Odour Control Wound Dressings

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Certain types of chronic wounds such as leg ulcers, diabetic foot ulcers and fungating lesions are often associated with wound malodour, which can cause both socially and psychologically distress for the patient and their family [1]. The smell from these wounds is associated with excess exudate production, presence of necrotic tissue and the release of volatile agents from infecting microorganisms [2].

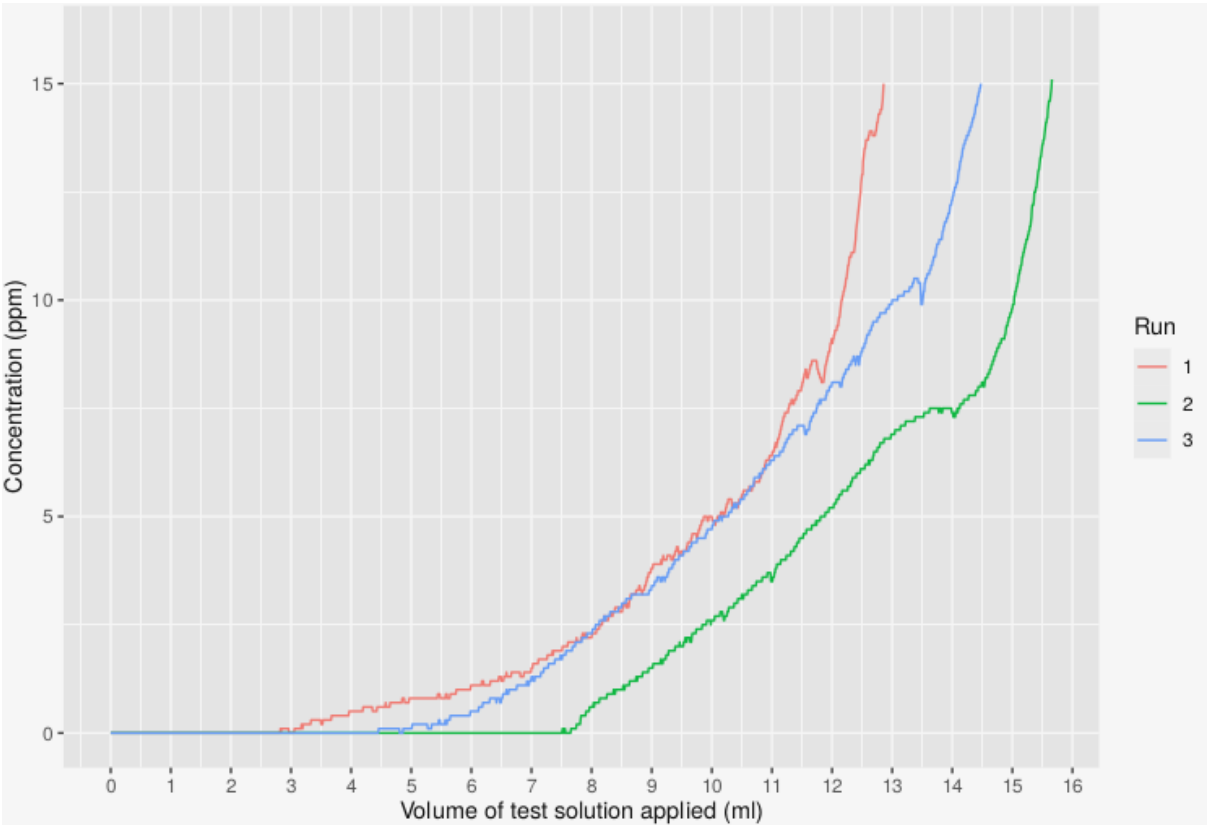
The most effective way of dealing with malodorous wounds is to prevent or eradicate the infection by cleansing and debriding the wound (surgical and biological larval therapy) and treating the underlying infection using antibiotics (systemic or topical) and antimicrobial agents (such as honey and silver) [3]. These treatments are often supplemented by using specialist odour-adsorbing dressings that are designed to retain the volatile molecules released from the wound.

