Managing high viscosity exudate

KEY WORDS
- Exudate
- Viscosity

Wound pain, odour and exudate have a major impact on patient quality of life. Understanding the management of these core components of wound healing is essential if patient outcomes are to be optimised. This paper discusses the role and types of exudate, the impact of high viscosity exudate on management and what to consider when selecting an appropriate dressing with the aim of restoring a satisfactory moist wound environment for healing.

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Exudate is an essential component of the normal wound healing process and first appears during the inflammatory phase, providing a moist wound environment and supplying dermal cells with essential nutrients for healing (White, 2008).

Variations in the type and amount of exudate occur over time as a result of various underlying physiological processes (White, 2008). In wounds that heal normally, exudate is usually clear and thin, with levels typically reducing as the wound progresses to healing. However, in wounds where healing is delayed, the combination of balancing components within exudate may change to favour harmful proteases; these are highly detrimental to new tissue formation and play a key role in prolonging the inflammatory response (Gibson et al, 2009). This persistent inflammatory phase may be associated with higher exudate levels, as well as increased viscosity, which can be problematic to manage and may indicate wound degeneration or infection (Romanelli et al, 2010).

Studies have also demonstrated that the pH of chronic wound exudate varies (Shukla et al, 2007), while an increase in wound fluid pH has been associated with the onset of clinical signs of local infection in patients with second-degree burns (Ono et al, 2014). As pH affects the solubility, activity and physical properties of the constituents of solutions such as proteins, changes in wound fluid pH is likely to alter the viscosity and appearance of exudate. Exudate composition is also affected by glycoproteins derived from cell and bacterial debris and biofilm material, while changes in patient hydration status (Widgerow, 2012), level of periwound oedema and the position of the patient (hydrostatic pressure) can influence exudate viscosity (World Union of Wound Healing Societies [WUWHS], 2007).

Accurate assessment of exudate characteristics can provide important clues as to the wound status, the wound healing phase and level of bacteria in the wound (WUWHS, 2007). This in turn can, along with patient considerations, guide appropriate treatment strategies to improve patient outcomes.

TYPES OF EXUDATE

Information about the type of exudate is gained from examination of the soiled dressing, wound bed and periwound skin at each dressing change (WUWHS, 2007). Observing the colour and consistency of exudate can indicate underlying or contributory factors such as the presence of bacteria or other contaminants in the wound (*Table 1*). The amount of exudate in a wound can be difficult to assess however; exudate volume can vary according to the size of wound and assessments are often done subjectively (Davies, 2012).

Wound bed preparation and the TIME framework can be used as systematic approaches to identifying and removing the barriers to healing such as exudate (Dowsett

Table 1. Significance of types of exudate (adapted from World Union of Wound Healing Societies, 2007; Wounds UK, 2013).

Type	Consistency	Colour	Significance
Serous	Thin, watery	Clear, amber	Often considered normal, but increased volume may indicate infection (e.g. Staphylococcus aureus)
Fibrinous	Thin, watery	Cloudy	May indicate presence of fibrin strands
Serosanguinous	Thin, slightly thicker than water	Clear, pink	Presence of red blood cells indicates capillary damage (e.g. post-surgery or traumatic dressing removal)
Sanguineous	Thin, watery	Reddish	Low-protein content due to venous or congestive cardiac disease, malnutrition Other causes include urinary, lymphatic or joint space fistula
Purulent	Viscous, sticky	Opaque, milky, yellow or brown, sometimes green	Presence of wound white cells, bacteria, slough or material from enteric or urinary fistula Bacterial infection (e.g. Pseudomonas aeruginosa)
Haemopurulent	Viscous	Reddish, milky	Established infection May contain neutrophils, dying bacteria, inflammatory cells, blood leakage due to dermal capillaries, some bacteria
Haemorrhagic	Viscous	Dark red	Bacterial infection Capillary damage indicative of trauma

and Newton, 2004). Other tools that aim to quantify the amount of exudate (Bates-Jensen, 2007; Fletcher, 2010) can also guide dressing selection. However, descriptors relating to colour and viscosity are often not included and a lack of consistency in the criteria used may hinder accurate communication between members of the team caring for the patient (Davies, 2012).

Reduction of exudate levels will depend on the successful management of the underlying cause. However, until the chosen therapy takes effect, practitioners are responsible for managing the symptoms as effectively as possible through the use of appropriate dressings and topical agents. Any increase in odour, consistency or exudate production should prompt further review. Regular re-assessment allows emerging problems to be identified and a review of the effectiveness of the current interventions (Wounds UK, 2013).

