A multi-centre observational study examining the effects of a mechanical debridement system

Wound debridement plays an essential role in preparing the wound to heal and can be achieved in several ways. Most wound debridement requires the skills of specialist practitioners which can be both time consuming and expensive. This observational study looks at a new mechanical debridement system with a monofilament fibre pad that can be used in any healthcare setting with minimal training. In twenty patients with wounds and/or skin that required debridement, the new system was found to be a fast and effective method of debridement causing minimal pain to the patients. This new approach to wound debridement could potentially have far reaching benefits to the patient, the nurse and the organisation

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Despite the lack of randomised controlled trial (RCT) evidence for wound debridement, it is recognised as a component of good wound care[1]. Debridement describes the removal of non-viable tissue from the wound bed and is an essential component of wound-bed preparation and management[2,3]. Wound-bed preparation is the removal of barriers to healing such as non-viable tissue, infection and moisture imbalance. Falanga[4] states that this should not be done in isolation, but as part of a holistic wound assessment which includes the patient's psychosocial needs as well as underlying and associated aetiologies.

Young[5] suggests that debridement facilitates:

- the reduction of bio-burden and biofilms
- reduction of wound malodour
- the advancement of epithelial cells
- the absorption and action of topical preparations
- thorough wound assessment[6]
- the prevention of a prolonged inflammatory phase of the healing process

Vowden and Vowden[2] also suggest that successful debridement is often associated with a reduction in wound exudate, a reduction in odour and the appearance of a healthy granulating wound bed. The European Wound Management Association (EWMA)[7] state that the presence of non-viable tissue in the wound is a potential factor for delayed healing, thus debridement is required.

Young[5] explains that unlike acute wounds, which usually only require debridement once if at all, chronic wounds may require maintenance debridement. She goes on to warn that autolytic debridement, removal of dead or sloughy tissue using an appropriate dressing, has become routine practice which requires reviewing as it may not be the best option for the patient. This may be because if the wound is highly exudative, the hydrogel is not able to absorb this and may cause maceration of the peri-wound skin, or where quick debridement is required, as autolytic debridement may take several weeks.

Care should also be taken if there is an underlying vascular or arterial component.

Biofilm removal

Wolcott *et al*[8] stated that regular debridement is the main tool for maintaining a healthy wound bed in most chronic wounds and that as part of a multifaceted treatment strategy, will keep a biofilm in a weakened state. In addition, because debridement physically disrupts the biofilm, an 'opportunity' window of 24-72 hours when an antimicrobial may be most effective, is presented before the biofilm reconstitutes itself[8,9].

Not all wounds will contain a biofilm, but non-healing chronic wounds are more likely to have a complex microbiology than those that are not[10]. It is difficult to describe what a biofilm looks like, but Wolcott[11] states that slough is a visible by-product of a biofilm. Biofilms are an important and until recently, an unrecognised barrier to chronic wound healing and the new debridement system discussed in this article has been shown *in vitro* to remove biofilm[12].

Methods of debridement

According to Gray *et al.*[13], the role of debridement is well recognised, but that there is a lack of standardised guidance of debridement practice in the United Kingdom (UK), possibly because of the variation in methods available. Although some of these can require a high level of

skill, simple debridement[14], in particular autolytic, can be undertaken by the non-specialist tissue viability practitioner. While the different methods, their advantages and disadvantages are well described[2,13,14], the most common include:

- autolytic (dressings)
- biosurgical (larval)
- mechanical
- hydrosurgical
- ultasound/sonic
- sharp
- surgical

The decision as to which method to use should be based upon a thorough patient assessment and formulation of a relevant treatment plan[13]. Vowden and Vowden[15] state that wound care, of which debridement is only one part, must be related to the overall patient care and that it is important to have a clearly defined treatment plan that can be tailored to the individual patient and the wound[16].

Methodology

The purpose of the observational study was to examine the effectiveness of a new mechanical debridement system, Debrisoft (Activa Healthcare, UK) on the removal of hyperkeratosis and/or the debridement of devitalised tissue within the wound bed.

Twenty patients took part in this 2-centre observational study; one centre was a hospital based wound care clinic, the other an inner city community-based leg ulcer clinic. The inclusion criteria were any chronic wound containing soft slough, or necrotic tissue, or any hyperkeratosis all requiring debridement. 10 patients from each centre were recruited with no drop outs reported.

