Using the exudate decision algorithm to evaluate wound dressings

Julie Gove, Sylvie Hampton, Glenn Smith, Carol Hedger and Barbara Topley

Abstract
Nurses have shown a weakness both in recognising different types of exudate and in choosing an appropriate dressing (Smith and Gibson, 2011). In order to support nurses in identifying the correct dressing choice, an exudate wound decision algorithm has been developed. The algorithm suggests the type of dressing required for bleeding and infected wounds is a calcium alginate dressing with a silver component. This study has examined the efficacy of calcium alginate dressings with silver in bleeding and infected wounds, selected through the use of the exudate wound decision algorithm. Over four consecutive dressing changes the results show a consistent improvement in all parameters of wound measurement. This demonstrates that the choice of a calcium alginate with silver dressing in the exudate wound decision algorithm will, in appropriate circumstances, provide nurses with an effective dressing choice.

Key words: Exudate ▪ Bleeding ▪ Infection ▪ Dressing choice

Community nurses are frequently involved in assessing wounds and support in selecting the most appropriate dressing can be helpful. Smith and Gibson (2013) designed a questionnaire to establish the understanding of tissue viability link nurses about different types of exudate and the role of dressings. The responses were analysed and demonstrated that ‘assessment and consideration of the exudate type does not appear to direct the choice of treatment’. Wound infection is thought to occur when there is an imbalance between the patient’s own immune system and colonising bacteria in the wound, i.e. lowered host resistance and ideal conditions for the bacteria to multiply in (European Wound Management Association, 2006; World Union on Wound Healing Societies, 2008; Wounds UK, 2010).

In order to help community nurses decide which dressing is the most appropriate an exudate algorithm has been developed. The algorithm guides the nurses to the correct dressing choice (Smith and Gibson, 2013) (Figure 1). The algorithm states that wet/bleeding wounds should be managed with alginate and bleeding/infected wounds managed with silver alginate dressings.

Alginites have been demonstrated to have haemostatic properties (Blaine, 1951). Sorbsan is a calcium salt of alginic acid and when applied to a wound exchanges calcium ions for sodium ions, creating a hydrophilic gel and promoting haemostasis (Figure 2) (Thomas, 1992; Sussman, 2007). The addition of silver to wound dressings reduces critical colonisation in wounds (Leaper, 2006) and the combination should be effective in bleeding and infected wounds. The use of these dressings in wounds selected as bleeding/infected through application of the wound exudate decision algorithm has not previously been evaluated. This study attempts to demonstrate that silver impregnated dressings such as Sorbsan Silver® do have a role in reducing bio-burden in chronic colonised wounds and suspected biofilms. There is evidence that arbitrary withdrawal of silver dressings can lead to increased incidence of septicaemia (Newton, 2010; Wounds UK, 2010).

Method
A multi-centre study of 49 patients under the care of community and tissue viability specialist nurses was undertaken. The patients came from 7 centres and were selected by one of 11 clinicians. Patients with chronic wounds (present for >12 weeks) had them evaluated according to the wound exudate decision algorithm. The dressings selected, including Sorbsan Silver flat and cavity dressings and Sorbsan Plus SA®, were used depending on the wound type. When silver dressings were no longer deemed necessary, the Sorbsan range of dressings were applied.

All the wounds were assessed using the algorithm and those wounds that were judged to be bleeding/infected were treated with calcium alginate with added silver dressing (Sorbsan Silver) and the effect assessed. All the wounds were friable and either bled or had brown exudate (considered to contain blood) on entry to the study. Critical colonisation of the wound was judged clinically in patients according to the presence of odour, exudate, pain and the parameters used on the evaluation documentation (percentage of necrosis, slough, granulation and epithelialisation as well as the presence of erythematous or blistered tissue). Pain was assessed using a visual analogue pain rating scale. Odour was measured subjectively on a scale of ‘none, present/slight, patient aware, odour evident on entry to the room’.
Wounds were documented over four sequential dressing changes using standardised evaluation documentation. The parameters recorded at each dressing change are in Table 1 and were recorded on a standard proforma for all patients. Dressings were changed at variable intervals, as clinically indicated. Baseline observations included tissue type, surrounding skin condition, exudate, odour, pain and bleeding in the wound. Frequency of the dressing change was indicated by the wound requirements rather than a specific timescale or frequency. All patients received other appropriate treatment modalities according to their needs—for example, attempts were made with the primary care team to maximise blood glucose control for the patients with diabetes and compression bandaging was applied as appropriate to patients with chronic venous leg ulcers.

A subset of patients had wound swabs performed before and after the study period. Patients were selected where significant bacterial colonisation was clinically suspected in chronic wounds of 12 weeks’ duration or more. Chi-square test was used to assess the statistical significance of the change in the number of wounds infected with each bacterial species.

Full written consent was obtained from all patients in the study. A full holistic assessment was documented and clinical observations were supported by photographs at each dressing change and wound swabs analysis.

**Results**

Forty-nine patients were recruited to the study across the 7 centres. The gender of 6 patients was not recorded. Twenty-one were male with a median age of 63 years (33–89). Twenty-two patients were female with a median age of 64 years (35–89).
age of 78 years (52–100). A variety of chronic wounds were included and the wound site/type is given in Figure 3.

The wounds showed clinical improvements on all parameters during the four dressing changes. Signs of bleeding and purulence were much improved (Figures 4 and 5).

Patients also noticed improvements in pain and odour as documented on the assessment chart (Figures 6 and 7).

