Alternative for negative pressure dressing equipment in resource-limited settings

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The authors describe a modification of the standard negative pressure wound therapy (NPWT) system that utilises cost-effective and readily available materials without reducing the quality of the NPWT system. Some of the components described may be acquired at commercial stores and be used in healthcare settings if sterilisation/autoclave facilities are available. This proposal is an easy and effective solution to the problem of limited resources in the South African government health sector. This is particularly relevant in rural settings to encourage the utilisation of NPWT where specialised equipment may not be available.

Keywords: negative pressure wound therapy, dressing equipment, resource-limited setting, VAC dressing, dressing alternative

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Introduction

The principle of wound healing is an integral part of any surgical speciality. It is vital for wound care practitioners to keep up-to-date with the ever-evolving field of wound management to promote faster wound healing.[1] Negative pressure wound therapy (NPWT) has become a mainstay in the treatment of many acute and chronic wounds. NPWT is the technique of applying continuous or intermittent sub-atmospheric pressure to a dressing system in order to provide positive pressure to a wound bed.[2] Components of NPWT include: a porous interface dressing applied to a wound; adhesive occlusive dressing to create an airtight seal; suction tubing to attach the dressing to a source of suction and a source of suction.[3] The principle of NPWT entails suction generated from a vacuum source being transmitted to a wound bed, resulting in negative pressure in the porous interface. This negative pressure in the interface results in a compressive force on the wound, thus causing an increase in tissue pressure.[1] The clinical significance of the system mentioned above is a resultant reduction in tissue oedema and an increased production of granulation tissue, which contributes to faster wound healing and improved patient outcomes.[1]

Wound care is a common medical concern that poses a significant financial burden to the healthcare system.[4] Healthcare provision in the South African public system is under extreme pressure due to a shortage of healthcare professionals, inequality and unemployment, and inefficient use of allocated resources funds.[5] As a result of these resource constraints, many adaptations of the expensive commercially available NPWT systems have been reported as a result of medical professionals improvising solutions based on available resources. Many variations of administration of NPWT described in economically restrained regions have indicated that improvised systems of NPWT may be equally as effective as commercially available systems.[6-9]

Junior doctors in rural areas often do not have access to proper manufactured equipment for NWPT. The purpose of this proposal is not to compete with well-established trademarks, but rather to suggest a technique of administering NPWT using widely available resources even in rural settings, such as wall suction and basic disposables. This aids to encourage the utilisation of NPWT in under-resourced settings where specialised equipment may not be available.

Method

The modified negative pressure dressing application process is described below in a stepwise approach.

Step 1

The following equipment will be needed: a surgical blade, sterile sponge/foam, any form of a clear/transparent adhesive dressing, nasogastric (NG) tube (preferably the largest available size), standard suction tubing, staple gun and sterile gloves (Figure 1). The procedure should be performed in an aseptic or sterile technique. For the purpose of the demonstration, no gloves were used but should be part of the technique.

Figure 1: Disposables needed for the NPWT adaptation

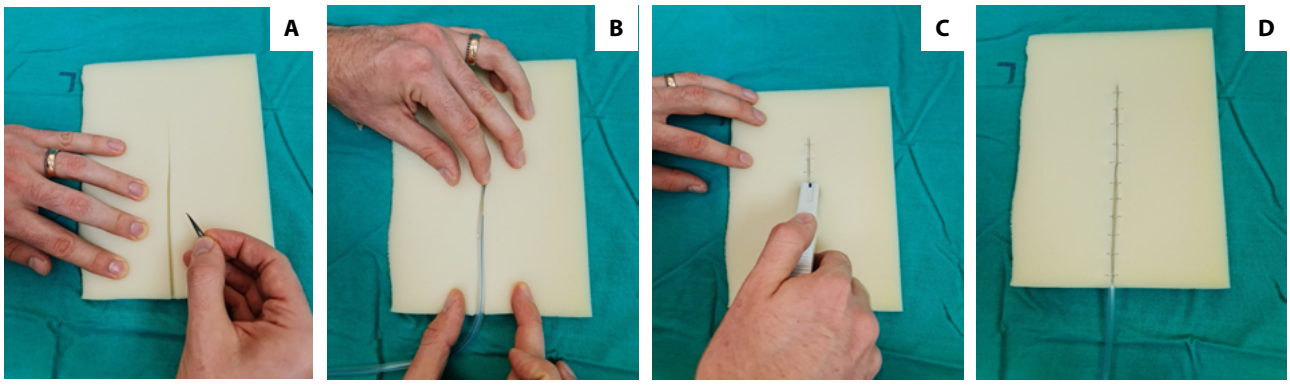

Figure 2 (A–D): Step-by-step preparation of the insertion of NG tube into foam

Step 2

Using a surgical blade, make an incision in the foam (Figure 2A). The incision depth should be enough to bury the whole diameter of the NG tube, which is approximately half the depth of the foam. The incision length should extend from the edge of the foam to past the midpoint of the foam (Figure 2B). Place the fenestrated tip of the NG tube into the incision in the foam, with the tip of the tube to the apex of the incision and secure the edges of foam over the NG tube using a staple gun (Figures 2C and 2D). The use of staples may be substituted by any available suture material. If foam is unavailable, gauze – a low-cost, universally available item – can also be used, with the NG tube tip placed in-between two opposing layers of gauze.

