

Negative pressure wound therapy for the management of diabetic foot wounds

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Introduction

Diabetes related foot complications place a significant burden on the National Health Service (NHS) and the economy. The most common and costly sequelae of the disease includes ulceration, gangrene, infection, and ultimately amputation¹. The management of diabetic foot wounds is a continuing battle for health services and therefore any intervention that promotes healing and possibly prevents the need for amputation could be extremely valuable.



Figure 1. The latest V.A.C® therapy system for ambulatory patients (Activac)

Negative Pressure Wound Therapy

Negative pressure wound therapy (NPWT) is one such intervention currently being used to treat diabetic foot wounds throughout health services, with the most recognised trade name being vacuum assisted closure (V.A.C®). The technique uses negative pressure (i.e. suction) to remove fluid from open wounds through a specialised sealed dressing placed into the wound cavity. The dressing, shown in figure 2, is attached via tubing to a collection vessel and delivers a controlled negative pressure².

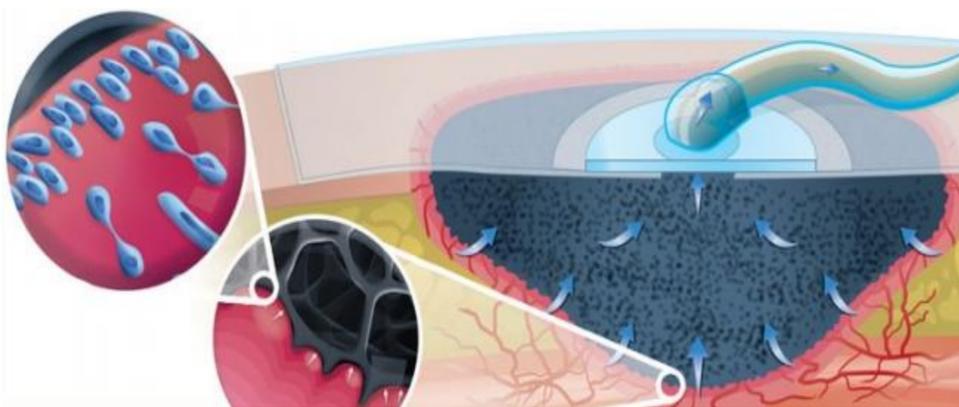


Figure 2. Schematic diagram of V.A.C® GranuFoam dressing in situ, demonstrating how the dressing promotes microstrain at a cellular level

The mechanism by which NPWT works is not yet fully understood but research suggests it is associated with macro & micro-strain including³:

- Removal of interstitial oedema
- Removal of exudate
- Reduction of bacterial load
- Mechanical effect on the wound bed
- Increased blood supply to the area
- Reduction of cytokines and matrix metalloproteinases

Current NICE guidelines advise to: "Consider negative pressure wound therapy after surgical debridement for diabetic foot ulcers, on the advice of the multidisciplinary foot care service."

Aim

The objective of this review was:

To ascertain the effectiveness of NPWT as a treatment for diabetic foot wounds and consider the cost effectiveness of this intervention given its widespread use throughout the NHS.

References & Acknowledgements

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Thank you to Pamela Jones, Acclity, for use of the images in Figures 1 & 2.

Methodology

An electronic search of the literature was carried out using a set of relevant key words to identify available literature published between January 2005 and January 2015. Ten primary research studies were identified as suitable for inclusion following critical assessment using the critical appraisal skills program appraisal tools, the CONSORT statement, and frameworks outlined by Hashmi and Greenhalgh.

Inclusion Criteria	Exclusion Criteria
Relevant primary research	Studies not relevant to research question
English language material only	Non-English language material without translation
Published literature	Un-published literature
Systematic reviews	Unreliable journals
Randomised controlled trials	Study types other than randomised controlled trials
Studies carried out between January 2000 and January 2015	Studies carried out before January 2000 or after January 2015
Literature specific to diabetic foot wounds	Studies not specific to diabetic foot wounds
Relevant literature reviews	Literature not available free of charge

Search terms included: conservative, non-surgical management, diabetic foot wound, lower limb, topical negative pressure, TNP, negative pressure wound therapy, NPWT, vacuum assisted closure, VAC therapy, VAC, sub-atmospheric pressure, sealed surface wound suction, vacuum sealing, foam suction dressing.

Results

- All studies reported positive effects of NPWT when compared to other more conventional wound healing modalities.
- The results of this review suggest that NPWT has a positive effect on wound healing when used to treat diabetic foot ulcers, including reducing time to healing, increasing the rate of granulation tissue formation and reduced amputation rates.
- Material costs are greater than those of traditional wound care methods although NPWT may have the potential to lower overall care costs due to a reduced need for inpatient care.

Discussion & Conclusion

The studies currently available are few and of varying quality, many with methodological flaws and bias, thus caution is required when interpreting results. The need for further quality RCTs to assess the effectiveness of (NPWT) for the management of diabetic foot wounds is highlighted. The onus should be on large numbers of participants, robust patient relevant objective outcome measures, and mid to long term studies to provide evidence of clinical effectiveness.

Since this review, a study protocol for a national, multicentre, RCT comparing NPWT with standard wound care for the treatment of chronic diabetic foot wounds has recently been published and the study is currently underway⁴.

NPWT is being increasingly utilised throughout health services nationally. It has emerged as a valuable tool available to podiatrists and wound care specialists when treating diabetic foot wounds.