in the gaiter region of the lower limb and is usually larger and more superficial in appearance than arterial ulceration. Venous ulceration can also occur over the malleolus/ankle region, and is often accompanied by oedema. In contrast, arterial ulcers typically have a punched-out appearance (*Figure 2*), with clearly defined wound edges and greater depth. They appear suddenly and can worsen rapidly, and are particularly painful, especially at night once the patient has gone to bed and is lying flat.

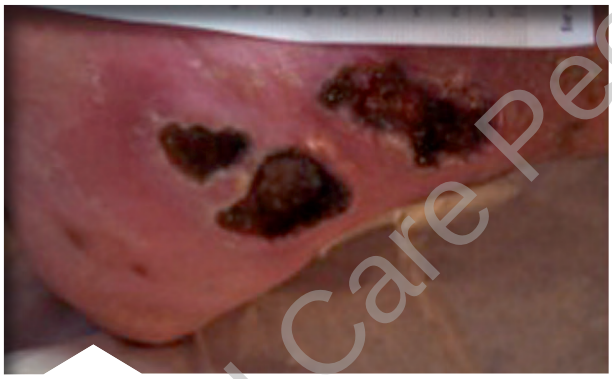

Figure 2. *Arterial ulcer showing characteristic punched-out appearance.*

Baseline assessment of the location, shape, size, tissue type, volume of exudate, and symptoms including pain should be recorded to act as a baseline against which to measure the success of any interventions.

To assess the patient's general health, baseline measurements of blood pressure, heart rate, and body mass index (BMI) should be taken (RCN, 2006). Additional blood tests will depend on the patient's clinical history and local protocol (RCN, 2006).

Skin assessment

Venous disease is associated with a number of skin changes, which should be looked for. These include:

- Ankle flare
- Spider veins
- Hyperkeratosis
- Varicose veins
- Haemosiderin staining
- Oedema
- Varicose eczema
- Lipodermatosclerosis.

Vascular assessment

It is also vital for clinicians to check the blood supply to patients' lower limbs, because if compression therapy was applied to limbs demonstrating arterial insufficiency, serious consequences could ensue, including pressure ulcers, ischaemia and/or amputation (RCN, 2006; Scottish Intercollegiate Guidelines Network [SIGN], 2010).

Clinicians can use a handheld Doppler to measure ankle brachial pressure index (ABPI), which will confirm or rule out arterial disease (RCN, 2006; SIGN, 2010).

Holistic assessment

Leg ulcers can have a negative impact on patients' and their carers' quality of life and wellbeing (Franks and Moffatt, 2001; Gray et al, 2011). As well as managing the ulcer itself, clinicians should empathise with the patient's feelings about their condition, paying particular attention to:

- Depression and feelings of hopelessness (Phillips et al, 1994; Jones et al, 2006a)
- Pain (Douglas, 2001; Briggs and Nelson, 2010; Price et al, 2008)
- Lack of independence
- Loss of mobility
- Social isolation and reduced social life (Stephen-Haynes, 2010)
- Difficulty in sleeping
- Related wound symptoms such as exudate and malodour (Snyder, 2006; Fagervik-Morton and Price, 2009).

Assessment should be ongoing, with clinicians regularly revisiting patients so that they can see if an ulcer is not progressing to healing, and immediately put in

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place any changes needed to the treatment plan.

MANAGEMENT

Once clinicians have isolated the cause of an ulcer, it is time to instigate a management plan, including both local and systemic elements. These should be agreed with the patient and their carers. The main tenets of any plan should be to:

- Address the underlying cause
- Manage the wound bed
- Address any extra-wound factors that might impact on healing, including malnutrition, loss of mobility, poor concordance
- Manage any complications, including infection or periwound skin problems
- Monitor healing progress and prevent ulcer recurrence.

Venous ulceration

Venous ulceration (those with an ABPI of greater than 0.8–1.2) (*Figure 3*), should be managed with a mixture of different techniques:

- Compression therapy
- Exercise
- Elevation of the limb to return venous blood to the heart.

Compression therapy

Compression therapy is the main treatment for venous leg ulcers (Cullum et al, 2006).

Different types of compression are available:

- Elastic/long-stretch bandages
- Inelastic/short-stretch bandages
  - Cohesive
  - Non cohesive
- Compression hosiery
- Intermittent pneumatic compression (IPC) therapy.

Selection of compression product should be influenced by the patient's wound, exudate volume, limb shape, preference and lifestyle. For example, if a patient has a distorted limb as a result of oedema, hosiery is unsuitable and bandaging must be used. Wadding can restore a graduated limb shape to make compression effective.

Likewise, a male patient who is the family breadwinner should not be given four-layer bandaging, which might prevent him from wearing normal footwear and limit mobility. Recent findings from a randomised controlled trial (RCT) show that two-layer hosiery kits are as effective as four-layer bandaging for healing (Ashby et al, 2013). In light of this, and the fact that there is more choice of products available (Dowsett, 2011), clincians should make their selection with the patient in mind. (For more information on compression therapy, see *pp 30–35*.)

Figure 3. *Patient's leg exhibiting extensive venous ulceration.*

Skin care

As well as managing the ulcer and any oedema present, it is also crucial that clinicians take steps to protect the peri-ulcer skin from breakdown. Skin problems that are seen in venous ulcers include:

- Allergic contact dermatitis
- Eczema
- Hyperpigmentation
- Induration
- Lipodermatosclerosis
- Hyperkeratosis.

Washing the lower limbs is an important part of any management plan (SIGN, 2010). This not only washes excess exudate away, but also provides an opportunity to talk with patients and establish a rapport (Lindsay, 2007).

Hyperkeratosis

It is not uncommon for patients with leg ulcers to develop hyperkeratosis, or thick layers of dry, dead skin around the wound. It is important to remove this before the layers develop into a source of pressure that could result in further ulceration. Dry skin is a common complication of venous ulceration and emollients can be used to counter this.

Wound management

Generally, compression therapy will help progress venous leg ulcers, with or without oedema, to healing. However, if healing is delayed, there are methods that can stimulate the wound bed (Falanga, 2004), including dressings designed to perform well under compression while also managing the wound's symptoms.

For example, if the ulcer is producing a large volume of exudate, an absorbent dressing can be chosen — this will also help to prevent maceration of the peri-ulcer skin.

Pain

Pain is an often underestimated factor in leg ulcer care and can be particularly severe at dressing changes (European Wound Management Association [EWMA], 2002; Price et al, 2008). Pain induced by leg ulcers ranges from acute ischaemic pain to the persistent dull ache caused by oedema (Nemeth et al, 2003; Jones et al, 2006b). If this pain is not properly dealt with, it can cause disturbed sleep (Stevens, 2006),

THE SCIENCE — COMPRESSION THERAPY

Compression therapy aims to control oedema and reverse venous hypertension. It works through the following mechanisms:

- Supporting the veins
- Squeezing the veins, thereby helping valves to close and preventing backflow of blood into the leg
- Increasing the speed of blood flow, reducing congestion in the veins and reducing oedema
- Increasing blood flow results in the tissue accessing more nutrients, improving skin condition.

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as well as mental health problems, such as anxiety and depression (Jones et al, 2006b; Woo, 2010).

It is vital that clinicians do not add to the patient's pain and they should handle the limb with care, particularly at dressing change. Compression can help to relieve pain by lessening the pressure of oedema as well as supporting the limb. Where appropriate, the patient should be prescribed analgesia.

PREVENTING RECURRENCE

The healing process of a leg ulcer can be lengthy and recurrence rates are high — one study found that after two years of compression bandaging, up to 20% of venous leg ulcers were still not entirely healed (Rippon et al, 2007).

Continued follow-up from clinicians and encouraging patients to attend leg ulcer clinics can help to maintain healthy legs. In addition, the recent Venus trial has found that recurrence is reduced if hosiery is used once healing has occurred (Ashby et al, 2013).

CONCLUSION

Management of venous leg ulcers is an ongoing challenge for all healthcare professionals, and with life expectancy increasing the propensity for ulceration grows. Clinicians are responsible for the care that they provide, and should give due consideration for both its clinical and cost-effectiveness.

The majority of leg ulcer management is undertaken in a primary care setting, either in GP surgeries, specific clinics or leg clubs.

Top tip:

With current evidence and the product choice available, using four-layer bandaging for everyone is not acceptable, as other options can be found that do not decrease efficacy and might be more acceptable to a patient's lifestyle.

To achieve the best outcomes, patients must be fully informed of the underlying cause of the ulceration and the reason for the treatment offered. Healthcare professionals should not manage in isolation, but engage and work with the multidisciplinary team with the patient firmly at the centre of all decisions relating to care. WCT

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Wound facts... concordance

Methods to improve concordance with compression therapy include:

- Develop a rapport with the patient.
- Be open about what having a leg ulcer means and the disease process.
- Back up any verbal information with leaflets, hand-outs, etc.
- Encourage patients to take responsibility for their treatment, involving them in a 'contract of care' and being specific about what you expect from them, as well as what they can expect from you.
- Outline the range of treatment choices, rather than simply presenting one option.
- As well as lifestyle factors and how active a patient is, also consider any cultural/religious influences when choosing compression therapy.
- Be sure to recognise the patient's pain and have a strategy to relieve it.

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Clinical companion 2

WOUND CARE TODAY

Leg ulcer compression

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Why is compression choice important?

- Compression, using either bandaging or hosiery, is essential for the management of venous leg ulceration (VLU) with or without oedema, oedema and early skin changes associated with venous disease.
- A wide range of products exist and selection should be influenced by the findings of assessment, while also considering patient preference and lifestyle.
- An understanding of the options available, how they work and the patients they are most suited for is essential for Best Practice.