SIGNIFICANCE OF VISCOUS EXUDATE

The consistency of exudate may vary from thick and viscous to thin and watery and is dependent on the amount of fluid being produced by the host and the number of white cells and bacteria in the wound (Romanelli et al, 2010).

Low viscosity (thin, runny) indicates low protein content. High viscosity exudate (thick and sometimes sticky) indicates high protein content, which may result from increased levels of bacteria in the wound or the inflammatory process (*Figure 1a*). As the number of white cells and bacteria increase, they thicken exudate, causing it to become opaque. Infected wounds are often characterised by an increase in the volume of exudate and its character may become purulent and malodourous (Cutting et al, 2005). As well as increasing viscosity, the exudate may change from a pale amber colour to yellow or brown, and sometimes green, the latter indicative of the presence of *Pseudomonas aeruginosa* (Wounds UK, 2013).

Exudate colour may also be influenced by dressing constituents released into the wound bed such as silver or iodine, while dressing moisture vapour transmission rate (MVTR) will affect exudate consistency by allowing volatile components, including water vapour to escape from the wound bed (WUWHS, 2007).

Figure 1(a). Chronic infected post-traumatic ulcer presenting with high level of viscous exudate (photo courtesy of F Meuleneire). Figure 1(b). Exudate is highly viscous and has not been absorbed by the dressing.

Other causes of viscous exudate are the presence of liquefying necrotic material, residue from dressings or topical preparations and material from an enteric fistula. Typically urinary contamination results in a watery straw coloured exudate with a high urea content (WUWHS, 2007).

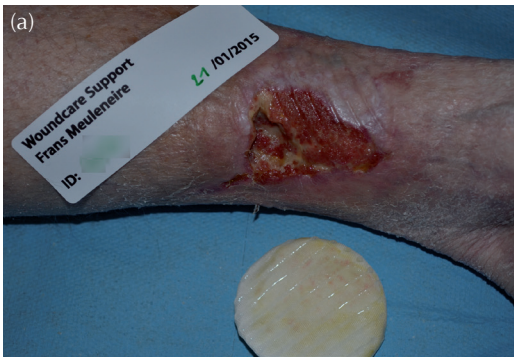
HIGH VISCOSITY EXUDATE MANAGEMENT

Managing high viscosity exudate can be challenging clinically, cause discomfort and distress to the patient (Vowden and Vowden, 2003) and be costly to manage (Bennett et al, 2004). Patients may also be subjected to more frequent or daily dressing changes, which can be painful (European Wound Management Association [EWMA], 2002). Exudate is often associated with an unpleasant odour and problems of leakage and/or strikethrough through dressings can lead to patient embarrassment and social isolation (Jones et al, 2008). If not managed effectively, exudate-related problems may lead to periwound maceration, increased infection risk and poor patient compliance due to a loss of confidence in the treatment (Wounds International, 2012). The challenge for the clinician is to understand what factors are changing the volume and consistency of the exudate and to act appropriately to restore a satisfactory moist wound environment that will support healing.

Box 1. Dressing choice and exudate management.

At dressing changes it is important to determine:

- If all the exudate has been absorbed into the dressing (*Figure 1b*)
- Whether the exudate is retained effectively in the dressing – is there strikethrough on the primary and/or secondary dressing?
- Leakage onto surrounding skin – is there evidence of maceration/excoriation?
- Whether the dressing is easy to remove – does the dressing adhere to the wound causing damage (e.g. bleeding) and pain on removal?
- The date of the next dressing change based on the level of dressing saturation (weight/heaviness of the dressing/strikethrough etc).



There is no standard guidance on how to manage high viscosity exudate, the emphasis being on how to manage volume of exudate (WUWHS, 2007; Wounds UK, 2013). While some of the challenges may be the same, it is important to consider the impact of high viscosity exudate on management.

If the exudate viscosity is due to the liquefaction of necrotic tissue then good wound debridement where appropriate can reduce viscosity in a very short period of time. Treatment of a wound infection using appropriate topical and/or systemic products can be an effective way to reduce exudate viscosity and promote wound healing (Gago et al, 2008).

Factors to consider when selecting dressings

The overall aim of effective exudate management is to achieve a moist, but not macerated, wound bed for optimal healing, while treating underlying contributory factors, improving patient quality of life, preventing complications and optimising use of healthcare resources (Romanelli et al, 2010).