Subjective improvements in the quality of the peri-wound skin were seen, as were reductions in exudate and the type of tissue within the wound (Figures 8, 9 and 10).

Eleven patients with 17 wounds had swabs taken for microscopy, culture and sensitivity at the start of the study and after the fourth dressing change (Figure 11). These patients (6 male and 5 female, mean age 73 years) were closely monitored over a period of 9–21 days. The results were mixed and even though the wounds improved clinically the reduction in positive cultures was not significant, except in the reduction in *Pseudomonas aeruginosa* (8 out of 17 positive before the first dressing application, 1 out of 17 positive after the fourth dressing change, *p*<0.001). None of the patients received oral or parenteral antibiotics during the study period.

**Discussion**

In order to promote effective wound healing, it is essential that an accurate wound assessment is carried out and that the most appropriate dressing is applied. Dowsett (2009) has identified that wound assessments by nurses are not always accurate. There is evidence that inappropriate dressing choices are detrimental to the wound, increasing the healing time, pain and risk of infection (McIntosh and Ousey, 2008). Ousey and Cook (2012) suggested that correct wound assessment will ensure improved quality and cost-effectiveness. This is particularly important as the NHS Quality Agenda (Department of Health, 2010) is looking to reduce costs without reducing quality. The study by Smith and Gibson (2011) demonstrated the difficulty nurses have in identifying different types of wounds and exudate, which may lead to inappropriate dressing selection. Identifying the correct nature of an exudate and why it is present is essential in order to manage the wound effectively (White and Cutting, 2006). Furthermore, the nurses questioned could not describe the differences between different types of dressings, particularly alginates and hydrofibre dressings, and this led to inappropriate dressing choices. These findings led to the creation of the algorithm and the recommendations within it. The rationale for the choice of Sorbsan Silver in the algorithm has been described in the introduction.

Sorbsan Silver dressing has been shown in this study to be effective in the management of bleeding and infected wounds and wounds with haemopurulent exudate when selected according to the wound exudate decision algorithm. The results demonstrated rapid significant clinical improvement across a range of wounds. There was a reduction in exudate and the number of wounds showing signs of bleeding (haemoserous and haemopurulent exudate). The number of wounds with critical colonisation as judged by the clinician...
In order to promote effective wound healing, it is essential that an accurate wound assessment is carried out and the most appropriate dressing applied. Some nurses have difficulty with both recognising different types of exudate and choosing an appropriate dressing. The algorithm states that wet/bleeding and bleeding/infected wounds should be managed with alginate and silver alginate dressings respectively. The purpose of the study was to determine whether the choice of dressing recommended by the algorithm was effective in clinical practice. Sorbsan and Sorbsan Silver dressings have been shown in this study to be effective in the management of bleeding and infected wounds and wounds with haemopurulent exudate when selected according to the wound exudate decision tree.

Figure 9. Number of wounds with varying amounts of wound exudate at each dressing change

Figure 10. Number of wounds by predominant tissue type at each dressing change

Figure 11. Swab results from 17 wounds in 11 patients

KEY POINTS

- In order to promote effective wound healing, it is essential that an accurate wound assessment is carried out and the most appropriate dressing applied.
- Some nurses have difficulty with both recognising different types of exudate and choosing an appropriate dressing.
- The algorithm states that wet/bleeding and bleeding/infected wounds should be managed with alginate and silver alginate dressings respectively.
- The purpose of the study was to determine whether the choice of dressing recommended by the algorithm was effective in clinical practice.
- Sorbsan and Sorbsan Silver dressings have been shown in this study to be effective in the management of bleeding and infected wounds and wounds with haemopurulent exudate when selected according to the wound exudate decision tree.

Conclusion

It has been demonstrated that the wound exudate algorithm helps guide nurses to choose an appropriate dressing and that this dressing choice results in good outcomes. Alginites are often regarded as useful for absorbing exudate (Thomas, 2010) and nurses may not consider their value in haemostasis. The presence of a bacterial load in chronic wounds makes it often regarded as useful for absorbing exudate (Thomas, 2010). The reduction in malodour may also imply a reduction in critical colonisation. Exudate was reduced, which also showed significant effects on the peri-wound area. These improvements were all reflected in a reduction of necrotic and sloughy tissue and an eventual improvement in granulation and epithelial tissue.

It has to be recognised that this study is based on four episodes of wound care, which were performed at varying intervals. It would appear that some clinicians carried out the four dressing changes within 1 week whereas others undertook them over 4 weeks. Results may have been even more significant if, instead of choosing sequential dressings, the wounds were assessed weekly. The lack of detailed timing information is thus a weakness of this study. A further problem is that there were some gaps in the documentation at the fourth dressing change. The reason for this is unclear.

Another aspect of the study was that it was performed across 7 centres with clinicians of varying skills, experience and qualifications. As a result, reliability across different clinicians rating the wounds could be questioned. As an example of variability it was noted that some clinicians varied their opinion of the packaging over the course of the study despite the fact that the packaging did not change. If the raters are not reliable on something as unchanging as the packaging, it calls into question the consistency of their judgement. A further example of variable clinical skill was that a few proformas recorded that the dressing caused skin stripping whereas Sorbsan Silver is not an adherent product (Thomas, 2010) and if removed appropriately by irrigation would not cause this problem. Despite these study weaknesses the results were overwhelmingly in favour of the dressing choice being effective.

Conflict of interest: none