Hydration Response Technology and managing infection

Julie Evans presents a case study of a wound infected with MRSA and its treatment using hydration response technology

Key words:
Hydration response technology (HRT)
Meticillin-resistant staphylococcus aureus (MRSA)

The Centers for Disease Control and Prevention (CDC) Atlanta, USA state that Meticillin-resistant staphylococcus aureus (MRSA) prevalence is increasing. In 1974 MRSA accounted for two per cent of the total number of staphylococcal infections and in 2004 it was recorded as 63 per cent (CDC, 2007).

Costs for UK nosocomial infections may be as high as £1 billion per year (Plowman *et al*., 2001). Despite the fact that wound care patients may succumb to infections from a variety of 'opportunistic' bacteria the last NICE report focusing on medical devices *Prevention of healthcare-associated infection in primary and community care* (NICE, 2003) overlooked the relevance of the subject in relation to wound care. However, in *A simple guide to MRSA* (DoH, 2007) wound infection was included but limited to indicating the clinical signs of MRSA wound infection and identifying the general principles of avoiding cross contamination such as: hand washing, wearing of gloves, screening and use of antibiotics.

Infection control in relation to wound management practice is a vital component of best practice in preventing the spread of multi-resistant microorganisms. Two components of infection control in relation to wound management may be considered, these are:

- Minimising the opportunity for wound infection to occur;
- Minimising the dispersal of microorganisms from the wound i.e. reducing the spread of infection, in particular resistant bacterial strains that are prevalent in the hospital and community setting.

Wound bioburden may be managed through application of active and passive mechanisms *(Table 1)*.

The following case report highlights the management of a longstanding, highly exuding, MRSA infected foot ulcer and indicates how appropriate intervention can lead to effective management of the bacterial load. It also emphasises the benefit of '*passive*' mechanisms and how this can be appropriated not only to lower the risk of cross contamination but also to support healing through the application of a dressing that incorporates Hydration Response Technology.

Case study

Mrs X is a 92 year old female patient who is registered blind. She was admitted to an orthopaedic trauma ward following a fall where she sustained a fracture to her left hip. The fracture required surgical intervention and pre / post operative care needed to take account of concurrent chronic heart failure and reduced mobility.

Mrs X immediate recovery from surgery was uneventful. The left surgical hip wound started to produce a high volume of exudate approximately 72 hours post surgery and this was successfully managed with topical negative pressure (TNP) treatment. Soon after admission to the post operative orthopaedic ward an ulcer appeared over Mrs X left hallux. This ulcer was possibly a result of trauma caused by inadvertent contact with bed rails combined with tissue ischaemia as a result of post operative bed rest and associated pressure.

Mrs. X was referred to the tissue viability nurse on the fifth week post surgery. Wound assessment at this time recorded a circular wound approximately 2.5cm in diameter located over left hallux with fragile and deep red granulation tissue that bled easily. There was widespread peri-wound erythema extending approximately 3 cm to midfoot and the adjoining digit was swollen, hot to touch and painful. A variety of wound dressings were used over weeks one to five and these included adhesive absorbent bordered foam (weeks one-two), a silver impregnated absorbent foam (week three), and a silver fibrous absorbent dressing (weeks four-five). Unfortunately, all of these dressing regimes failed to prevent maceration. Subsequently, gradual breakdown of the *peri* wound area from the caustic effects of high levels of exudate production occurred and the wound surface area increased in size.

An overview of wound care intervention and the related wound response is tabulated below (*Table 2*). It can be seen that not only was wound progress stalled but that deterioration was clearly evident. An increase in wound exudate production in conjunction with stalled healing is generally accepted as clinical indication of wound infection (Cutting & Harding, 1994; Cutting *et al*., 2005). A surface swab of the wound reported positive culture for MRSA. This, in conjunction with the increase in wound exudate, delayed healing and the general appearance of the wound lead to the conclusion that the wound was infected with MRSA.

