

## The effective management of exudate in chronic wounds

Author:  
Janice Bianchi

Moisture is essential to the normal healing process in acute wounds. In chronic wounds, however, exudate can be detrimental to wound healing. Wound exudate, particularly from chronic wounds, contains a cocktail of elements (cellular debris and enzymes), which can be very corrosive to the wound bed itself and the skin surrounding the wound. Careful holistic assessment of the patient and the wound is essential to determine if exudate is delaying the healing process. This article looks at ways that clinicians can identify excess wound exudate, as well as offering some innovative solutions, such as wound bed irrigation.

### INTRODUCTION

Wound healing is a sophisticated continuous process where cells undergo a number of complicated biological changes to facilitate haemostasis, combat infection, migrate to the wound space, deposit a matrix, form new blood vessels and contract to close the defect<sup>[1]</sup>.

Moisture (exudate) is an essential component of this normal wound healing process and first appears in the wound during the inflammatory phase, when the fibrin clot is degraded and the capillaries dilate and become permeable, allowing fluid into the injured site and activating the complement system<sup>[1]</sup>.

The complement system is a sequence of proteins found in serum and extracellular fluid, the function of which is to destroy target cells.

The moisture/exudate produced at the early stages of the wound healing process will facilitate the inflammatory response by destroying bacteria, eg matrix metalloproteinases (MMPs), and help bind neutrophils to bacteria, facilitating phagocytosis. Moisture also aids autolytic debridement, which is the process by which the body's own enzymes liquify debris in the wound bed<sup>[2]</sup>.

The process of epithelialisation, where the

wound contracts and new skin cells form over the wound, is dependent on moisture. In his seminal work<sup>[3]</sup>, Winter demonstrated that epithelial cells only move over viable tissue and require a moist environment. Therefore, moisture is essential to the normal healing process in acute wounds.

In chronic wounds, however, the exudate can be detrimental to wound healing. Wound exudate, particularly from chronic wounds, contains a cocktail of elements (cellular debris and enzymes), which can be very corrosive to the wound bed and intact skin surrounding the wound<sup>[4]</sup>. Several studies have examined the impact of chronic wound fluid on the wound environment.

Phillips et al<sup>[5]</sup> used cultured fibroblasts from human neonatal foreskins in a plated laboratory model and treated them with either chronic wound fluid or a control (bovine serum albumin). The researchers found chronic wound fluid dramatically inhibited the growth of fibroblasts. They concluded that this study illuminated how the micro-environment has a negative effect on wound healing.

Trengrove et al<sup>[6]</sup> found differences in the levels of MMPs in chronic wounds, compared with acute wounds. In a further study, they identified that chronic wound fluid also contained higher levels of pro-inflammatory

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cytokines, free oxygen radicals and proteases such as MMPs and elastase<sup>[7]</sup>. These studies help us to understand the effects of chronic wound fluid on the wound bed.

## HOW DOES MOISTURE AFFECT THE PERIWOUND SKIN?

In addition to the damage caused to the wound, constant exposure to moisture can result in damage to the periwound skin. As well as causing problems within a wound, such as breakdown of the extracellular matrix, exposure to MMPs can damage the periwound area as the proteins enveloping the corneocytes are destroyed, impacting the epidermal barrier function<sup>[8]</sup>. This can result in a red and 'weeping' skin surface. Additionally, the pro-inflammatory cytokines in chronic wound fluid cause damage to the stratum corneum, further reducing skin barrier function<sup>[9]</sup>.

Prolonged exposure of the skin to high levels of moisture also over-hydrates the outer layer of epidermal cells, which swell, weakening the links between the layers of tissue. Irritant fluids strip away the outer layer of the epidermis and expose the fragile germinative layers, increasing the risk of secondary infection and further damage. Once the germinative layer is exposed to the air, basal cells leak serous fluid, which dries out quickly to form eschar, leading to progressive tissue damage in deeper layers<sup>[8]</sup>. These effects significantly alter the ability of the skin to withstand damage, from friction in particular, but also from shear and pressure.