Holistic assessment

A holistic assessment should be carried out to look for factors that may point to underlying venous and/or lymphatic disease. Consider:

- Patient history — is there a history of venous or lymphatic disease? Has the patient had any conditions such as deep vein thrombosis (DVT), venous thromboembolism, surgery or trauma that could have damaged the valves in the lower limb? Does the patient have any known conditions which may make compression therapy unsuitable?
- Quality of life and wellbeing — does the patient suffer from restricted mobility due to compression choice? Does compression choice negatively affect activities of daily living? Could the compression system be changed?
- Then consider:

Limb, wound and skin assessment

Oedema	Limb shape	Wound size	Exudate volume	Vascular	Skin	Limb measurement
› Is there oedema on the limb? › If so, is the oedema soft and pitting?	› Is the limb shape distorted? › The limb must be graduated in shape, from ankle to below knee, for compression to be effective › If distorted, padding can be used to restore shape	› Is the wound healing? Document wound size/shape for reassessment? › Large wound dressings will distort limb shape › If distorted, padding can be used to restore graduated shape	› Is the wound producing exudate — low, medium or high volume? › If heavily exuding, superabsorbent dressings will be needed › Dressings should perform well under compression to avoid maceration	› Measure ankle brachial pressure index (ABPI) with a handheld Doppler to confirm or exclude the presence of arterial disease	› Venous disease is associated with skin changes such as: • Ankle flare • Varicose veins • Haemosiderin staining • Hyperkeratosis • Varicose veins • Varicose eczema	› The limb should be measured to determine which size of compression product is required › Measurement guides are supplied by individual manufacturers, but always include ankle circumference

Use assessment findings to guide leg ulcer compression selection

	Indications	Limb measurement	Patient's mobility	Positve effects on patient's mobility	Self-care
Leg ulcer hosiery kit. The garment delivers adequate compression for healing (average 40mmHg)	More than 0.8 and less than 1.3 ABPI — apply hosiery kit Less than 0.8 and more than 1.3 — hosiery kits used only after specialist referral/under strict supervision	Ankle, foot and calf measurements in accordance with manufacturer's measuring charts	Suitable for patients with ability/dexterity to apply/remove hosiery. Application aids available	Excellent	Yes Application aids can also be used to aid donning/doffing
VLU compression bandage kits (or two-component kits): • Inelastic • Elastic	If the ABPI is 0.8 — 1.3 compression bandages can be applied If the ABPI is >1.3 further investigation may be required before compression bandages can be applied (seek specialist guidance) *Precautions — compression bandaging should be used with caution/specialist guidance in the following conditions: VLU with arterial disease; VLU with diabetic foot ischaemia; VLU with cardiac failure*	18–25cm/25cm–32cm (larger sizes may be available)	Suitable for all patients	Good	Yes/No Application and removal education needed
Inelastic cohesive compression bandaging system		Ankle circumference above 18cm Flexible systems to fit different size and shape limbs	Suitable for all patients	Good	Yes/No Education needed to use
Four-component elastic compression bandaging systems (3–4 layer)		18–25cm/25–32cm (larger sizes may be available). System can fit larger sizes and different-shaped limbs	Suitable for all patients	Poor	No

When is it time to reassess compression choice?

- Each dressing/bandage change requires reassessment. A change in wound healing status, oedema, ABPI, skin, mobility and comorbidities may require change to compression therapy, e.g. on healed wound, hosiery can be used for maintenance.
- There is now greater choice in compression therapies, with more fabrics, sizes and colours available. This has improved concordance, which helps to prevent recurrence[1].
- Recent evidence has shown that two-layer hosiery kits are as effective as four-layer bandaging for healing venous leg ulcers — and linked to reduced recurrence after healing[2].

An ideal compression system[3]

- A clinically and cost-effective, evidence-based treatment
- Provides sustained pressure for one week or more
- Enhances calf muscle function
- Adaptable to a range of limb sizes and shapes
- Easy to apply
- Conformable and comfortable (non-slip)
- Non-allergenic

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IN BRIEF

- By far the majority of leg ulcers seen in clinical practice are caused by underlying venous disease.
- Compression therapy aims to reverse venous hypertension, undoing the conditions that cause oedema and venous ulceration.
- Different types of compression are available and their use depends on the amount of pressure required.
- Compression techniques include various types and strengths of bandaging, as well hosiery.

KEYWORDS:

- Compression
- Venous leg ulcers
- Oedema
- Bandaging
- Hosiery

Understanding and applying compression therapy

Leanne Atkin, Kate Shirlow

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Compression therapy is recognised as an essential component for the healing of venous leg ulcers, and the maintenance of healing once it has been achieved. Traditionally, four-layer bandage systems were the only option for the application of appropriate levels of compression. However, over the past decade, two-layer compression bandage systems and compression hosiery kits have been introduced, providing clinicians and patients with a variety of options to achieve the required levels of compression. This article will explain why compression therapy is vital in healing and maintaining healing in venous leg ulcers and preventing the deterioration of skin changes associated with venous disease. It will also discuss the options available to clinicians when trying to achieve optimum compression levels.

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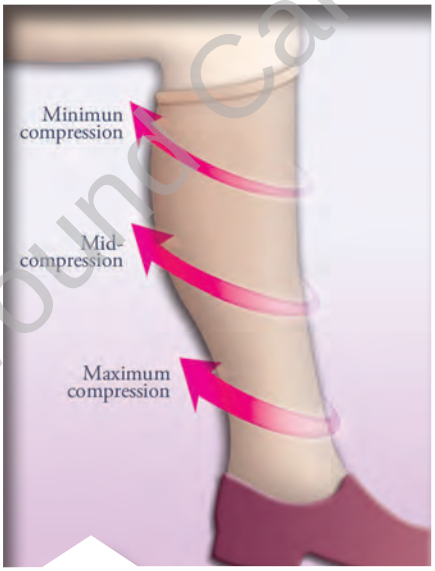

Figure 1. *Compression systems provide graduated compression to the lower limb to improve venous return and reduce oedema.*

THEORY OF COMPRESSION

It is widely accepted that compression therapy increases healing rates for venous ulceration (Cullum et al, 2001; Ashby et al, 2013). Compression therapy aims to reverse venous hypertension and works on a number of levels to achieve this. In simple terms, the application of direct graduated pressure on the patient's lower limb increases tissue pressure, supports the superficial veins, encourages venous return, reduces the calibre of the veins, and aids calf muscle pump activity (*Figure 1*). Through these actions, compression therapy helps to improve venous return and reduce lower limb oedema, as fluid is directed from the tissues back into the venous and lymphatic system.

COMPRESSION OPTIONS

Compression systems are all designed to provide graduated compression to the lower limb and thereby improve venous return and reduce oedema if present. Graduated compression means that the highest pressure is applied to the ankle, decreasing as it rises up the patient's lower limb. Compression systems that deliver 40mmHg pressure at the ankle have been shown to be the most effective in treating venous leg ulceration (O'Meara et al, 2012).

Compression bandaging

The four-layer system of compression bandaging was considered the 'gold standard' treatment for venous disease and remains a valuable tool in the management of leg ulceration. The technique involves the application of

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THE SCIENCE — COMPRESSION

The aim of compression is to control the volume of blood in the patient's veins and arteries, as well as regulating the fluid in the tissues. Compression can be applied at varying degrees, with the effect on the fluid in the limb being dependent on the amount of pressure applied. This is also influenced by the type of compression used — bandages or hosiery — and the method of application (Moffatt, 2007). Compression exerts the highest pressure on the blood vessels near the surface of the skin, such as capillaries, with less pressure applied to deeper veins and arteries (Moffatt, 2007).

various bandages so that sub-bandage pressure is built up through a series of layers, including padding, a layer of crepe bandage, a third layer of light compression bandage, and a fourth layer of cohesive bandage (Bianchi et al, 2013).

However, compression bandaging does have some drawbacks. Patients often find the bandages bulky, which can restrict mobility, interfere with clothing choice, and cause difficulty in choosing appropriate footwear. Similarly, compression bandages need to be applied by an experienced clinician who is competent in their application — poor technique can damage the limb, the amount of compression delivered may be compromised, and bandages can slip causing increased discomfort, all of which will increase the time to healing.

However, over the past decade two new compression therapy options have been introduced — the two-layer bandage system and the two-layer hosiery kit, both of which are designed to provide graduated compression with the recommended 40mmHg pressure at the ankle, while being less bulky than traditional four-layer bandaging.

Whether a two- or four-layer system is chosen, compression bandages continue to be useful in the management of venous ulceration, especially when a patient has a highly exuding ulcer requiring bulky dressings, or where there is significant oedema, which results in a distorted limb shape. Both are unsuitable for management with hosiery, as they would mean the clinician recreating the graduated limb shape required for hosiery using wadding.

As with any treatment, concordance is crucial, and it is important to stress to patients that compression requires a lifetime commitment if the benefits gained initially are to be kept up. There are ways of helping the patient commit to this, for instance, if patients experience pain at night, as many venous leg ulcer patients do, inelastic bandages (see box below) can be used as they are less tight during sleep due to low resting pressure.

Compression hosiery

Hosiery can be used on limbs with wounds — if they are not too large or heavily exuding — and on those limbs where oedema needs to be managed. The key to moving from bandaging to hosiery is for the limb itself to have a graduated shape (as opposed to that shape being artificially created with wadding). As long as this condition is met, hosiery can be used on larger limbs.

Hosiery should be worn to maintain the benefits of compression gained by the bandaging. It is worn during the day, and often at night, and, as with bandaging, it is important to stress to patients that it is a long-term commitment.

There are a wide range of compression hosiery styles available and these are manufactured as either 'circular' or 'flat-knit' (Hopkins, 2008). However, they all conform to either British Standard or European classification (SIGN, 2010). Hosiery is classified according to the pressure that is applied and this is measured in millimetres of mercury (mmHg).

Of crucial importance when choosing hosiery is whether or not it suits the patient — there will be little therapeutic effect unless compression is consistently applied. Therefore, clinicians should take time to involve patients in choosing the right colour and style of hosiery, as well as talking them through how compression works and how it will help to reduce oedema (if present), as well as healing/improving skin changes and, in the case of open ulcers, promoting healing (Timmons and Bianchi, 2008; Lay-Flurrie, 2011).

Involving patients in the choice of hosiery means that they will feel more empowered and, in turn, are more likely to keep up the treatment. Concordance can also be improved by various kits that aid patients with compromised dexterity to apply their own hosiery.