It can be seen that little or no progress was achieved following use of active mechanisms i.e. antimicrobials in the form of topical silver dressings with systemic antibiotics (*Table 2*). This was particularly disappointing as topical and concurrent systemic antimicrobial therapy should have yielded a positive response. It was therefore

Table 1

Active	Passive
Use of systemic antibiotics or topical antiseptics / antibiotics in order to reduce the microbial burden	The use of wound dressings that not only offer an optimal environment for wound healing by favouring local host immune response (Laing, 1994; Boulton, 1999), but also sequestration of wound bacteria, thus 'locking' them away and lowering the risk of transmission through aerosol dispersal (Wysocki 2002)

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decided to focus on managing the wound environment using an absorbent dressing that possesses Hydration Response Technology (HRT).

Key components of HRT include its powerful osmotic pull while maintain a moist wound healing environment. HRT has the ability to draw wound fluid into the dressing matrix (where the aqueous component is bound) together with the accompanying free floating bacteria. Romanelli *et al.* (2009) have recently reported on the associated debriding capability of a dressing with HRT. They have commented on the sequestration of bacteria and active regulation of the wound climate as components of wound bed preparation. These attributes have been found following use of sorbion sachet S. Prompt management of the high exudate volume and the associated bacterial load swiftly returned the wound bed to an environment conducive to healing.

Efficient management of exudate and bacterial load are key components of wound bed preparation (Schultz *et al.*, 2004). The initial management strategy of using active mechanisms (antimicrobials) together with moderate absorbent capacity dressings had failed to manage the bioburden or the exudate volume. Using sorbion sachet S with HRT allowed this highly absorbent, non traumatic dressing to bind the exudate, sequester bacteria, modulate protease activity whilst maintaining a moist wound environment. Apart from wound resolution the additional benefits were reduced costs and a vastly improved quality of life for the patient.

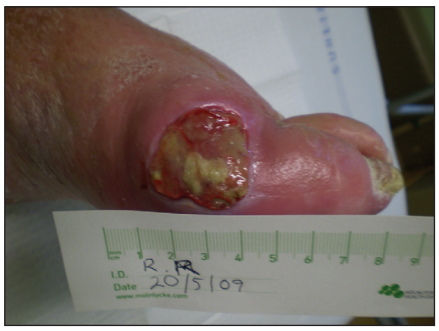

Figure 1: week 6

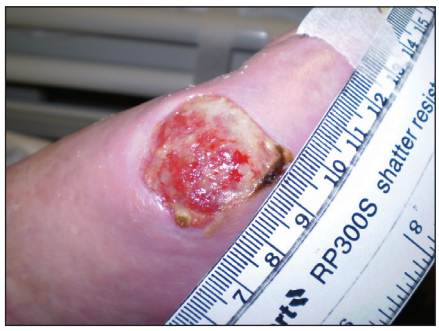

Figure 2: week 8

While this is a single case study it is anticipated that future additional case study evidence will additionally challenge the current perceived need for widespread antimicrobial use when managing local wound infection.

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Table 2: Sequence of intervention and associated wound response

Week	Wound status at beginning of week	Swab culture	Dressing	Antibiotic
3	Exudate not controlled. Peri-wound maceration, breakdown with proud wound bed, fragile easily bleeding tissue. Size, approx. 3cm diameter	MRSA +ve	Ag Foam	Doxycycline
4	Exudate not controlled. Peri-wound maceration, breakdown. Size, approx 3cm diameter	MRSA +ve	Ag Fibrous absorbent dressing	Rifampicin and Doxycycline
5	Exudate not controlled. Peri-wound maceration, surrounding cellulitis. Size, approx 3cm diameter	MRSA +ve	Ag Fibrous absorbent dressing	Rifampicin and Ciprofloxacin
6	Exudate not controlled. Peri-wound maceration with surrounding cellulitis. Size approx 2.5 cm diameter *(Figure 1)*	MRSA +ve	Sorbion sachet S	Rifampicin and Ciprofloxacin
7	Exudate controlled – no maceration, healthy granulation tissue. Size, approx. 2 cm diameter	MRSA –ve	Sorbion sachet S	None
8	Healthy granulation tissue, wound exudate reduced. Size, approx. 1.5cm diameter *(Figure 2)*	MRSA -ve	Sorbion sachet S	None
9	Healthy granulation, wound exudate – negligible. Size, approx. 1 cm diameter	MRSA -ve	Foam with soft silicone dressing	None