

Roundtable meeting:

THE ROLE OF MECHANICALLY POWERED DISPOSABLE NEGATIVE PRESSURE WOUND THERAPY (dNPWT) IN PRACTICE

Recommendations from an expert working group

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FOREWORD

The changing landscape of negative pressure wound therapy (NPWT) now provides clinicians with more choice than ever before, and subsequently more decisions to be made in clinical practice. The development of disposable, lightweight and portable devices has facilitated treatment in the community setting, providing practical and economic benefits.

The NANOVA™ Therapy System and the SNAP™ Therapy System (Acelity) are two mechanically powered disposable NPWT (dNPWT) devices that provide distinct advantages to both clinicians and patients when used in the appropriate clinical scenario.

A group of international experts met in February 2017 to discuss the clinical implications of developments within dNPWT as a whole, and specifically these two products. The group set out to:

- Review and discuss how the development of new dNPWT devices has changed the treatment landscape
- Provide clinicians with guidance on the most suitable NPWT for wound type, patient well-being and cost-effectiveness
- Develop structured treatment pathways to guide clinicians in the most appropriate use of the NANOVA and SNAP Systems.

The goal is to provide clinicians with the information they need to select and use the NANOVA and SNAP Systems appropriately in practice.

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Introduction to NPWT

Negative pressure wound therapy (NPWT) is the continuous or intermittent application of subatmospheric pressure to the wound bed, which has been shown to help improve the wound environment, kick-start healing and help reduce the time to closure of the wound (Cutting et al, 2013); this can be particularly beneficial in hard-to-heal wounds at risk of complications and extended healing time.

NPWT is a useful treatment in a variety of acute and chronic wounds, and has a number of clinical effects that promote healing responses, making it a well-established method of treating a variety of wound types.

Reported benefits include:

- reduction in wound size
- increased blood flow to the wound
- removal of excess fluid and reduced tissue oedema
- stimulation of granulation tissue, resulting in progressive wound closure
- increased cell proliferation
- protection from outside contaminants and decrease in bacterial bioburden
- maintenance of moist wound healing environment
- reduced wound bed trauma (Fletcher et al, 2012).

DEFINING AN NPWT WOUND

NPWT is primarily used on chronic wounds that have stalled and/or hard-to-heal wounds that have not responded to standard treatment. NPWT can be considered in any wound that:

- is failing to progress towards healing in the expected time frame using standard care
- produces volume/viscosity of exudate that is difficult to manage
- requires reduction in size to achieve surgical (primary) closure or healing by secondary intention (Henderson et al, 2010).

Holistic assessment and accurate diagnosis are vital to ensuring that patients receive the right treatment at the right time. While NPWT is not generally used as a first-line treatment, risk factors for hard-to-heal wounds (or in acute wounds, such as complicated post-surgical wounds) may be identified that trigger more timely commencement of treatment. NPWT should not be seen as a 'last resort' and should ideally be started as soon as possible when standard treatment does not result in sufficient healing – within a maximum of 4 weeks. With this in mind, the emphasis should be on healing rather than management, as well as ensuring the patient does not wait too long for effective treatment. Potential root causes for complexity and chronicity of the wound must be identified.

As such, identifying and addressing comorbidities, medications and conditions that may delay healing is also key. These may also cause wounds to be more prone to infection, which in turn may further delay healing. Infection is often a major factor in hard-to-heal wounds and NPWT can be used to kickstart healing. While NPWT should not be used as the sole treatment for infected wounds, NPWT may be used as an adjunctive therapy for infected wounds or may be useful in wounds where infection has been a factor in chronicity (i.e. where multiple infections have delayed healing) along with the appropriate clinical protocol, which may include debridement and antibiotic therapy.

THE CHANGING LANDSCAPE OF NPWT

NPWT has been used steadily to heal complex wounds since its initial development in the early 1990s (Sinha et al, 2013), initially used primarily in a hospital setting. Since then, the technology has evolved and the introduction of disposable devices (dNPWT) has facilitated treatment in the home care setting, which has led to earlier discharge for patients from hospital and enabled continuity of care in the community.