Compression hosiery kits consist of two layers of stocking, which together are designed to provide 40mmHg at the ankle. The kits comprise an under-stocking and an over-stocking, and both layers need

Wound facts... compression bandages

Compression bandages are often termed 'elastic' or 'inelastic', then further classified into single-layer and multi-layer compression systems. Bandages are also classified according to their capacity for 'stretch', being described as 'long' or 'short-stretch'. However, the terms elastic or inelastic are more helpful in understanding how these bandages actually work on the limb (International Lymphoedema Framework, 2012). Elastic bandages work by 'following the limb in' and applying constant pressure at both rest and exercise, whereas inelastic bandages form a rigid case that exerts more pressure when the patient exercises (i.e. when the muscle 'pushes' against the inelastic bandage).

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Wound facts... what is ABPI?

Measuring the patient's ankle brachial pressure index (ABPI) with a hand-held Doppler machine can help to confirm or exclude the presence of arterial disease. This is recommended in national guidelines on leg ulcer assessment (RCN, 2006; SIGN, 2010). Measuring the direction and velocity of blood with a Doppler can show whether the arterial vessels are diseased. The technique requires the clinician to measure the brachial and ankle systolic pressures with the Doppler probe. The ankle pressure is then divided by the brachial pressure to provide an ABPI reading (Beldon, 2010). If the systolic readings are the same, or just slightly different, there is unlikely to be arterial disease in the patient's lower limb. However, where there is significant difference between the two readings, the arterial flow in the lower limb may be impaired to an extent that renders compression therapy dangerous. To summarise (RCN, 2006):

- ABPI of 0.5–0.8 shows significant arterial impairment
- ABPI of 0.6–0.7 means that reduced compression can be used, although this should be supervised by an experienced clinician
- ABPI of 0.8 indicates the patient's suitability for compression (patients with venous ulcers tend to have an ABPI of 0.8 or greater).

to be worn to provide appropriate levels of compression. Patients require sufficient dexterity to be able to remove and reapply the stockings, which can be a barrier to use. Two-layer hosiery kits may offer some advantages to certain patients, as they are less bulky and, therefore, do not restrict patients' choice of footwear or clothing. Hosiery kits, like hosiery in general, are available in both European classification and British Standard. Additionally, hosiery kits provide guaranteed levels of compression, which is not practitioner-dependent — this also has the major advantage of allowing the patient to self-care if they wish.

One large randomised controlled multi-centre study compared the clinical benefits and cost-effectiveness of compression hosiery versus compression bandages in the treatment of venous leg ulcers, (Ashby et al, 2013). Researchers randomised 457 patients to be treated with either compression bandages or compression hosiery kits — the study did not dictate which manufacturer of bandage or stockings should be used, leaving this decision to the patient and clinicians. Results showed that compression hosiery was effective at healing venous leg ulcers and is a viable alternative to four-layer bandaging. The study found similar results in both the bandaging and the hosiery groups — median time to ulcer healing was 99 days in the hosiery group and 98 days in the bandage group. The proportion of ulcers healed was also similar in both — 70.9% in the hosiery group and 70.4% in the bandage group.

The researchers did, however, report significant differences in changes in treatment — 38.3% of patients in the hosiery group changed from their allocated treatment compared to 27% in the bandage group, suggesting that hosiery may not be suitable for all patients (Ashby et al, 2013).

PATIENT ASSESSMENT

Accurate assessment of every patient is vital before considering the application of any form of compression therapy, as considerable damage can be caused by inappropriately applying compression to patients who have peripheral arterial disease (SIGN, 2010).

Peripheral arterial disease can be asymptomatic, therefore, patients do not always express the main symptoms of intermittent claudication or arterial pain when resting. Arterial insufficiency can only be ruled out by assessment of the patient. A comprehensive arterial assessment involves a combination of measures — palpation of the peripheral pulses and assessment using a hand-held Doppler to measure the ankle brachial pressure index (ABPI). ABPI compares the systolic pressure in the arm to that of the lower leg — these measurements are then used to calculate the patient's pressure ratio. When this ratio is greater than 0.8, it is safe to apply compression therapy (European Wound Management Association [EWMA], 2005). However, if the ABPI result is above 1.2, care should be taken that the results are not falsely elevated due to arterial wall calcification — a problem that is of particular concern in patients with diabetes (Vowden and Vowden, 2001).

ABPI assessment is an effective way of ruling out any evidence of peripheral arterial disease, but it has been shown to be unreliable when carried out by inexperienced clinicians and reliability can be considerably improved with training (Cullum, 1997). Therefore, clinicians must ensure that they have adequate knowledge and skills before undertaking ABPI assessments. Also, ABPI must be avoided in the following instances (Ruff, 2003):

- Patients with suspected deep vein thrombosis (DVT), due to the risk of emboli
- Those with cellulitis — the procedure may be too painful
- Those with severe ischaemia — the procedure can cause further tissue damage.

Clinicians should also exercise caution in patients with certain conditions, which can cause unreliable readings, for example, diabetes, atherosclerosis or oedema. It is important to remember that ABPI should be one element of the patient assessment and should not be used in isolation. Also, if the results

Did you know:

Venous leg ulcers are less likely to recur once healed if hosiery is used consistently (Ashby et al, 2013).

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of ABPI do not support other clinical findings, further investigations should always be performed.

PATIENT CONCORDANCE

When deciding which method of compression is to be used, many factors have to be considered. These include the size and shape of the limb, extent of any ulceration, volume of exudate, condition of surrounding skin, manual dexterity of the patient, whether the patient has restricted mobility, availability of footwear, and if the patient wishes to self-care.

It is also important to remember that any degree of compression is better than none at all, therefore, patient concordance in at least attempting to apply compression on a regular basis, is vital (Timmons and Bianchi, 2008). For each individual, the clinician must weigh-up the pros and cons of all options. For example, some patients find four-layer bandages bulky and uncomfortable, limiting their choice of clothes and footwear and affecting their self-image (Mudge et al, 2006). Ultimately, it is the patient that should make the decision as to which system they prefer.

There are many other reasons why patients may not adhere to recommended treatments, depending on their motivation, which can be affected by a number of factors:

- Previous negative experience of compression therapy (Hareendran et al, 2005)
- Pain while wearing compression, possibly due to poor bandaging techniques (Hareendran et al, 2005; Vowden and Vowden, 2012)
- Disturbed sleep, often due to poorly managed pain (Moffatt, 2004)
- Social pressures, such as fear of going out, self-image and relationships problems.

Wound size and depth, and the patient's age have also been found to affect concordance (Miller et al, 2011). However, if symptoms can be controlled with dressings or analgesia, patients' tolerance of compression can be improved, (Briggs and Nelson, 2012). Patient concordance with compression therapy is vital to expedite ulcer healing. Providing a choice of treatments, along with clear explanations as to why compression therapy is needed, will help to improve concordance.

CONCLUSION

Compression therapy is often used sub-optimally in practice because of a lack of knowledge and confidence in relation to assessing patients, ABPI measurement and the application of compression therapy (RCN, 2006).

It is vital that clinicians are competent in interpreting ABPI results and recognise the importance of adequate compression therapy to facilitate healing, therefore, ensuring that patients receive high-quality evidence-based care. There is currently more choice of compression therapy than ever before, with compression hosiery kits becoming a credible alternative to bandaging for some patients. The choice of which method to use is ultimately down to the patient, but clinicians need to have a clear understanding of the advantages and disadvantages of each system and be able to communicate this to patients so that they can make informed decisions. about their treatment. WCT

Top tip:

Compression hosiery is available in a range of styles and colours and offering patients choice can increase their involvement in treatment.

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Clinical companion 3

WOUND CARE TODAY

Exudate management

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What is exudate?

- Exudate is the fluid that enters a wound following injury.
- Exudate contains substances needed for wound healing, including water, electrolytes, growth factors, nutrients, protein-digesting enzymes (matrix metalloproteinases [MMPs]), inflammatory mediators and white blood cells.
- While exudate is needed to maintain a moist wound healing environment, too much exudate can damage the periwound skin.
- Similarly, chronic wound exudate can be harmful, since it contains more inflammatory mediators and MMPs than acute wound fluid.

Holistic assessment

Before assessing exudate, remember to perform a holistic assessment to look for factors that may influence exudate production. You should consider:

- Patient history — does the patient have a history of wounds or a condition that may dispose them to poor healing, such as diabetes? Are there any conditions that may be contributing to the amount of exudate produced, e.g. oedema?
- Wound type — some wounds are known to produce large volumes of exudate, e.g. burns and venous leg ulcers
- What is the general state of the wound bed? For example, what is the tissue type (necrosis, slough etc); how large and deep is the wound; does the wound smell? Infection may cause a sudden increase in exudate volume
- What is the condition of the skin around the wound? Is there leakage of exudate from the wound; is the skin red (excoriated), or does it look white and boggy (macerated)?

Assess exudate

Odour

Healthy exudate should be clear and odourless. Malodour indicates:

- Infection
- Death of tissue in the wound (necrosis)
- An enteric or urinary fistula (depending on wound location)

Colour

- Normal exudate is straw-coloured
- Green, milky or cream exudate might indicate bacterial infection
- Pink or red exudate is a sign of bleeding in the wound bed
- Yellow or brown exudate may be slough

Volume

- The amount of exudate produced should reduce with healing
- Larger wounds produce more exudate
- Some wound types are considered to produce more exudate, e.g. burns and venous leg ulcers
- A sudden increase in exudate could indicate infection or deterioration of an underlying medical condition

Consistency

- Thick, sticky exudate can be caused by the presence of infection, necrotic tissue or may be dressing residue
- Thin, 'runny' exudate may indicate that the patient has malnutrition, or venous or heart disease

What are the main strategies for controlling high exudate volumes?

- If a patient has a wound that is producing too much exudate:
  - Identify if the patient has an underlying condition that may be contributing to excess exudate, e.g. oedema and, if possible, optimise its management
  - If the patient has a venous leg ulcer, consider if the patient is spending time with leg(s) in a dependent position and if they are concordant with compression therapy
  - Select an appropriate absorbent dressing; different types of dressings are designed to deal with varying volumes of exudate, e.g. superabsorbents can absorb a large volume of fluid, so are suitable for large/heavily exuding wounds.