Deodourising wound dressings have been used for many years, however despite their widespread use, there is little objective data on their odour handling characteristics. The European standard *EN 13726-6:2003* [4] details a test method designed to assess the resistance of primary wound dressings to penetration by odours. The test method only applies to dressings of a design where the odour absorbing material is not penetrated by exudate. As the wound dressings are tested in a dry state, this does not simulate clinical use and is inadequate for ascertaining a realistic evaluation.

In 1998 *Thomas et al*. [2] devised an in vitro test method where both odour-adsorption and fluid-handling capacity are assessed together, and thus more realistically simulates the conditions of normal clinical usage. Over recent years the SMTL have refined and developed this method to produce a validated test method that determines the ability of wound dressings to absorb exudate and control odour in the wet state.

In this test, the wound dressing under test is placed over a stainless steel plate with a recess (16.6 cm^2 wound area) and covered with an airtight perspex chamber. A 50ml syringe attached to a syringe driver is filled with a volatile/malodorous test solution (2% diethylamine solution) which is infused onto the dressing at a rate of 30ml/hour. A calibrated photo-ionisation gas detector placed immediately above the wound dressings continually monitors the concentration of diethylamine in the chamber (1 second intervals), and the test continues until the concentration of 15 parts per million (ppm) is detected (Figure 1). The volume of test solution applied to the wound dressing when the concentration of diethylamine in the chamber reaches 15 ppm is then calculated. The higher the volume of the test solution, the better the wound dressing's odour-adsorbing properties.

Figure 1 - Example Odour Adsorption Results



The studies listed in Table 1 show that exudate production rates vary depending on wound type. For example, if an average exudate rate of 0.5 ml/cm^2/24 hours was used, then a wound with an area of 10 cm^2 could therefore be expected to produce approximately 5 ml of exudate in 24 hours (0.21 ml per hour).

Based on the results of the test, an estimate of the degree of odour control can be calculated. For example, if the mean volume of test fluid applied to the dressing was 15ml, the dressing could be expected to provide a degree of odour control for approximately 72 hours.

It is important to note however, that the rate at which the test solution is applied during the test is 30 ml per hour (43.4 ml/cm^2/24 hours) and this value is considerably in excess of that encountered clinically.

Wound Type	Method of exudate production measurement	Paper Reference	Rate of exudate production (g/cm^2/24 hours)
Leg ulcers	Dressing weight	5	0.17 - 0.21
Leg ulcers	Dressing weight	6	0.43 - 0.63
Various	Negative pressure wound therapy canister collection	5	1.3*
Granulating wounds	Vapour pressure gradient (evaporative water loss)	7	0.51
Skin donor sites	Vapour pressure gradient (evaporative water loss)	7	0.42
Partial-thickness burns	Evaporimeter	8	0.42 - 0.86
Partial-thickness burns	Vapour pressure gradient (evaporative water loss)	7	0.43
Full-thickness burns	Vapour pressure gradient (evaporative water loss)	7	0.34

Table 1 - Reported Exudate Rates per Wound Type

Note:

*Units: ml/cm2/24 hours

1. Benbow, M (1999) Malodorous wounds: how to improve quality of life. Community Nurse 5(1): 43-46

2. Thomas S, Fisher B, Fram P, Waring M (1998) Odour Absorbing Dressings: A comparative laboratory study. J Wound Care 7(5): 246-250.

3. Lee G, Anand S C,Rajendran S, Walker I (2006) Overview of current practice and future trends in the evaluation of dressings for malodorous wounds. J Wound Care 15(8): 344-346

4. EN 13726-6 Non-active medical devices - Test methods for primary wound dressing - Part 6: Odour control

5. Dealey C, Cameron J, Arrowsmith M (2006) A study comparing two objective methods of quantifying the production of wound exudate. J Wound Care 15(4): 149–53

6. Thomas S, Fear M, Humphreys J et al (1996) The effect of dressings on the production of exudate from venous leg ulcers. Wounds: Compendium Clin Res Prac 8(5): 145–50

7. Lamke LO, Nilsson GE, Reithner HL (1977) The evaporative water loss from burns and water permeability of grafts and artificial membranes used in the treatment of burns. Burns 3: 15965

8. Ferguson GC, Martin CJ, Rayner C (1991) Burn wound evaporation measurement of body fluid loss by probe evaporimeter and weight change. Clin Phys Physiol Meas 12(2): 143–56