The development of portable dNPWT devices has facilitated treatment in the community setting. There are distinct economic benefits associated with the growing use of NPWT in this setting:

- Earlier hospital discharge for patients who would otherwise have been treated with NPWT in hospital; this continuity of care from hospital to home is likely to lead to a reduction in the cost of wound care compared with keeping a patient in hospital for a day
- Reduction in resource use, where the alternative to NPWT would require higher levels of resource; for example, reduction in the frequency of dressing changes for patients with high levels of exudate may lead to reduced nursing time and quantity of consumables used
- Potential for prevention of high-risk complications such as emergency hospital readmissions for grafting or amputation; the incidence of these complications was shown to be reduced in patients with diabetic foot ulcers who receive NPWT (Blume et al, 2008)

These potential benefits may translate to substantial cost savings: compared with the use of NPWT in the acute setting, NPWT in the community was estimated to save £4,814 per patient across the duration of their care (average duration: 20.4 days; Dowsett et al, 2012). The development of a new generation of wound care products creates opportunities to improve access to advanced therapies by broadening their applicability and making them easier to apply and manage. The goal is to help minimise the effect of wounds on patient quality of life and encourage patients to participate in their care at home, while improving clinical outcomes — all of which reduce the economic burden on the healthcare system (Dowsett, 2015).

Reduced length of hospital stay offers many potential benefits to patients, as it can help:

- Improve patient experience, satisfaction and compliance
- Reduce the amount of inpatient time, enabling patients to resume everyday activities
- Improve mobility and reduce the chances of contracting a hospital-acquired infection.

THE ROLE OF MECHANICALLY-POWERED dNPWT

Traditionally, NPWT devices have been powered electrically (i.e. using plug-in electrical units). This meant that the units required a bulky electrically-powered pump that was difficult to procure and use for both clinicians and patients (Fong and Marston, 2012). As such, treatment of some wounds that may have benefited from NPWT was impractical, particularly smaller-sized wounds.

Mechanically-powered NPWT uses a pump with a spring mechanism to generate a preset continuous subatmospheric pressure level to the wound bed. This technology has demonstrated similar efficacy and increased usability for both clinicians and patients when compared with electrically-powered NPWT devices (this was a non-inferiority study, where the wounds treated with electrically-powered NPWT were larger), while providing extra benefits in terms of practicality and convenience (Fong and Marston, 2012).

The use of mechanically-powered NPWT devices allows for the practical treatment of smaller-sized wounds with NPWT, and are also designed specifically to facilitate ambulatory treatment, which enables the patient to be treated at home and continue with their everyday life, enabling independence and encouraging self-management where possible.

Patient acceptability and concordance to treatment is a vital factor, which may be enhanced through the use of mechanically-powered dNPWT, as the treatment devices are lightweight and ultraportable. For instance, the NANOVA and SNAP devices are small enough to be hidden under normal clothing; the SNAP System includes a strap so the device can be worn on a patient's leg, arm, or belt. In practice, this has been found to improve concordance and patients' quality of life. For example, particularly in younger patients, the devices may facilitate a return to work and everyday life in general. The mechanically-powered devices have been found to be simple to use, which further enables independence and self-management for the patient.

As the mechanically-powered units do not require either mains power or batteries, there are added environmental and cost benefits (i.e. there is no need to buy or dispose of batteries). This also means that patients do not have to worry about battery life being an issue. Additionally, battery-powered devices can be less discreet for users, with sound levels causing potential problems.

The development of disposable, mechanically powered systems has resulted in improved access to treatment; therefore a greater range of patients are able to benefit from NPWT, particularly in a home or community setting. The ability of patients to understand and contribute to their own care is an advantage and may also help to cut down on nursing visit time; however, it is important that this is encouraged only in suitable patients (e.g. patients with dementia may not be able to be involved in their own care) and after suitable training has been provided by the clinician. Where patients can be encouraged to be involved in their own care, monitoring is still required to ensure that the patient is using the device correctly.