Choosing the right dressing

- The ideal dressing for heavily exuding wounds should be able to:
  - Absorb large volumes of exudate, reducing the frequency of dressing changes needed
  - Retain exudate, so that it does not leak onto the surrounding skin, even when used under compression
  - Be removed easily, minimising pain for the patient, while remaining intact upon removal
  - Trap (sequester) exudate components that can otherwise damage the skin, e.g. MMPs in chronic wound exudate
  - Conform to the wound site and be comfortable during wear.
- Remember, the dressing will require changing when saturated or strikethrough of exudate occurs.

When is it time to reassess the wound and/or dressing?

- It is vital to continually check the wound and the dressing to ascertain if the wound is progressing, or if healing is being held back by excess exudate. Consider:
  - Does the periwound skin look healthy?
  - Is the wound increasing in size?
  - Are there signs of soiling around the dressing edges?
  - Is the patient experiencing pain?
  - Are dressing changes still frequent due to exudate saturation?
  - Does the exudate smell?
  - Has there been a deterioration in any underlying conditions that may result in increased exudate production?
- If the dressing cannot manage the exudate volume produced or protect the periwound skin from damage, an alternative dressing should be used and the general health of the patient and their wound reassessed.

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sorbion dressings are specifically indicated as primary dressings for preparing the wound bed in exuding wounds (http://www.hrhealthcare.co.uk/sorbion).

For more information and to download this poster, go to: www.woundcare-today.com, or www.hrhealthcare.co.uk/sorbion

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IN BRIEF

- Wound fluid, or exudate, is a normal consequence of healing.
- Physiological circumstances within the individual or their wound can arise, which lead to excessive wound fluid production.
- There is a risk of maceration and excoriation of surrounding skin.
- This can cause distress and impact on quality of life.
- Robust assessment and nursing intervention can successfully manage exudate and facilitate improved wound healing.

KEY WORDS:

- Exudate
- Moisture
- Maceration
- Quality of life
- Assessment

How to recognise, assess and control wound exudate

Pauline Beldon

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Wound exudate plays a vital role in wound healing, preventing the wound from drying out and providing nutrients for cell metabolism, which enables the migration of epithelial cells and the separation of necrotic tissue from the wound bed by autolysis (World Union of Wound Healing Societies [WUWHS], 2007).

The production of wound exudate is a natural and, therefore, necessary part of wound healing. However, if the volume of exudate becomes excessive, there is a risk of periwound skin maceration (*Figure 1*), where the nutrient-rich wound fluid actually begins to break down the skin. This can complicate wound management for the clinician, as well as being distressing and uncomfortable for the patient. There are many pathophysiologies that can lead to excessive exudate production (*Table 1*).

Pauline Beldon, tissue viability nurse consultant, Epsom and St Helier University Hospitals NHS Trust, Surrey

INDIVIDUAL WOUND ASSESSMENT

The consequences for the individual with a highly exuding wound are varied and numerous, including:

Figure 1. *Example of periwound skin maceration as a result of excessive exudate.*

- Personal distress caused by wet wound dressings
- Soiled clothing
- Malodour
- Self-imposed isolation due to embarrassment.

All of these factors can lead to poor quality of life, which, in turn, may cause depression and dissatisfaction with the care provided by clinicians (Ousey, 2013). To prevent this, it is vital that clinicians are able to assess patients holistically, including:

- Identifying any comorbidities that might contribute to their overall health
- Assessing the state of the wound and the level and type of wound exudate being produced
  - Identifying any potential danger to the periwound skin.

Clinicians should be able to act appropriately to minimise the risk to the patient of skin maceration, leaking dressings and poor or delayed wound healing.

Individual wound assessment will help the clinician determine the cause of the wound and whether there are underlying comorbidities, which are either affecting the wound or may rule out some forms of management. For example, in cardiac oedema and wet leg ulcers, it may not be possible

Top tip:

Did you know that exudate is a good indicator of the state of a wound? Changes in colour, amount, viscosity or smell of the wound fluid can be a trigger to reassess the wound.

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THE SCIENCE

Wound exudate is the fluid that is released from an open wound, oozing from the blood vessels as a response to inflammation (Wolcott, 2012). It includes a rich mix of components required for wound healing, such as (White and Cutting, 2006):

- Electrolytes
- Nutrients
- Proteins
- Growth factors
- Inflammatory mediators
- Matrix metalloproteinases (MMPs)
- Various cells, such as leukocytes, macrophages, neutophils and platelets
- Microorganisms.

to apply therapeutic compression due to the risk of overloading the cardiopulmonary system with fluid (Wounds UK, 2009).

However, in a patient with a highly exuding venous ulcer, for example, assessment might indicate that compression therapy is the appropriate measure to reverse the venous hypertension — with the added benefit of reducing exudate and encouraging wound healing because the oedema has been reduced. If patients have several comorbidities, such as diabetes or cardiac problems, it may be necessary for them to be seen by more than one clinician in order to manage the underlying problems and allow more robust wound management to begin.

This ability to bring in clinicians from different specialties to address a patient's various comorbidities is one of the benefits of a multidisciplinary approach to wound management. Patients themselves should also be regarded as members of the multidisciplinary 'team', as they are the people who will be affected by any decisions made, as well as having experience of their own condition. Therefore, they should have a 'voice' in their treatment (Ousey, 2013).

Clinicians should recognise that their role is to examine and assess the patient, explain the aetiology of the problem using appropriate terminology and present possible treatments. The patient, on the other hand, should be encouraged to make decisions regarding treatment while allowing themselves to be guided by the 'expert' clinician — this is the basis for a concordant relationship, through which clinician and patient can arrive at the most appropriate treatment regimen. It is also important that patients understand that the outcome of treatment may rely as much on their ability to comply with treatment,as the clinician's ability to deliver it (Anderson, 2013).

Table 1: Pathophysiological conditions leading to excessive wound exudate

Condition	Result
Lymphoedema	If unmanaged can lead to wet ulceration (Rice, 2011)
Venous hypertension	Large chronic venous ulcers (Gardner, 2012)
Congestive cardiac, hepatic or renal failure	Oedema of the lower limbs and potential wet ulceration (Adderley, 2008)
Obesity	Venous hypertension and ulceration of lower limbs (WUWHS, 2007)
Malnutrition	High exudate volumes in wounds due to hypoproteinaemia (very low protein level in the blood) (Collins et al, 2005)
Surgery	Examples include large dehisced abdominal wounds and split-skin graft donor sites, which, although superficial, exhibit substantial exudate initially (Beldon, 2007)
Fungating wounds	Highly exuding and malodorous (Adderley and Smith, 2007)
Infection	Usually causes an increase in wound exudate (WUWHS, 2007)

Wound facts... the appearance of exudate

Exudate can provide important information on the condition of a wound — the volume, colour, viscosity and odour can all provide clues to factors that can impact on healing, such as bacterial load and infection (WUWHS, 2007). For example, a wound infected with the bacteria *Pseudomonas aeruginosa* may exhibit excessive fluorescent green wound fluid (Cutting, 2003). This is easily identifiable and treatment with systematic antibiotics and an antimicrobial dressing will help to resolve the infection and restore the wounds progression towards healing. Similarly, serosanguinous (thin, red-coloured) exudate may indicate bleeding within the wound bed, which could be due to trauma from dressing removal or infection (Best Practice statement [BPS], 2013). The appearance of recently removed dressings and their level of saturation with exudate also provides clues to the efficiency of the dressing and the state of the wound. For example, if the wound is infected, the exudate in the dressing will be purulent; similarly, the nurse will be able assess if the dressing is successfully absorbing any odour from the wound (WUWHS, 2007). It is important to discuss the appearance of any exudate with patients, who may be anxious about their wound's progress and require an explanation to allay their fears.

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Top tip:

Remember that not all exudate is bad — a certain amount of wound fluid is necessary for wound healing as it is full of the proteins, growth factors and cells required for healing...

DANGERS OF EXCESSIVE EXUDATE

When wound fluid is trapped against the skin for a prolonged period of time, the skin becomes softer and is at risk from proteolytic enzymes contained within exudate (BPS, 2013). It is good practice when managing highly exuding wounds to examine the periwound skin for evidence of (BPS, 2013):

- Maceration: skin has a pale or white, 'soggy' appearance
- Excoriation: breaks in the skin and erythematous (red-coloured rash-like) appearance; often painful
- 'Spongy' texture.

Any of the above elements should alert the clinician to the fact that the current wound regimen is not effectively managing the exudate, and that a review of the treatment by both clinician and patient is required. For example, has the clinician chosen the correct dressing and is the patient complying with the treatment?

MANAGEMENT OF EXCESSIVE EXUDATE

Frequency of wound dressing change can be vital when dealing with wounds that are leaking large volumes of exudate — a wound dressing may be classed as highly absorbent, but its fluid-handling capacity will still be finite, and, once this is reached, the dressing should be changed.

There is a danger that clinicians become over-reliant on the absorbent qualities of certain dressings, resulting in them reducing the frequency of dressing changes, with the dressings becoming saturated and leaking exudate. In some cases, clinicians and patients may assume that the responsibility for exudate leakage lies with the dressing itself, rather than less frequent changes (WUWHS, 2007).

Even if the most appropriate absorbent dressing has been selected, it will still need to be changed at regular intervals even if this places a strain on nursing resources. Relying on excessive padding as some clinicians do, results in saturated, heavy dressings and increases the potential for macerated skin (Gardner, 2012).

It is short-sighted of clinicians to reduce the frequency of dressing changes as — if they are prepared to engage in an intensive period of frequent dressing changes — they can improve patients' skin integrity, and progress the wound towards healing more rapidly.

DRESSING SELECTION

There are a plethora of wound dressings available to clinicians, however, it is vitally important to select the one that is most appropriate for the individual patient. This means considering the characteristics of the wound, including:

- Wound site
- Shape
- Underlying aetiology
- Volume of exudate being produced.

The ideal properties of a dressing required to manage a high volume of exudate have been described as (Adderley, 2008; Stephen-Haynes, 2011):

- High-absorbency: helps to reduce dressing frequency
- Ability to 'lock away' exudate: prevents leakage between dressing changes
- Ability to prevent maceration/excoriation of the periwound skin
- Ability to be used under compression bandaging: does not become too 'bulky' when saturated with exudate
- Ability to minimise trauma and pain on removal
- Comfort and acceptability to the patient
- Conformity to wound site
- Cost-effectiveness.