Step 3

Measure the foam against the wound, and cut it with the foam covering the whole wound to about 1 cm past the wound edge (Figure 3A). This step can be carried out at any previous stage of the process. Secure the foam over the wound (to a margin of surrounding skin) using transparent adhesive dressings (Figure 3B). Make sure the surrounding skin is clean and clear of any excessive oil. Avoid circumferential negative pressure dressings on extremities.

Step 4

Cut off the distal, funnel-shaped tip of the NG tube (Figure 4A) and slide the cut distal tip of the NG tube into the free end of a standard suction tubing (Figure 4B). This creates an airtight seal. If an airtight seal is not achieved, seal off this junction with a transparent adhesive dressing. Attach the other end of the suction tubing to any suction source (usually a wall suction unit in most government settings). The foam will collapse if the negative pressure dressing is applied correctly (Figure 4C); if the foam is not collapsing, patch any holes or leaks in the dressing with clear adhesive dressing.

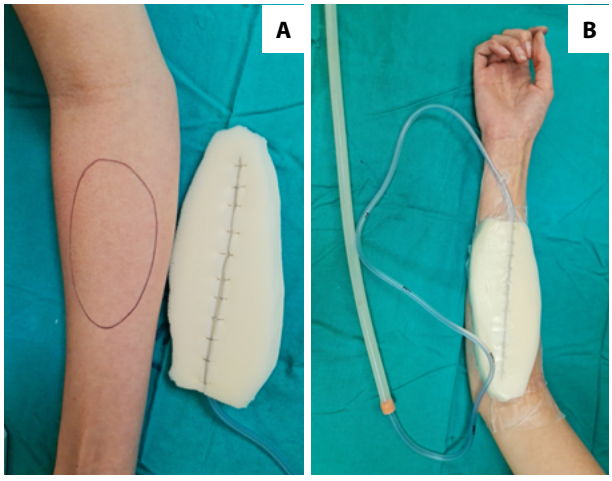

Figure 3 (A&B): Step-by-step preparation of the foam containing the NG tube to adjust to the wound to be dressed

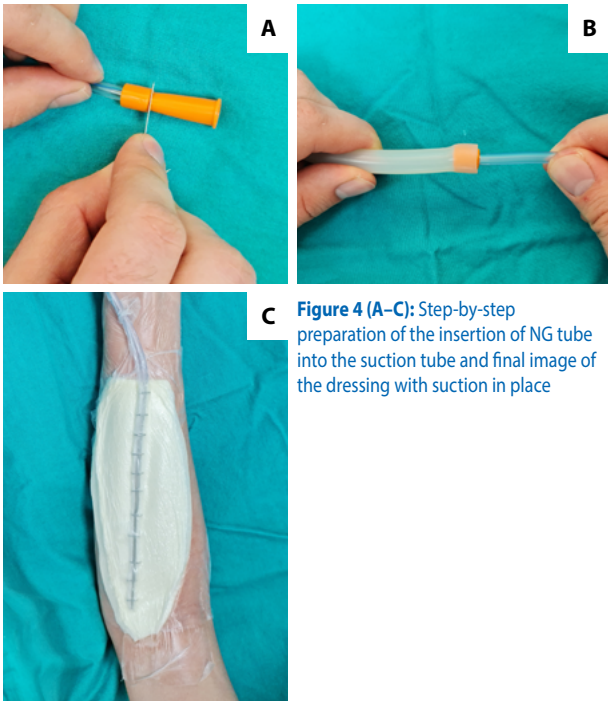

Figure 4 (A–C): Step-by-step preparation of the insertion of NG tube into the suction tube and final image of the dressing with suction in place

Discussion

The described modification of the standard NPWT system utilises cost-effective and readily available materials without reducing the quality of the NPWT system. Many of the components described, such as foams, may be acquired at commercial stores and may be used in the healthcare setting if sterilisation/autoclave facilities are available. This proposal serves as an easy and effective solution to the problem of limited resources in the South African government health sector, particularly in rural settings, to encourage the utilisation of NPWT where specialised equipment may not be available and thus improving patient wound care.

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Conflict of interest

The authors declare no conflicts of interest. We further report that there is no association with any product or company.

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Ethical approval

No patient details are used for this study, and the model is anonymous. Consent was given for the application of the dressing and the pictures taken.

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