BOX 1 | Summary of potential benefits of dNPWT in practice

Wound management

- Promotes wound healing
- Maintains moist wound environment, which helps wound bed condition through autolysis
- Facilitates self-care, potentially reducing nursing time in wound management and associated cost

Practical factors

- Easy to manage in the community setting
- Allows patient mobility
- Facilitates early discharge from hospital and continuity of NPWT treatment

Patient quality of life

- Allows the patient to continue with everyday activities to the fullest extent possible
- Patients have the option to increase self-care where appropriate, providing more control and independence
- Manages exudate
- Portable, easy to use, silent and discreet, increasing patient acceptability

NPWT IN PRACTICE: OPPORTUNITIES AND CHALLENGES

In practice, there can be practical barriers to starting any form of NPWT, particularly where wounds are managed in the community setting,

The challenges of NPWT use in a home care setting are the same as those for inpatients and may relate to incorrect technique in using the system. This can include:

- Infrequent dressing changes
- Issues such as a poorly sealed system leading to inadequate pressure application
- Issues caused by use of incorrect foam size, e.g. excoriation (Venturi et al, 2005; Centre for Reviews and Dissemination, 2003).

The primary complication of NPWT in any setting is poor wound revascularisation, which can lead to ischaemia at the wound edge (Fagerdahl et al, 2012; Venturi et al, 2005; Attinger et al, 2006). Other complications may include infection, skin irritation, pain during dressing changes, retention of sponge dressings in wounds and bleeding (Fagerdahl et al, 2012; Venturi et al, 2005; Attinger et al, 2006).

In wounds where NPWT is appropriate, it is viewed as an ideal option for efficient and faster healing. For example, in a study of diabetic foot wounds (Armstrong and Lavery, 2005), NPWT was found to improve rate of healing based on time to complete closure, compared to standard care; the rate of granulation tissue formation, based on the time to 76-100% granulation tissue formation in the wound bed, was faster in the NPWT group.

While for some there may be perceived cost issues with use of NPWT, the fact is that healing is more cost-efficient than continued management. Anecdotally, there is a tendency in wound care to continue to use dressings that may have little impact on wound healing (or result in slower healing of a wound), where NPWT would be a more efficient treatment option; there may also be a tendency to try unsuccessful treatment options for a long period of time before initiating more advanced treatment for wound healing such as NPWT.

Total healing costs in chronic wounds are based far more around time and resource costs than product costs (approximately 90% versus 10%; Guest et al, 2015). Therefore, NPWT should be considered as a treatment option as soon as possible where appropriate, in both acute and chronic wounds. While NPWT is particularly useful in chronic wounds, it should be considered as an option for suitable acute wounds (e.g. use in incision management).