Many different types of wound dressings are designed to absorb exudate, including:

- Foams, such as Allevyn® (Smith and Nephew); Biatain® (Coloplast), Mepilex® (Mölnlycke Health Care)
- Hydrofibers, such as Aquacel® (ConvaTec)
- Superabsorbent dressings, such as Flivasorb® (Activa Healthcare); Sorbion Sachet® (H&R Healthcare); Eclypse® (Advancis); KerraMax Care® (Crawford Healthcare).

PREVENTING PERIWOUND SKIN DAMAGE

There are many causes of periwound skin damage for patients with an exuding wound, the obvious one being maceration. However, indirect causes might also include:

- Inappropriate dressing choice leading to 'pooling' of exudate against the skin and maceration
- Trauma caused by frequent removal of adhesive-bordered products, usually referred to as 'skin stripping', where the adhesive repeatedly removes the outer layers of the skin and triggers an inflammatory reaction, oedema and pain (Langøen and Lawton, 2009).

Sensitivities to products such as moisturisers, emollients and creams that contain lanolin (also known as 'wool wax' or 'wool fat') or parabens (preservatives used in pharmaceutical/cosmetic products), especially where they are used

Wound facts...

The odour of exudate can be a clue to the state of the wound. For example, clear, healthy exudate does not have an identifiable odour, whereas strong-smelling fluid may be an indication that the wound is infected; that there is necrotic tissue in the wound bed; or that the wound is connected to a sinus or fistula (WUWHS, 2007).

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THE SCIENCE — SUPERABSORBENT DRESSINGS

So-called superabsorbent dressings are specifically designed to hold more fluid, as well as 'locking' the fluid into the structure of the dressing. This helps to reduce dressing frequency, which also means that these dressings can be more cost-effective through reduction in nurse time, an important consideration in modern health care (Cook, 2011). However, the weight of saturated dressings may cause discomfort to older patients with wet leg wounds, as well as problems with mobility (Gardner, 2012). As mentioned above, it is vital to consider the patient's preferences when choosing a dressing, and selection should not be solely based on whether the product chosen will reduce the number of dressing changes. In addition, because managing heavily exuding wounds is a multifaceted undertaking, over-reliance on dressings is unlikely to be successful — tackling any underlying comorbidities, enlisting the cooperation of the patient, and correct wound management are at least as important as correct dressing choice (*Table 2*) (Vowden and Vowden, 2003).

frequently, may also trigger an allergic reaction in some patients (BPS, 2013).

Barrier products can be used to protect the periwound skin — the use of a dimethicone-based barrier cream (e.g. Cavilon® [3M]; LBF® [CliniMed]) is helpful, and, if used correctly, can help to prevent dressings from adhering to the skin (WUWHS, 2007).

However, if the patient has already reported sensitivities to certain products, clinicians should avoid using adhesive dressings altogether, rather than risk a skin reaction and distress to the patient.

Should symptoms of contact dermatitis such as erythema and irritation arise, the use of a steroid ointment/cream is useful in allaying the inflammation (BPS, 2013).

Table 2: Management of highly exuding wounds includes:

Comprehensive medical assessment of patient's underlying medical problems to ensure care is optimised
Joint decision-making on treatment between nurse and patient/carer
Wound and exudate assessment by a knowledgeable and competent nurse
Absorbent dressing, which is appropriate with concurrent treatment, such as compression bandaging
Dressing that is compatible with the patient's skin assessment and unlikely to cause irritation
Concurrent skin protection treatment with washing, moisturising and emollient therapy
Regular evaluation and reassessment of treatment

CONCLUSION

While a certain amount of exudate is necessary to aid the process of wound healing, copious volumes can cause problems for the patient. The distress and discomfort of a patient whose dressings have become saturated should not be underestimated. If it is not addressed, the clinician risks destroying the therapeutic relationship necessary to ensure successful wound management.

Treatment must involve a multidisciplinary team approach, in which the patient plays a pivotal role. This involves selecting an appropriate dressing, deciding on the frequency of dressing changes, protecting the surrounding skin, and ensuring that the patient also takes responsibility for elements of their treatment, such as limb elevation.

Regular evaluation of the wound's progress is also vital — always taking into account the patient's perspective — to ensure the goal of exudate management is met by both patient and clinician working together. **WCT**

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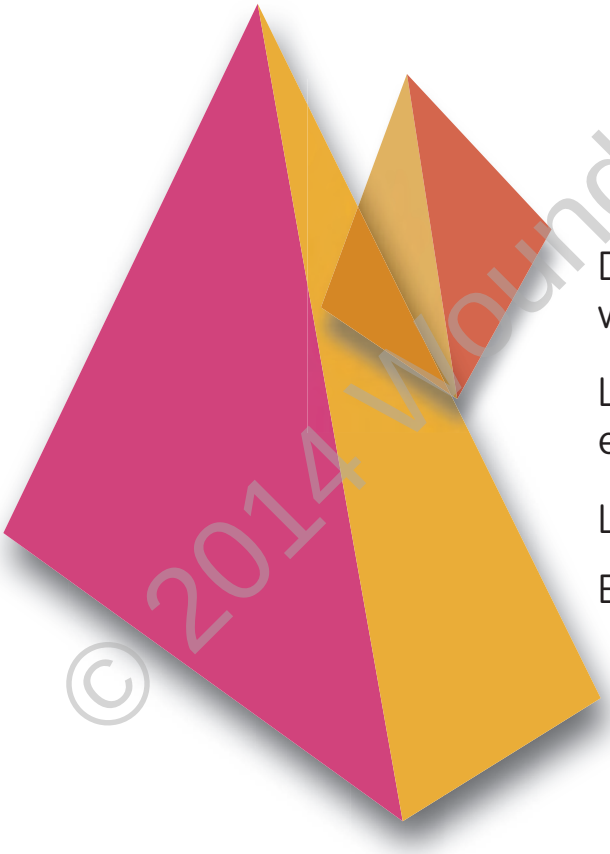

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Desloughing wounds

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Why deslough wounds?

› Desloughing wounds helps to prepare the wound bed for healing and minimises the risk of infection by removing any debris, slough and/or necrotic tissue[1].

Wound assessment

› To understand if desloughing is appropriate, first cleanse and comprehensively assess the wound to evaluate:

- Its cause
- Location and size
- Tissue type present (i.e. condition of the wound bed)
- Condition of the surrounding skin
- Infection
- Exudate.

› The patient's health and preferences should also be considered before desloughing a wound[2].

Determine and record tissue type present

Black	Yellow	Red	Pink
Indicates necrotic tissue and eschar (dry, devitalised tissue). Unless removed, this will delay healing	Indicates fibrous, sloughy tissue that sticks to the wound bed and cannot be washed away. Together with exudate, slough provides an ideal environment for bacteria to grow	Indicates healthy moist tissue, made up of new blood vessels and dermal cells (granulation tissue), a sign that healing is occurring	Indicates that tissue is in the final stage of healing (epithelialisation)

Remove

- Black or yellow tissue needs removing for healing to occur. It can also:
  - Obsure the wound bed and hinder assessment
  - Hide and/or increase the risk of infection
  - Increase odour and the volume of exudate.

Protect

- Fragile red or pink tissue needs protecting with dressings to maintain the moist wound environment that is encouraging tissue growth and healing.

How?

- Although there are several methods of desloughing wounds (surgical, mechanical, chemical, larval, for example), the one most frequently chosen in the community setting is autolytic[3] — whereby the body's own natural white cells deslough the wound. If the body's own natural cleansing ability is unable to cope with the volume of exudate and sloughy tissue in the wound bed, clinical intervention with dressings helps to kickstart the healing process.

- Choice of dressing will depend on the condition of the wound bed:
  - if dry, select a moisture-donating dressing
  - if wet, select a moisture-absorbing dressing.

Moisture-donating dressings

These dressings donate moisture to dead tissue, helping to facilitate autolysis. They include: hydrogels, hydrocolloids, honey.

Moisture-absorbing dressings

These dressings absorb moisture, without drying out the wound bed to maintain moisture balance at the wound surface. They also help to prevent skin damage to the surrounding skin from excess volumes of exudate. They include: alginates, hydro-desloughing fibres.

Remember: regularly reassess wounds and change dressings as needed to ensure that the wound does not dry out or become too moist. If there are signs or symptoms of infection, always refer.

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IN BRIEF

- Wound infection poses an economic burden to healthcare providers and can have a negative impact on patient quality of life.
- Identification can be challenging for healthcare professionals.
- Early identification and treatment, through a systematic approach to assessment, underpins the principles of good practice.
- This article outlines the assessment process to facilitate early and accurate diagnosis of wound infection.

KEY WORDS:

- Wound infection
- Assessment
- Signs and symptoms
- At-risk patients
- Accurate diagnosis

Assessment of wound infection

Kirsty Mahoney

Normal wound healing follows a complex series of biological and chemical events that can be divided into four distinct overlapping phases (Hart, 2002). Progress is usually well-organised, occurring in a timely manner (Enoch and Leaper, 2005). However, wounds that fail to follow this orderly progress may become 'static' or 'delayed' in healing, and be classified as chronic (White, 2008).

Wound infection is recognised as an intrinsic factor that can disrupt the normal healing process, and pose a significant economic burden to healthcare organisations (Menke et al, 2007) and negatively affect patient quality of life (Benbow and Stevens, 2010). Costly interventions to healthcare organisations may be due to hospital admission, extended hospital stay or expensive treatments (Patel, 2009). Exact costs of treating infected wounds have been hard to establish. This may be due to patients being treated over a variety of healthcare settings, as well as hidden costs that may not be accounted for (Hamilton, 2008), for example, litigation, pain management, or treatment for depression (Dowsett, 2009). In the most severe scenario, wound infection may lead to loss of limb or even death (Dunk and Taylor, 2009; Gottrup et al, 2013).

Figure 1. *Infected wound.*

Effective management of wound infection relies on accurate clinical assessment and early identification. Once identified, treatment objectives are to reduce the bacterial load and increase the host response (World Union of Wound Healing Societies [WUWHS], 2008). This may be with systemic antibiotics, topical antimicrobials (Bowler et al 2001), or debridement (Dowsett and Ayello, 2004). There is, however, concern around resistance and spiralling costs of increased use of both antibiotics and topical antimicrobial agents. Thus, all clinicians involved in wound care have a responsibility to be able to identify wound infection accurately through a systematic aproach, and to ensure that patients are treated appropriately and in a timely manner.