Patients one to ten had chronic leg ulcers of varying underlying aetiology, patients 11-20 had various chronic wounds including, ischaemic ulcers, diabetic ulcers and leg ulcers. The level of exudate and extent/thickness was not recorded on the data collection forms.

Treatment of either the wound bed (removal of slough and soft necrotic tissue) or hyperkeratotic skin, or treatment of both was undertaken as appropriate. Pain was monitored during the procedure using a visual analogue scale (VAS) where 0 is no pain and 10 is the worst pain possible[17]. Treatment was evaluated using the same documentation.

Table 1: Wound, tissue type, pain scores and treatment time

Patient No.	Wound/Skin/Both	Slough/Necrotic	Pain VAS	Time in minutes
1	Wound	Slough	7	5-7
2	Skin	N/A	0	5-7
3	Skin	N/A	0	5-7
4	Wound	Slough	0	2-4
5	Wound	Slough	0	More than 7
6	Wound	Necrotic	0	5-7
7	Wound	Slough/necrotic	0	5-7
8	Wound	Necrotic	0	More than 7
9	Wound	Slough	0	More than 7
10	Wound	Necrotic	1	More than 7
11	Both	Slough	0	2-4
12	Skin	N/A	0	2-4
13	Wound	Slough/necrotic	0	More than 7
14	Wound	Slough	1	2-4
15	Wound	Slough	0	2-4
16	Wound	Slough/necrotic	0	2-4
17	Both	Slough	0	2-4
18	Both	Slough	1	2-4
19	Skin	N/A	0	2-4
20	Wound	Slough/necrotic	0	2-4

Results

Table 1 provides the wound description, VAS score and time taken to debride the wound and/or hyperkeraosis using Debrisoft.

Table 2 presents information on the authors' view of Debrisoft efficacy and the resulting skin condition compared to previous debridement methods used.

Discussion

During this evaluation the new debridement system was found to be very easy to use and easily transferable into practice; not only does it look simple but it actually is simple to use in hospital and community settings requiring very little educational input/training re its use.

Using Debrisoft as a first-line approach to hyperkeratosis removal or debridement will not only expedite debridement, but potentially save money due to the fact that debridement can 'kick-start' the healing process, or by preventing the need for referral to a specialist practitioner or hospital admission[14]. Evidence also suggests that having a 'clean' wound and peri-wound area can aid wound assessment and pressure ulcer categorisation, leading to appropriate and timely wound care management objectives[6].

We have demonstrated that the debridement system, unlike many other systems, did not require expensive equipment and consumables. Time was also saved; for example, biosurgical debridement requires waiting for order and despatch, autolytic debridement with dressings can take weeks to achieve.

Patients found the debridement treatment very acceptable with none or minimal pain in 95 per cent of cases in this evaluation. Giving them a chance to touch the monofilament fibre pad helped dispel anxiety as they realised that there would be no 'cutting' away. In addition, as treatment began, a small amount of pressure only was used, gradually building up to that required to remove the dry skin, slough or soft necrotic tissue. Nevertheless, the pressure required was still low. Both circular movements and long strokes were used, and the pad required only a small amount of water or saline to moisten. Prior to use, any creams, ointments or ungents have to be removed as these can

Table 2: Efficacy of Debrisoft on debridement and skin condition post-debridement

Patient No.	Skin condition compared to previous hyperkeratosis method	Debridement performance compared to previous method
1	N/A	Good
2	Good	N/A
3	Very good	N/A
4	N/A	Very good
5	N/A	Good
6	N/A	Good
7	N/A	Good
8	N/A	Very good
9	N/A	Very good
10	N/A	Good
11	Much better	Much better NB Kick started healing
12	Much better	N/A
13	N/A	Much better
14	N/A	Much better
15	N/A	Much better
16	N/A	Much better NB Preserving leg
17	Much better	Much better
18	Much better	Much better (revealed healed wound)
19	Much better	N/A Pre-operative skin prep
20	Much better	Much better (total debridement)

clog the fibres of the monofilament pad.