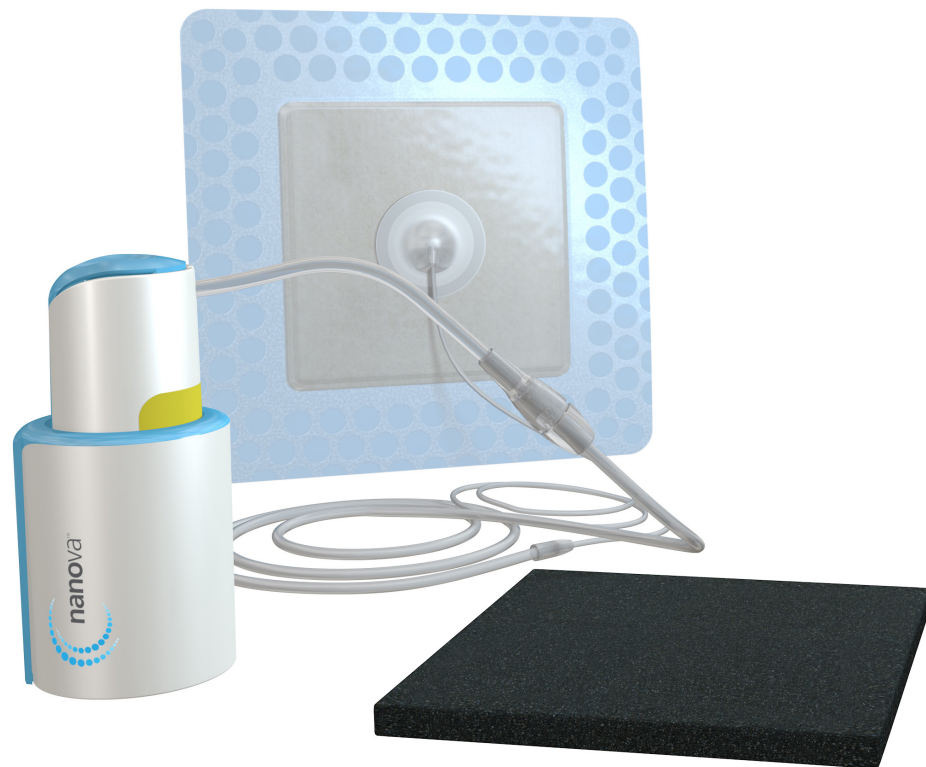
It may be suggested that a starting point should be exclusion criteria – i.e. all patients should be considered for NPWT treatment unless specifically excluded. Certain patient groups may benefit from NPWT at an earlier stage, so treatment should be triggered sooner; for example, in older patients who are more likely to have risk factors for wounds becoming chronic, bariatric patients, or those at risk of skin breakdown. However, it is important that NPWT is targeted at correctly identified patients. See Appendix for a criteria checklist to assist in identifying suitable patients for treatment with NPWT.

Before commencing any NPWT treatment, it is vital to address any underlying factors and ensure that the wound is ready to start NPWT treatment. Wound bed preparation is a key foundation to any treatment and should be appropriately carried out before NPWT commences. Tracking treatment goals and monitoring are also vital as treatment continues.

Focus on the NANOVA™ Therapy System

The NANOVA Therapy System combines NPWT with an absorbent dressing, in a portable and lightweight system that promotes healing and is easy to use for patients and clinicians. The NANOVA System is indicated for removal of small amounts of exudate (low to moderate) from chronic, acute, traumatic, subacute and dehisced wounds, partial-thickness burns, ulcers (such as diabetic, venous or pressure), surgically closed incisions, flaps and grafts. The absorbent dressing retains exudate, which helps minimise the risk of maceration and removes the need for a separate fluid reservoir. The dressing will continue to absorb fluid even if negative pressure has been lost.

FIGURE 1 | The NANOVA System



HOW DOES THE NANOVA SYSTEM WORK?

Figure 1 shows the key components of the NANOVA System:

1. Dressing

The absorbent dressing also includes pressure distribution layers to ensure that negative pressure is maintained regardless of the amount of fluid absorbed, and SENSASEAL™ Protective Seal Technology.

2. NANOVA Therapy Unit

The therapy unit is mechanically powered (rather than being mains or battery powered). Its operation is intuitive, with one to three compressions of the plunger needed to deliver regulated negative pressure (-125 mmHg). There is a yellow visual indicator that appears when negative pressure is lost. If the line reappears, the plunger needs to be compressed to re-establish negative pressure. The unit can be manually re-primed at any time, which reduces the need for specialist training and allows patients or carers to manage the system between clinician visits if appropriate. The unit can be used on a single patient for up to 30 days, with regular dressing changes.

2. GranuFoam

The dressing is supplied with V.A.C® GranuFoam™ wound filler, which can be used at the clinician's discretion and can be cut to fit within the wound margins.