DEFINITIONS OF WOUND INFECTION

Percival and Cutting (2011) highlight that managing wound infection remains confusing and that the treatment initiated is often inappropriate. This is mostly due to lack of understanding of wound infection and poorly defined terminology such as colonisation, critical colonisation and biofilm.

THE SCIENCE

Loss of skin integrity provides the opportunity for a multitude of microorganisms such as bacteria, fungi, yeasts and viruses — known as wound bioburden — to invade and contaminate the wound. If the body's own natural defences are unable to control wound bioburden, it overwhelms the immune system, resulting in infection.

Kirsty Mahoney, clinical nurse specialist, wound healing, Cardiff and Vale University Health Board

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Several authors have sought to quantify the progress of wound infection as a continuum, in which the clinical and microbiological state of the wound increases in severity, requiring different treatment objectives (Kingsley, 2001; European Wound Management Association [EWMA], 2005). Clinicians should familiarise themselves with the terminology associated with development of infection, namely:

- Contamination
- Colonisation
- Critical colonisation
- Clinical infection
- Systemic infection
- Biofilms.

HOLISTIC APPROACH TO ASSESSING WOUND INFECTION

Accuracy of assessment impacts on the decision-making process, documentation and clinical outcome measures (Brunt et al, 2005). Regular assessment is vital to detect the subtle changes that may occur during the early stages of wound infection.

Top tip:

All wounds, whether acute or chronic, should be systematically assessed on a regular basis, with the findings documented in a clear and concise manner.

Identifying patients at risk of wound infection

Within the assessment process, clinicians should identify factors that may contribute to an individual's potential and susceptibility to develop infection (*Table 1*).

Most chronic wounds are polymicrobial (Bowler et al, 2001). This sometimes causes difficulty in establishing which bacteria are causing issues within the wound. It is therefore important to consider the quantity and virulence of the bacteria present within the wound, along with the host's ability to combat infection.

Wound facts...

Contamination	At the start of the continuum, whether an acute or chronic wound, is contamination. All wounds are contaminated with microorganisms (bioburden), which do not necessarily cause any problems with wound healing and no host reaction occurs
Colonisation	Once bacteria start to multiply, the wound progresses to colonisation. Here, although the bacteria are present and multiplying, they do not impede healing (Mertz and Ovington, 1993)
Critical colonisation	Before clinical infection, it has been identified (Kingsley, 2001; White et al, 2001) that wounds become 'critically colonised', i.e. the host response is no longer able to control the microorganisms that are colonising the wound (Patel, 2010). During this stage, there may be some subtle clinical changes to the wound, such as delayed healing that may be a precursor to the development of wound infection. However ,the existence of critical colonisation is still under debate due to inconsistent findings in clinical studies (EWMA, 2005)
Clinical infection	The next stage is clinical infection, when bacteria not only multiply but also impede healing and overwhelm the host's immune defences. This may damage wound tissue and the patient will display certain signs and symptoms (*Table 1*)
Systemic infection	The patient becomes unwell, and this stage may be limb and life-threatening
Biofilms	Bacteria that are usually planktonic or 'floating around' the wound bed form colonies by encasing themselves in a gelatinous matrix and attaching themselves to the wound bed. Biofilms are not easily detected by common investigations such as wound swabbing, and their influence on wound healing is not yet fully understood. However some studies have revealed that biofilms may inhibit the wound healing process (Stephens et al, 2003). Their presence may not display overt signs and symptoms of infection, but may cause the wound to become indolent or static

Signs and symptoms of wound infection

Assessment of wound infection is an acquired skill, and clinicians need to have a good understanding of the signs and symptoms that may be observed. It has been suggested that different wound aetiologies display slightly different characteristics, so clinicians should familiarise themselves with the signs and symptoms of infection that are common to the types of wounds that they routinely see and assess in their day-to-day practice (EWMA, 2005).

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Table 1: Risk factors associated with wound infection (adapted from Wounds UK, 2009)

Risk factor	Examples and rationale for risk factor
Comorbidities that may reduce oxygen perfusion (cardiovascular or respiratory disorders)	› May reduce wound oxygen tension resulting in an environment that promotes bacterial growth (Sibbald et al, 2007)
Metabolic disorders such as diabetes that may impair the immune response	› Reduces neutrophil activity which can interfere with the ingestion of bacteria, increasing the risk of infection (Slaughter, 1993)
Malnutrition	› Inadequate nutrition and poor nutritional status can lead to a poor immune response (Dealey, 2005)
Medication	› Some medications, such as corticosteroids, cytotoxic therapy and immunosupressants, may interfere with the immune response and reduce neutrophil activity
Age	› Changes that come with age may affect the immune response and ability of a wound to heal (Wilson, 2006)
Psychological factors	› These may lead to an unhealthy lifestyle, such as smoking, poor diet, poor personal hygiene
Wound characteristics, such as size, location and tissue type present	› Chronic wounds are more at risk of infection due to the longer exposure of multiple organisms › Wounds around the anal area are more at risk of contamination › Necrotic and sloughy tissue provide a medium for bacterial growth (Sibbald et al, 2007)
Type of wound	› For example, a surgical wound that arises from long and/or contaminated surgery

Several clinicians have sought to validate which signs and symptoms of wound infection are most accurate, in an attempt to develop assessment criteria or tools to provide a consistent approach to identifying wound infection (Cutting and Harding, 1994; Wilson et al, 1986; Gardner et al, 2001; EWMA, 2005). There are signs and symptoms of infection that are common to all wound types, as well as ones that are specific to chronic wounds (*Table 2*). In patients who display two or more, clinicians should suspect that wound infection is present (Sibbald et al, 2007).

A patient with spreading systemic infection may show signs and symptoms such as spreading erythema, lymphangitis, crepitus, wound breakdown/dehiscence, malaise and pyrexia. These patients require immediate specialist referral and fast intervention and treatment to avoid potentially serious complications, such as loss of limb or death.

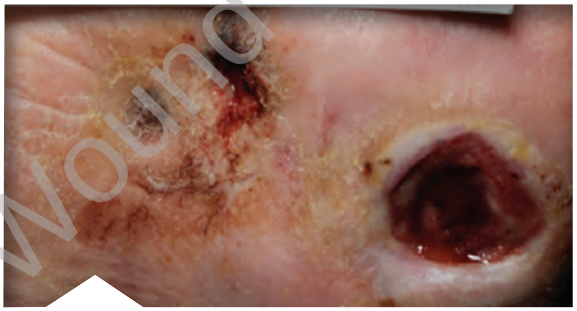

Figure 2. *Diabetic neuropathy is a risk factor for wound infection.*

Certain signs and symptoms may be difficult to identify in particular circumstances. For example, odour is a subjective measurement and may not be accurately detected by the clinician (Gardner et al, 2001). Pain may also be difficult to assess in patients with neuropathy or altered sensation, such as those with diabetes (*Figure 2*). This should be considered within the holistic assessment. Patients that have an altered immune response, or patients with diabetes mellitus, may also not display obvious signs of infection. For these patients, clinicians should maintain extra vigilance, as delayed healing may be the only sign of infection that is displayed (Patel, 2008).

There are also signs and symptoms of wound infection that may be attributed to a cause, other than wound infection (*Table 3*).

COMMON INVESTIGATIONS FOR WOUND INFECTION

Wound swabbing is the most frequently and easily used method of confirming the causative organism of wound infection, and can assist in accurately identifying possible antibiotic sensitivities. However, if used indiscriminately, it can be costly. The accuracy of a wound swab result has also been questioned, as it may only detect surface bacteria that has colonised the wound and not deep-seated bacteria within the wound bed (WUWHS, 2008). A technique that has been suggested to assist in a more robust collection of wound swabbing is the Levine technique:

- The wound is cleaned first to remove surface bacteria
- A swab is rotated over the wound bed with sufficient pressure to express fluid from below the surface of the wound (WUWHS, 2008)
- Accurate and relevant information should be provided on the microbiology form, including wound type, site and any antibiotic therapy that the patient is receiving. This assists the microbiologist in determining the most likely pathogen causing the infection (Bowler et al, 2001).

Blood tests that may reveal an elevated white cell count and elevated serum reactive protein

Did you know:

that wound infection is usually identified by clinical observation, as subtle changes to the inflammatory response can be observed over time by constant and repeated observation.

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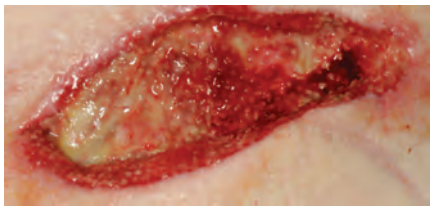
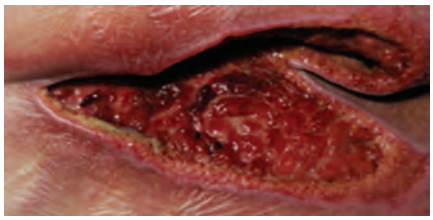
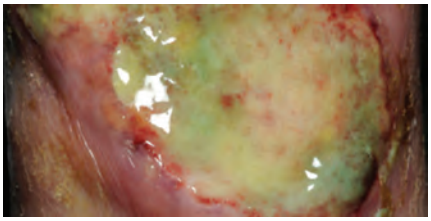
Table 2:	Signs and symptoms of wound infection
Common to all wound types	**Specific to chronic wounds**
› Cellulitis/erythema	› Friable granulation tissue that bleeds easily 
› Malodour	› Delayed healing
› Pain	› Discoloration of granulation tissue 
› Delayed wound healing or wound deterioration	› Pocketing at base of wound
› Increase in exudate volume (not seen in acute wounds healing by primary intention) 	› Increase in serous exudate 
	› Superficial bridging of wound bed

Table 3:	Differential diagnosis of signs and symptoms of wound infection
Signs and symptoms	**Differential diagnosis**
Erythema/inflammation	› Inflammation can occur during the normal process of wound healing and should not be mistaken for infection, especially in acute surgical wounds › Contact dermatitis/eczema
Malodour	› May be due to devitalised tissue (although this is a risk factor) › Fungating wounds produce odour-producing compounds, such as putrescine and cadaverin (Jones, 2012) › Some dressings may cause odour, e.g. hydrocolloids
Discolouration of granulation tissue	› Some dressings may cause discolouration of the wound bed, e.g. silver
Increased oedema and clear serous exudate	› May be due to uncontrolled cardiac failure

(CRP) can also help to diagnose wound infection.