To achieve these goals practitioners need to have a detailed knowledge of the fluid-handling properties of wound dressings and recommended wear time. However, there is

often confusion given the variety and number of dressings available.

Dressing choice is determined mainly by the ability to handle and manage the current volume of exudate (*Box 1*). Wound dressings vary in the way they absorb and retain exudate. Simple absorptive dressing materials take up fluid into spaces in their structure by wicking the exudate laterally, across the dressing, and/or vertically and are aided by moisture vapour transmission (evaporation). However, due to problems of retention of fluid, other dressing materials take up liquid to form a gel or use fibres/particles in the dressing to trap or 'lock in' exudate and its components (e.g. bacteria and proteases), influencing the composition of exudate in the wound (WUWHS, 2007). Often dressing products combine different materials, resulting in a wide range of dressings that vary considerably in their fluid-handling characteristics and usages (Romanelli et al, 2010).

As well as the absorbent capacity potential of dressings, certain key performance characteristics are required to ensure an optimal moist wound environment for healing and that take the patient's preferences into consideration (White, 2008). These include:

- Prevents leakage between dressing changes
- Prevents strikethrough
- Provides protection from excoriation/maceration
- If used under compression, ability to retain absorbed fluid under pressure
- Easy to apply and remove
- Stays intact and can be left in place for long duration
- Minimises trauma and pain on removal
- Low allergy potential
- Comfortable and conformable
- Cost-effective.

Dressings that handle high volumes of low viscosity exudate well may not deal as effectively with lower volume high viscosity exudate. When the exudate is highly viscous, it may interfere with the way in which dressings absorb exudate. For example, if the perforations in the dressing wound contact layer are too small and become clogged, the viscous exudate cannot pass through, leaving a film of exudate between the wound, periwound skin and the dressing.

Poor absorption can therefore cause exudate to become trapped beneath the dressing and build up on the wound bed, damaging the underlying tissue and potentially increasing the depth and size of the wound. If the exudate also leaks out under the dressing onto the periwound skin and is left in contact with it, the enzymatic activity of proteases in chronic wound exudate can also impair skin barrier function, accelerating the development of maceration and/or excoriation (Lawton and Langon, 2009). This can have a direct impact on patient quality of life and lead to delayed healing, greater patient morbidity and increased dressing usage and nursing time. There may also be increased risk of infection with the additional costs of systemic antibiotic therapy (Thomas, 2008).

When dealing with high viscosity exudate it may be necessary to change dressings more frequently or select a dressing that it is designed to absorb thicker exudate components. The selection of a dressing that is effective in managing this type of exudate is a challenge for clinicians with the ideal dressing being one that is superabsorbent, atraumatic, with large 'pores' and the ability to wick away the exudate to protect the periwound skin and reduce frequency of dressing changes. This requirement will change as the exudate becomes less viscous. It is therefore important to evaluate the capability of the dressing to manage exudate effectively at each dressing change (Romanelli et al, 2010) and to adapt the dressing choice based on the characteristics of the wound and exudate assessment.

A multifunctional dressing capable of handling both high volume and high viscosity exudate effectively could simplify dressing selection and provide patient and cost benefits.

CONCLUSION

Healthcare practitioners should have the appropriate skills and training to ensure that they understand the importance of accurate assessment of exudate as part of a holistic assessment of the patient and the wound. This, combined with knowledge of specific wound dressings, will

help with appropriate dressing selection. It is also important to address patients' needs in terms of comfort, avoidance of strikethrough and prevention of leakage, while maintaining efficient use of resources

However, more research should be undertaken to understand the true extent of the clinical, economic and patient-related challenges posed by high viscosity exudate. In order to gather information from practising clinicians, a survey has been compiled and is available online (*Box 2*); the results of which will be used to benchmark current knowledge and facilitate the development of practical guidance on the management of high viscosity exudate. It is hoped that this will drive innovative treatment approaches and ensure earlier implementation of appropriate cost-effective strategies. WUK

Box 2: Take the online survey.

A global survey has been put together to gain insight into current knowledge about viscous exudate and what challenges clinicians face when managing high viscosity exudate in wounds.

The survey will take no more than 5 minutes to complete and all responders will remain anonymous.

Take part at: https://www.surveymonkey.com/s/exudate

Thank you for your support.

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For details of the survey please go to: https://www.surveymonkey.com/s/exudate

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