HOW DOES NANOVA DIFFER FROM TRADITIONAL NPWT DEVICES?

The lightweight and portable nature of NANOVA facilitates patient concordance and, in the right instances, empowers patients and caregivers to take control of elements of their own treatment. NANOVA's ease of use and the fact that it is discreet to use may encourage concordance in patients who will benefit from NPWT but are reluctant or unable to use larger powered devices.

As the system is mechanically powered and intuitive to use, it is simple for patients to operate. If the seal is lost at any time, negative pressure can be easily restored by resealing the dressing and depressing the therapy unit, so there is no need for a nurse visit to fix the unit.

The NANOVA System can be used in wounds where exudate levels are not sufficiently high for standard NPWT, but where other dressing options are not able to manage exudate effectively (Wounds UK, 2014). Exudate is absorbed and retained within the absorbent dressing. Since the pressure distribution and absorbent layers are separate and independent of one another, negative pressure is maintained as the dressing absorbs exudate. Absorption continues even if the NPWT seal is lost, unlike with conventional powered NPWT devices.

The structure of the dressing means that the delivery of negative pressure is maintained regardless of orientation. Therefore the dressing can be rotated or placed off-centre without compromising functionality. This also means the NANOVA dressing can stay in place if pressure is lost, and simply be replaced at the next scheduled dressing change.

WHEN IS NANOVA INDICATED?

The NANOVA System can be considered for use in a range of wound types, including::

- Traumatic wounds
- Shallow acute, sub-acute and dehisced wounds
- Partial thickness burns
- Chronic ulcers (including venous, diabetic or pressure ulcers)
- Closed incisions
- Flaps and grafts.

Use of NANOVA may be suitable in wounds that display one or more of the following characteristics:

- Failing to improve sufficiently after 4 weeks of standard care
- Low to moderate levels of thin/medium viscosity exudate

- Wound bed not granulating
- Wound bed granulating but not epithelialising
- Presence of slough, with or without granulation tissue, following appropriate debridement
- Shallow cavity wounds.

Use of NANOVA is not suitable for the following:

- Wounds that are contraindicated for NPWT – e.g. the presence of untreated osteomyelitis, malignancy, exposed organs/underlying structures or fistulae
- Over articulated joints or on the foot, where a seal cannot be effectively achieved and maintained (e.g. on the knee or the side of the foot)
- Bleeding wounds or wounds with high levels of exudate
- Infected or necrotic wounds (where infection is an issue, infection should be treated first and followed by NPWT)
- Wounds where severe or significant oedema is present (the underlying cause of oedema should be identified and treated first, followed by NPWT).

Particular care should be taken when using NANOVA with the following patients:

- Patients with fragile periwound skin – many older patients or those with risk factors for chronic wounds may have fragile skin, which is common in patients suitable for NPWT treatment, so this should be seen as a special caution rather than a contraindication. The dressing technology is designed to minimise impact on the periwound skin. However, if necessary, steps should be taken to protect the skin, using adhesive remover where required and skin barrier protection.
- Patients at increased risk of bleeding, or who are taking anticoagulation medication – although use of NANOVA is not contraindicated in such cases, care should be taken to monitor for increased bleeding.
- Patients with high pain levels – regular pain assessments should be taken using a validated scale, and clinicians should take appropriate measures to minimise pain at dressing change.
- Patients who require certain treatments such as magnetic resonance imaging (MRI), hyperbaric oxygen treatment or defibrillation should be treated with special consideration and caution.

Focus on the SNAP™ Therapy System

In addition to NANOVA, the SNAP Therapy System was specifically developed to allow NPWT to be used on a wider range of wound types. Many of the chronic wounds that could benefit from NPWT, such as diabetic foot ulcers, are relatively small in size. Therefore the SNAP System was designed to deliver NPWT effectively to small-to-medium sized, hard-to-heal wounds.

HOW DOES SNAP WORK?