## MANAGING EXUDATE

Controlling exudate levels and protecting the periwound skin are key in the prevention of maceration and wound breakdown.

### Protecting the periwound skin

Local treatment to avoid or treat periwound maceration includes the use of highly absorbent dressings. Dressings with a super-absorbent component give good protection<sup>[10]</sup>. Other technologies, such as topical negative pressure, should also be considered as they actively remove fluid from the wound bed. Skin barriers, in the form of films and creams, can also help by sealing healthy skin from bodily fluids<sup>[11]</sup>.

## Controlling exudate

Where exudate levels are high, an holistic assessment of the patient will help establish the cause and how best to treat the patient and wound. High levels of exudate may be related to:

- Medical conditions that increase capillary leakage (eg cardiac, renal or hepatic failure)
- Pathology of the wound (eg venous disease)
- Failure of the lymphatic system
- Increased bacterial burden (infection/critical colonisation)<sup>[11]</sup>.

## Underlying medical conditions

Where an underlying medical condition or medication is thought to be contributing to the elevated exudate levels, an examination of the patient and review of medication by an appropriately trained clinician may be required in order to reduce capillary leakage and correct or minimise symptoms.

## Venous disease/lymphatic disease

Legs with venous problems can produce copious amounts of exudate. The removal of oedema using sustained compression therapy is fundamental to achieving moisture balance<sup>[12]</sup>. Compression is an effective method of controlling wound exudate in patient with venous disease as it reduces venous hypertension<sup>[13]</sup>.

Application of compression should be carried out by a clinician with appropriate skills following a full leg ulcer assessment, including vascular assessment. If the patient has lymphatic failure, referral to lymphoedema specialists services to establish the cause may be appropriate. Patients with lymphoedema will also benefit from compression therapy. If it is appropriate, external support/compression along with skin care can be used<sup>[14]</sup>. In both venous and lymphatic disease, a programme of exercise and movement would also be considered part of the management.

## Increased bacterial burden (infection/critical colonisation)

Research suggests that all wounds are contaminated with bacteria but that this alone will not disrupt the wound

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## Useful links

Managing high exudate wounds  
Exudate Made Easy  
Prontosan Made Easy  
Wound Exudate and the role of dressings

healing process<sup>[15,16]</sup>. Problems occur when contamination changes to a state of critical colonisation or infection and the bioburden of the wound impedes healing<sup>[16]</sup>. Infected wounds usually have an increased level of exudate, which may have an offensive odour and can be the first indication of infection<sup>[17]</sup>.

If infection occurs, other clinical signs, including pain, heat, swelling and erythema<sup>[17]</sup> will usually be present. Preventing wound infection is the most important factor in preventing an acute wound becoming chronic<sup>[16]</sup>. When a clinical diagnosis of infection or critical colonisation is made, good wound care with regard to wound cleansing and the use of appropriate dressing products should be commenced with the aim of reducing the wound bio-burden.

## Wound cleansing

Wound cleansing is also important in order to remove foreign matter, necrotic tissue and surface bacteria. Traditionally, either normal saline or tap water were used to cleanse wounds<sup>[18]</sup>, however, there is evidence suggesting that in chronic, hard-to-heal wounds, polyhexanide (found in wound irrigation solutions, such as Prontosan® [B. Braun]) offers a safe, cost-effective method of wound cleansing which is more effective than normal saline<sup>[16]</sup>.

In critically colonised wounds, antiseptic dressings should be applied. Where a clinical diagnosis of infection has been made, treatment by antibiotic therapy and antiseptic dressings should be initiated<sup>[19]</sup>.

## CONCLUSION

Moisture/exudate is required to facilitate the wound healing process. In those patients with chronic wounds, however, the content of the fluid may delay the wound healing process, harming both the wound bed and the periwound skin. Careful holistic assessment of the patient and the wound is essential to determine if exudate is delaying the healing process.

## AUTHOR DETAILS

**Janice Bianchi** is a Medical Education Specialist at JB Med Ed Ltd and Honorary Lecturer at University of Glasgow