CONCLUSION

Wound infection has a detrimental effect on wound healing. However, correct identification within clinical practice is not always easy due to the controversies surrounding the definition of wound infection and the lack of standardised assessment criteria. Critical thinking, holistic assessment and correct documentation of clinical indicators are key to correctly identifying clinical infection in patients with wounds. WCT

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Wound facts...

- The Nursing and Midwifery Council (NMC, 2009) state that accurate record keeping is an essential part of nursing practice.
- The guidance implies that good documentation supports the nurse's decision-making process.
- Accurately recording changes in a patient's wound, may enable the early detection of complications such as wound infection.
- Accurate documentation is also seen as an indicator of the quality of care delivered (Ousey and Shorney, 2009).

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Clinical companion 5

WOUND CARE TODAY

Skin tears

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About skin tears

- Skin tears are commonly seen in elderly and neonatal patients, because of the fragility of the skin in these two groups[1].
- Patients with lower limb oedema, malnutrition, dry skin conditions or those who have been on long-term steroid therapy or take multiple medications, are also at risk of skin tears[2].
- Many skin tears can be avoided by removing the factors that cause them, e.g. friction and shear forces, or objects which may be bumped into, resulting in trauma[1].

Patient assessment

- **Take a patient history**
  To see if the patient has a history of skin tears, or risk factors for skin tear development.

  To establish how the skin tear happened, e.g. trauma or friction/shear forces so they can be prevented in future.
- **Evaluate the wound**
  Consider the location of the wound, its dimensions, tissue types present in the wound, and the degree of flap necrosis, if present. The colour, volume, consistency and odour of wound exudate should also be considered.
- **Assess surrounding skin**
  Fragile and/or dry skin is at further risk of damage and will need managing to prevent this.

Categorise the skin tear[3]

Category 1: Skin tears without tissue loss		Category 2: Skin tears with partial tissue loss		Category 3: Skin tears with entire loss of tissue
a. Linear	**b. Flap**	**a. Less than 25%**	**b. More than 25%**	
› Edges can be realigned without stretching › Skin/flap is not pale, dusky or darkened	› Edges can be realigned without stretching › Skin/flap is pale, dusky or darkened	› Edges cannot be realigned › Skin/flap is not pale, dusky or darkened	› Edges cannot be realigned › Skin/flap is pale, dusky or darkened	› A skin tear where the skin flap is completely absent › Refer to tissue viability team

Cleanse the wound

- Gently irrigate the wound with saline or running tap water to remove debris and dirt.

Reapproximate

- If a viable skin flap is present, ease it back into position (reapproximate) using tweezers or gloved fingers. If difficult to align, use a moistened swab for 5–10 minutes to rehydrate the area.
- On robust skin, wound closure strips can be used to secure large flaps or micro-adherent closure products for fragile skin. Avoid the use of staples, sutures and traditional adhesive strips, as traction and further trauma may result.
- Record reapproximation in patient notes.

Protect the surrounding skin

- Apply a skin barrier product to surrounding skin.

Dress the wound

- Apply a non-adherent or atraumatic dressing (without tension) to secure the flap, leaving a 2cm overlap around the wound.
- Leave dressing in place for as long as possible to minimise flap disturbance.
- Wear time will be determined by wound conditions, e.g. wounds producing large volumes of exudate may require more frequent dressing changes.
- Mark the dressing with an arrow to indicate direction of removal to minimise flap disturbance.

Review and reassess

- Gently lift the dressing, working away from the attached skin flap. Silicone-based adhesive removers may be used to reduce trauma to the surrounding skin.
- Monitor for changes in the wound. If the skin flap is pale, dusky, or darkened, reassess within 24–48 hours for further breakdown.
- If signs of infection are present, manage according to local guidelines/refer.
- If healed, discontinue dressing and use good skin care (washing/moisturising) to prevent recurrence.

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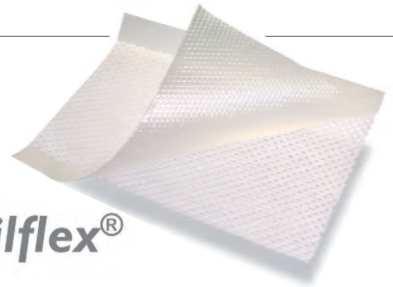

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IN BRIEF

- Skin tears occur in neonates and the elderly due to the fragility of the skin.
- A large proportion of skin tears are considered to be avoidable, making prevention a core tenet of management.
- An increase in elderly populations could mean a significant rise in the incidence of skin tears.
- Both qualified and non-qualified staff, patients, and carers have a role to play in the management of skin tears.

KEY WORDS:

- Skin tears
- Skin care
- Skin protection
- Prevention
- Assessment
- Categorisation
- Maintenance

Skin tears: a guide to prevention, assessment and management

Jackie Stephen-Haynes, Michelle Greenwood

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Skin tears have been defined as 'a wound caused by shear, friction, and/or blunt force resulting in the separation of skin layers. A skin tear can be partial-thickness (separation of the epidermis from the dermis) or full-thickness (separation of both the epidermis and dermis from underlying structures)' (LeBlanc and Baranoski, 2011).

Skin tears often occur on the body's extremities — the lower limb, the dorsal aspect of the hands and on the arms (Baranoski, 2001; Baranoski, 2003). Two main age groups are identified as being at risk — the elderly (Payne and Martin, 1993; Baronoski, 2001; Morey, 2007), and the very young (Beldon, 2008), primarily due to the ease at which the skin layers can separate in these two groups.

An awareness of the anatomy and physiology of the skin is vital for the clinician, as the smallest bump or knock can lead to significant tissue damage — hence every effort should be made to prevent this where possible.

The majority of skin tears occur while people are carrying out routine care activities (Everett and Powell, 1994) and, therefore, it is important to try and create a safe environment. Identifying and removing factors that cause skin tears helps to reduce their prevalence, particularly in older people. Increasing awareness of risk in carers should also be encouraged.

Figure 1. *A typical skin tear.*

THE RISKS ASSOCIATED WITH SKIN TEARS

It is important that clinicians consider each patient's risk of skin tears and implement an appropriate preventative strategy. There are several risk factors, including:

- Previous history of skin tears
- Fragile dry skin; very young or elderly skin
- Poor skin care
  - Multiple medications, particularly diuretics and steroids
  - Echymoses (discolouration of the skin caused by leakage of blood into the subcutaneous tissue due to trauma to the underlying blood vessels)
  - Restricted mobility
  - Reduced nutrition and hydration
  - Cognitive/sensory impairment
  - Comorbidities, including chronic heart disease, renal failure, cerebral vascular accident
- Patients who are unable to independently shower, dress or manoeuvre themselves.

SKIN TEAR CLASSIFICATION

The first skin tears classification tool was published in 1990 (Payne and Martin, 1990), then updated in 1993 (Payne and Martin, 1993). This classified skin tears by the severity of the lesion. A later system, the

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THE SCIENCE — SKIN PROTECTION

An essential aspect of skin protection is keeping the skin well-hydrated by maintaining nutritional intake and fluid balance. Cleansing, moisturising and protecting the skin is vital in maintaining skin integrity. Individuals with dry skin on their arms and legs will benefit from the application of an appropriate pH-friendly moisturising cream twice a day (Hanson et al, 2005). It is also important to:

- Use a pH-friendly soap and cleansing solutions and avoid the use of drying soaps
- Apply creams or lotions to maintain skin integrity and resistance to skin tears
- Appropriately manage moisture from incontinence or other sources
- Be careful when applying any adhesive tapes directly on to the skin
- Consider protecting fragile skin by covering the area with tubular or roll-on bandages and long-sleeved clothing.

Skin Tear Audit Research (STAR) classification system, comprises three different categories (Carville et al, 2007) (see box below). The STAR system is more specific in relation to the different levels of epidermal loss and the state of the epidermal tissue.

Whichever system is used, the emphasis is on the preservation of as much epidermal tissue as possible. The condition of the epidermal tissue is important, as a flap that is pale, dusky or darkened is more likely to break down and become unviable.

Stephen-Haynes and Carville (2011) have suggested that the STAR acronym may also be used as a prompt to ensure the appropriate assessment and treatment of skin tears:

- Select appropriate cleanser to clean the wound
- Tissue alignment
- Assess and dress
- Review and reassess.

The International Skin Tear Advisory Panel (LeBlanc et al, 2013) have also developed a toolkit to aid the prevention, assessment and treatment of skin tears and suggest three categories of skin tear:

- Type 1: linear flap tear, which can be re-positioned to cover the wound bed
- Type 2: partial flap loss, which cannot be repositioned to cover the wound bed
- Type 3: total flap loss exposing entire wound bed.

Wound facts... the STAR system

Category 1a	A skin tear where the edges can be realigned to the normal anatomical position (without undue stretching), and the skin or flap colour is not pale, dusky or darkened
Category 1b	A skin tear where the edges can be realigned to the normal anatomical position (without undue stretching), and the skin or flap colour IS pale, dusky or darkened
Category 2a	A skin tear where the edges cannot be realigned to the normal anatomical position, and the skin or flap colour is not pale, dusky or darkened
Category 2b	A skin tear where the edges cannot be realigned to the normal anatomical position, and the skin or flap colour IS pale, dusky or darkened
Category 3	A skin tear where the skin flap is completely absent.

However, in the authors' opinion, the STAR classification offers significant advantages, having clearer definitions and breaking down the categories into sub-sections, which offer the clinician a more accurate description.

Beldon (2008) stated that skin tears on the front of the leg or on the shin bone should in fact be classified as 'pretibial lacerations'. In these cases, it is important to undertake an assessment of the blood supply to the lower limb and consider the patient's suitability for compression therapy (Beldon, 2008).