Like NANOVA, the SNAP system is a mechanically powered and portable dNPWT device (see Figure 2). SNAP utilises spring technology, which reduces air density within an enclosure in a controlled manner. The specialised springs equilibrate even in the presence of exudate, so that a constant controlled level of negative pressure is applied to the wound bed. Like NANOVA, there is no electrical pump, so operation of the SNAP System is silent. The device is portable, lightweight and small enough to be worn on the patient's leg, arm or belt, and can be hidden under everyday clothing.

FIGURE 2 | The SNAP System



Figure 2 shows the key components of the SNAP System:

1. The cartridge with activation reset key
2. Hydrocolloid dressing layer with integrated nozzle and tubing and foam wound interface layer
3. Strap with attachment clip (not shown)
4. Optional SecurRing™ Hydrocolloid accessory (not shown), which enables fast and easy sealing on uneven skin surfaces and challenging body contours, reduces accessories needed to seal and protect the wound from moisture and increases adhesion of the SNAP Dressing on dry and uneven skin.

HOW DOES SNAP DIFFER FROM TRADITIONAL NPWT DEVICES?

The SNAP System has three cartridges with different preset pressure levels: -75 mmHg, -100 mmHg and -125 mmHg. The variable pressure options may be useful where stepping therapy up or down is necessary, or for patients that cannot easily accommodate -125mmHg (such as patients with venous deficiency).

There are two options for the canister within the cartridge, with a capacity of either approximately 60ml, or 150ml (-125 mmHg only), of wound exudate. A visual indicator signals if the canister is full or if there is an air leak. The SNAP System also incorporates BioLock® technology that isolyzes or gels the wound exudate that collects in the cartridge, which helps to control potential contamination and odour. This makes it potentially useful in patients where exudate is an issue.

The hydrocolloid dressing protects the periwound skin and provides a seal around the wound for effective NPWT delivery. This is used over a wound filling material consisting of a specialised foam dressing.

WHEN IS SNAP INDICATED?

The SNAP System may be suitable for the removal of small amounts of exudate from the following type of wounds:

- Chronic (e.g. diabetic, venous or pressure ulcers)
- Traumatic/acute
- Subacute and dehisced
- Partial-thickness burns
- Surgically-closed incisions
- Flaps and grafts.

The SNAP System may be suitable for use in wounds that display one or more of the following characteristics:

- Failing to improve sufficiently after 4 weeks of standard care
- Low to moderate levels of thin/medium viscosity exudate
- Wound bed not granulating
- Wound bed granulating but not epithelialising
- Presence of slough, with or without granulation tissue, following appropriate debridement
- Shallow cavity wounds.

As with most NPWT devices, the SNAP System should not be used over:

- Actively infected wounds
- Inadequately drained wounds
- Necrotic tissue such as eschar or adherent slough
- Exposed blood vessels, anastomotic sites, organs, tendons or nerves
- Malignant wounds
- Fistulae
- Untreated osteomyelitis
- Actively bleeding wounds.