One patient in the evaluation had treatment of dry skin prior to a below knee amputation as part of the pre-operative care. The post-operative wound went on to heal with no complications. It is possible that by removing hyperkeratotic skin, slough and soft necrotic tissue and hyperkeratotic skin prior to surgey then bacteria are also removed thus minimising infection risk. Further work is required to confirm if this is indeed the case.

Conclusions

Practitioners should be clear that allowing devitalised tissue to remain on the wound bed unless there is a strong clinical argument for doing so is counter-productive[18]. This new approach to wound debridement could potentially have far reaching benefits to the patient, the nurse and the organisation.

For the patient it is an effective, safe, rapid, pain free method of wound debridement allowing the wound to progress to healing more quickly. This system is ideal for patients to use themselves, particularly to prepare the skin prior to the nurse visit and hyperkeratosis management. Rapid intervention will ensure that exudate caused by slough and necrosis will not have chance to macerate the peri-wound skin, thus minimising infection risk. Its simplicity makes it an attractive debridement option, particularly in light of problems often encountered with other methods if undertaken incorrectly, for example, bleeding, pain and trauma.

Cost reductions can be evident. For example, the authors have calculated that a Debrisoft pad costs £6.19, compared to £563.45 for conventional sharp debridement, £697.66 for hydrosurgical debridement and £273 per application of larval therapy. In addition, saving is made on nursing time. Any method of debridement that reduces treatment time and overall treatment costs has benefits for the organisation including positive budgetary implications[18].

References

1. National Institute for Health and Clinical Excellence (NICE). (2001) Guidance on the use of debriding agents and specialist wound care clinics for difficult to heal surgical wounds. Technical Appraisal Guidance Number 24. London

2. Vowden K, Vowden P. (2011) Debridement Made Easy. *Wounds UK*. 7; (4): 1-4

3. Falanga V. (2001) Introducing the concept of wound bed preparation. International Forum Wound Care. 16; (1): 1-4

4. Falanga V.(2004) Wound bed preparation: science applied to practice. EWMA position document. Wound bed preparation in practice. MEP Ltd, London

5. Young T (2011) Debridement – is it time to revisit clinical practice. *Br J Nurs.* 20; (11): S24-S28

6. Stephen-Haynes J, Callaghan R. (2012) The role of an active debridement system in assisting the experienced clinician to undertake an assessment and determining appropriate wound management objectives. Poster presented at the 22nd European Wound Management Association (EWMA) conference, Vienna

7. European Wound Management Association (EWMA). (2008) Position document: Hard-to-heal wounds: a holistic approach. MEP Ltd, London

8. Wolcott RD, Kennedy JP, Dowd SE. (2009) Regular debridement is the main tool for maintaining a healthy wound bed in most chronic wounds. *Journal of Wound Care*. 18; (2): 54-56

9. Wolcott RD, Rumbaugh KP, James G, *et al.* (2010) Biofilm maturity studies indicate sharp debridement opens a time-dependant therapeutic window. *Journal of Wound Care*. 19; (8): 320-328

10. Percival S. (2011) Microbiology: the future. *Journal of Wound Care*. 20; (5): 220-224

11. Wolcott RD. (2011) Biofilm-based wound care. *Journal of Wound Care*. 20; (5): 224-226

12. Westgate S. (2012) A novel treatment method for the removal of biofilm material. Poster presented at the 22nd European Wound Management Association (EWMA) conference, Vienna

13. Gray D, Acton C, Chadwick P, *et al.* (2011) Consensus guidance for the use of debridement techniques in the UK. *Wounds UK*. 7; (1): 77-84

14. Hampton S. (2011) Some simple solutions to wound debridement. *Nursing and Residential Care.* 13; (8): 378-382

15. Vowden KR, Vowden P. (1999) Wound debridement, Part 1: non-sharp techniques. *Journal of Wound Care*. 8; (5): 237-240

16. Vowden KR, Vowden P. (1999) Wound debridement, Part 2: sharp techniques. *Journal of Wound Care*. 8; (6): 291-294

17. World Union of Wound Healing Societies (WUWHS). (2004) Minimising pain at wound dressing-related procedures: A consensus document. MEP, London

18. Gray D, Cooper P, Russell F, *et al.* (2011) Assessing the clinical performance of a new selective mechanical wound debridement product. *Wounds UK*. 7; (3): 42-6

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