Implementing STAR in practice

Worcestershire Health and Care Trust developed the 'STAR box' in 2007 and this has since been adopted by a number of other healthcare organisations. The box was designed to provide skin tear resources and information at a central location, which would assist clinicians in preventing, assessing, managing and maintaining skin tears effectively. The box includes prevention guidance, an assessment chart, appropriate dressings and a maintenance plan. This allows carers and clinicians to maintain the skin flap without the need for referral to tissue viability services, A&E, or the local minor injuries unit.

MANAGEMENT OF SKIN TEARS

The aim of management is to reduce the risk of infection, to close the wound, protect the periwound margins, and achieve healing. The focus is on assessment, re-approximation of the skin

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flap, dressing application and reassessment. It is important to continually reconsider and undertake holistic, skin and wound assessment. Detailed management of the skin tear itself is outlined in *Table 1*.

PAIN

It is important to assess and manage pain, as skin tears can be painful due to the trauma affecting the superficial nerve endings in and around the wound (Beldon, 2008).

Clinicians can use a visual analogue scale (VAS) to assess and grade a patient's pain (Mudge and Orsted, 2010) and a number of factors can assist in skin tear pain management (World Union of Wound Healing Societies [WUWHS], 2004; Mudge and Orsted, 2010):

- Recognise, identify and manage pain, involving the patient
- Use warm cleansing solution to irrigate the wound
- Select atraumatic dressings that minimise trauma and pain during application and removal
- If an adherent dressing is in place, use a silicone medical adhesive remover
- Evaluate each patient's need for pharmacological and non-pharmacological strategies to minimise wound-related pain.

Wound facts... skin tear assessment

Several authors have identified the need for an appropriate skin tear assessment (Cooper, 2006; Lloyd Jones, 2010; Stephen-Haynes et al, 2011; Stephen-Haynes and Carville, 2011). It is important to establish the type of injury and also to focus on the prevention of further injury. The following are important points to consider:

- Location
- Wound dimensions (length, width, depth)
- Amount and percentage of viable/non-viable tissue
- Degree of flap necrosis
- Presence of haematoma
- Type and volume of exudate
- Integrity of periwound and surrounding skin.

Table 1: Management of skin tears

Step	Action
Cleanse the wound	› Use saline or running tap water to remove any dirt or grit › Gently pat dry the surrounding skin
Reapproximate the skin flap	› Where the skin flap is viable, bring the edges together gently easing the flap back into place using tweezers or a gloved finger, and consider using the flap as a 'dressing'. Record any approximation (Cooper, 2006) › If the flap is difficult to align, consider using a moistened non-woven swab, applied for 5–10 minutes to rehydrate the area › Use wound closure strips to secure large skin flaps. The fragility of the skin means that sutures and staples are not recommended › Apply a skin barrier product to protect the surrounding skin
Application of the dressing	› Secure the flap. Without tension, apply a non-adherent dressing. The dressing should be appropriate for the wound condition and category of skin tear, with a 2cm overlap › Wear time will be dependent on the type of dressing and volume/viscosity of exudate › Traditional adhesive strips are not recommended as they may cause traction and further trauma (Meuleneire, 2003) › Gentle micro-adherent wound closure products may be considered if the skin is fragile › The dressing should be left in place for up to five days to avoid disturbance of the skin flap › The dressing may be marked with an arrow to indicate the direction of dressing removal
Review and reassess	› The dressing can stay in place for approximately 3–7 days. The dressing should be gently lifted, working away from the attached skin flap. Silicone-based adhesive removers may be used to reduce trauma to the surrounding skin (Meuleneire, 2003; Beldon, 2006, Stephen-Haynes, 2008) › When removing the dressing take care not to disrupt the skin flap › Monitor for changes in the wound and document › Maintain periwound skin integrity › Where the skin or flap is pale and dusky/darkened, reassess within 24–48 hours, as further breakdown may occur › Monitor for signs of infection and manage appropriately (WUWHS, 2008; Wounds UK, 2011; European Wound Management Association [EWMA], 2013) › Digital photography is useful to monitor the progress of the wound and to support accurate documentation › Treatment can be stopped if complete re-epithelialisation is achieved › It is now imperative to focus on essential skin care, e.g. washing, drying and moisturising

PREVENTION

Consideration should be given to reducing environmental factors that may put the individual at increased risk of slips, trips and falls. These may include:

- Ensuring adequate lighting and that light switches are easy to reach
- Removing loose rugs and cluttered furniture
- Ensuring that items of small furniture (night tables, chairs) are positioned carefully to avoid unnecessary trauma. Upholster sharp furniture edges with padding and soft material
- When transferring people, use appropriate aids and employ proper movement and handling

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Top tip:

Helping to prevent skin tears can involve quite simple precautions, such as ensuring that light switches are easily reachable, rugs and carpets are not overly slippery, and that small furniture such as chairs and night tables are not cluttering walkways...

techniques following local manual handling guidance, e.g. when using lifting devices or slide sheets. Bed sheets should NEVER be used to move an individual, as this can cause a 'dragging' effect on the skin and strip the epidermis and dermal layer (Beldon, 2006)
- Where possible, reduce or eliminate pressure, shear and friction using pressure-relieving devices and appropriate positioning techniques
- Encouraging patients to wear appropriate footwear and clothing to reduce the risk of injury. For example, wearing socks can protect the pretibial leg area.

Holistic prevention

Clinicians should consider ways in which the overall risk to the individual can be minimised. This may include optimising nutritional status, encouraging movement and mobility, frequent review of medications and the maintenance of the skin.

ONGOING MAINTENANCE

Identifying those at risk of skin tears and implementing preventive strategies will help to keep the skin intact, as will making sure that patients' skin is well-hydrated by maintaining their nutritional intake and fluid balance.

Patients with dry skin on their arms and legs will benefit from twice-daily applications of an appropriate moisturising cream (Hanson et al, 2005). It is important to:
- Use pH-friendly soap (avoid highly perfumed products) or cleansing solutions
- Control or contain moisture from incontinence or other sources
- Avoid/minimise the application of adhesive tapes directly onto the skin
- Protect limbs and fragile skin by using tubular or roll-on bandages, long thick — but not tight-fitting — socks, full-length trousers, and long-sleeved clothing.

CONCLUSION

The prevention of skin tears is an important aspect of skin care in older people and neonates. It is important that older people with a skin tear are treated promptly and appropriately to prevent complications and optimise healthcare resources.

An awareness of the anatomy of the skin and the effects of ageing will help clinicians identify those patients at risk of developing skin tears.

It is also important for clinicians to have a thorough knowledge of skin tear management techniques, as well as the patient's medical co-morbidities, social circumstances, mobility, continence status and psychological wellbeing.

A competent clinician should be able to assess a patient who presents with a skin tear, as well as agree a plan of care, while more junior staff and healthcare assistants are ideally placed to assist with prevention. **WCT**

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Back to basics

Sometimes it's hard to cut through all the research and evidence to find out exactly what the basics of good wound care are. Here, *Wound Care Today* outlines five key areas of everyday wound care practice...

1 Dressing removal

Dressings are designed to help create an ideal healing environment by supporting the body's healing response, and they often contain skin adhesives that ensure the dressing stays in place. Used for short periods on healthy skin, these adhesives are unlikely to cause tissue damage. However, damage can occur on removal of these adhesive dressings, particularly where the patient's skin is delicate or when the adhesives used are aggressive.

Similarly, using absorbent products on wounds that are already dry may further dry out the wound bed and lead to dressing adherence, causing pain on removal.

However, care must be taken, as applying moist products such as hydrogels and/or using secondary dressings that are not absorbent enough may lead to maceration of the surrounding skin.

2 Debridement

The aim of debridement is to remove physical impediments to wound healing through chemical, biological and or physical means, including surgical/sharp debridement, hydrosurgery and autolytic debridement, where the moist environment dissolves necrotic tissue within the wound. Debridement can also help to reduce wound odour by removing bacteria.

Debridement removes tissue so that the wound can be properly assessed. When devitalised tissue is present there is an increased risk of infection, which again will slow wound healing. Dead tissue stimulates the inflammatory response and is also a physical barrier to healing.

3 Cleansing the wound

Wound cleansing is the use of a solution to remove surface debris, bacteria and dressing material from the wound bed, and sometimes the surrounding skin. The aim of wound cleansing is to assist the wound healing process and to create a wound environment which is conducive to healing.

Wound cleansing is not always necessary if a wound is clean, granulating, dry and free of debris. However, many wounds will require cleansing to help remove left over dressing material such as gels and fibres. Devitalised tissue, slough and purulent exudate can also be removed by wound cleansing.

4 Factors affecting healing

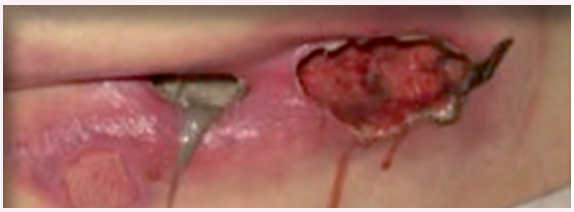
Wound healing is a complex chain of events that requires a number of key 'ingredients' and physiological processes to occur, such as the body's healing response and the provision of a moist wound healing environment. Similarly, there are a number of influencing factors that can impede the healing process, and it is of paramount importance that the clinician is aware of how these may slow down a wound's progress.

These factors can be divided into those that are 'external' such as unrelieved pressure, and those that are 'internal' such as physical comorbidities. Clinicians should be aware of a number of systemic conditions that can have a deleterious effect on healing unless they are recognised, including diabetes and rheumatoid disease.

The impact of ageing is also one of the major concerns for patients with chronic wounds, as it can have a negative impact on many of the body's systems; likewise nutrition is known to have a significant role to play in the wound healing process, as energy and protein are need to fuel the growth of new tissue.

Less is known about the impact of social circumstances on wound healing specifically, but clinicians should be aware of the possible effect of factors such as poverty, loneliness and poor housing, as all are associated with poor health outcomes generally.

5 Treating infection



Treatment of wound infection will depend on the wound type, patient immunity and the strain of bacteria. However, the cornerstone of wound treatment is accurate assessment. There are three main options for infected wounds — antibiotics, antimicrobial dressings and debridement. For patients with systemic infection, antibiotic treatment may be necessary to help reduce the risk of sepsis. For locally infected wounds, treatment with antimicrobial dressings may be necessary for 7–10 days.

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