Treatment pathway

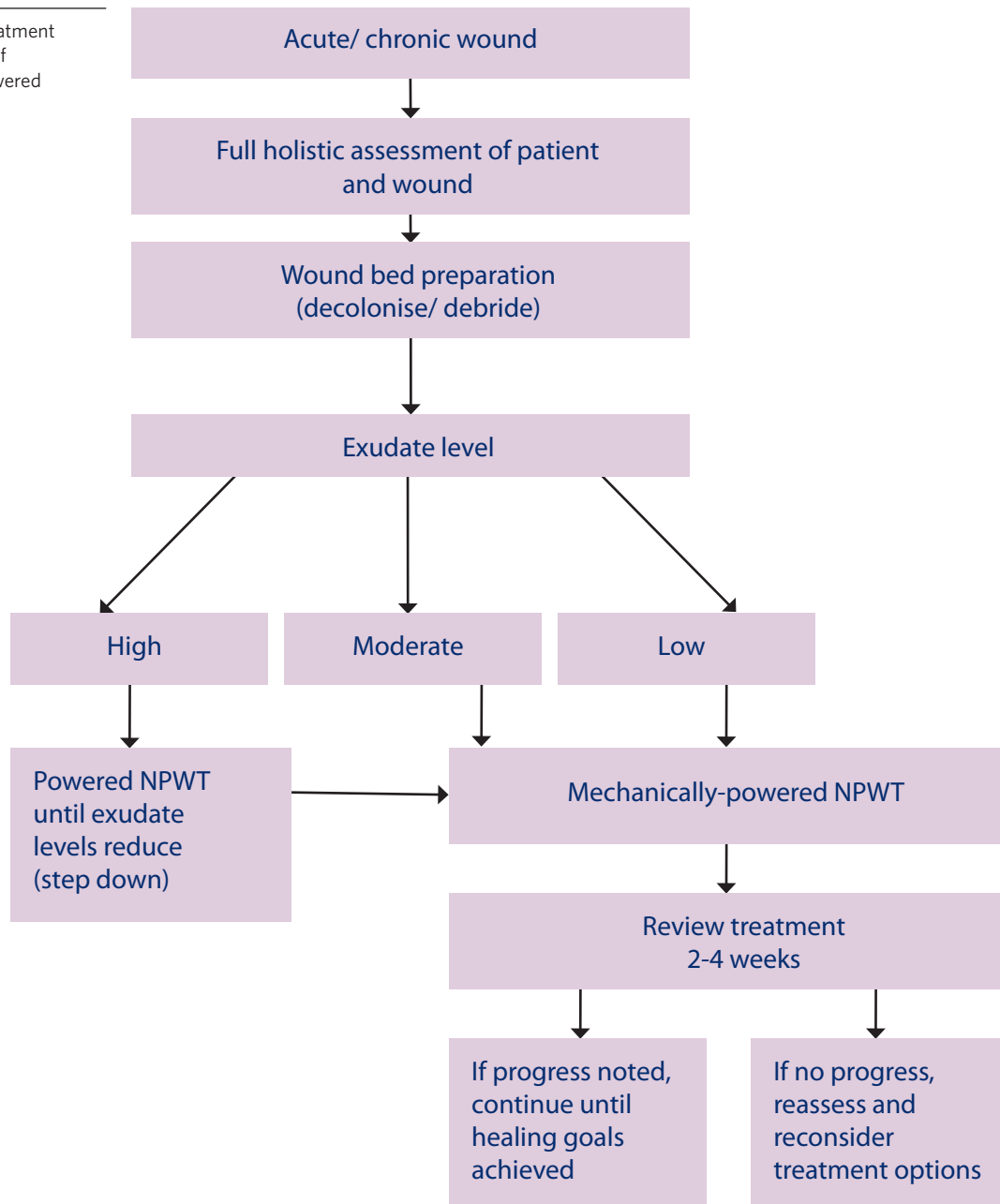
In wounds where NPWT has been identified as appropriate treatment, it may be beneficial to use a structured pathway to decide which NPWT device is the most appropriate for the individual patient and their specific wound (see Table 1 for more specific information on treatment options and the appropriate clinical scenarios for use).

TABLE 1 | Comparison of NPWT treatment options

		Disposable NPWT	Traditional NPWT
Clinical	Goal of therapy	<ul style="list-style-type: none"> Promote wound healing Exudate management 	<ul style="list-style-type: none"> Granulation tissue Exudate management
	Wound surface area	$\leq 13\text{cm} \times 13\text{cm}$ (SNAP Therapy System) $\leq 10\text{cm} \times 20\text{cm}$ (NANOVA Therapy System)	$> 2.5\text{cm}^2$
	Wound depth	$\leq 3\text{cm}$ (SNAP Therapy System) $\leq 2\text{cm}$ (NANOVA Therapy System)	$> 1\text{cm}$
	Exudate management	$\leq 180\text{ml/week}$	$> 180\text{ml/week}$
Patient QoL	User interface	Mechanical activation	Tactile screen/buttons
	Portability	70g	500-1000g
	Alarms	Visual only	Audible and visual
Economic	Facility economics	Simple application (reduced application time) May help reduce time to heal Off the shelf availability	More complex application (moderate application time) May help reduce time to heal

Figure 3 provides a decision-making pathway that may be useful in identifying the most appropriate way to use mechanically-powered dNPWT in practice. This is intended only as a guide to clinicians when considering different types of wound, location and other relevant factors.

FIGURE 3 | Treatment pathway for use of mechanically-powered dNPWT



HOW TO INTEGRATE THE TREATMENT PATHWAY INTO PRACTICE

The appropriate form of NPWT treatment should be based on a full holistic assessment of the patient and their wound (including lifestyle factors that may affect choice of device). Holistic assessment to assess suitability should include:

- A full patient, medical and surgical history to establish underlying cause(s), any comorbidities and previous history of the wound
- A wound assessment to identify the wound's aetiology, assess the condition of the wound and the surrounding skin
- A psychosocial assessment to understand the patient's needs, as well as their living circumstances, and ability and willingness to use the particular device.

MEASURING AND MONITORING SUCCESS

When NPWT therapy is started, treatment goals should be defined in order to monitor the progress of treatment. Overall treatment goals may include:

- Kick-starting healing: in both chronic wounds and acute wounds where complicating factors are present, to prevent the wound from becoming stalled, or to speed transition to standard wound care; to encourage vascularisation and granulation, and to move the wound towards healing
- Preventing complications in acute wounds – e.g. in surgical wounds where the patient has multiple comorbidities or is at elevated risk of skin breakdown
- Stepping down care: where use of a conventional NPWT system is no longer practical (e.g. at hospital discharge) but where the patient would still benefit from NPWT, a portable unit may be used as a transitional therapy
- Allowing other procedures to be expedited: where the speed of wound closure is paramount to the patient's overall wellbeing – e.g. because the presence of the wound is preventing another procedure, such as orthopaedic surgery or chemotherapy
- Managing the wound through to healing: maintaining an optimum environment for wound healing, particularly where the wound is slow to heal or the patient has multiple comorbidities.

Continued monitoring is vital to ensure that the patient is receiving the right treatment. Treatment should be continually reviewed, and if there is no measurable progress within the first two weeks of treatment, the options should be reviewed and the patient should be reassessed.

Interim treatment goals may include:

- Decrease in size of wound, as it progresses to closure/healing
- Increase in granulation tissue/epithelialisation
- Reduction in exudate
- Reduction in pain levels
- Improved patient quality of life.

As well as clinical and patient benefits, economic benefits may be identified as treatment continues, such as:

- Shorter stay in hospital required, as care at home is facilitated
- Reduced nursing visits/time
- Reduced total costs as time to healing is improved.

See Appendix for a checklist to facilitate hospital discharge for patients using NPWT.

TIPS FOR USE

- Wound bed preparation prior to treatment is key – prepare the wound bed using the TIME principles (Dowsett and Newton, 2005):
 - Tissue
 - Inflammation/infection
 - Moisture
 - Edge of wound
- Consider use of a barrier cream for protection if the periwound skin is fragile – note that creams should only be used after the dressing has been applied, as these may make it more difficult to achieve an initial seal
- Consider use of adhesive remover at dressing change if the patient has fragile skin or high pain levels
- With application of negative pressure using the NANOVA System, it is normal to observe dimpling in the skin (corresponding to the perforations of the dressing). This should resolve spontaneously. However, if the skin becomes irritated or an allergic reaction occurs, treatment should be discontinued and the skin treated accordingly
- If there is an increase in pain, investigate for infection and treat accordingly – NPWT should be discontinued until signs and symptoms have been resolved. Monitor for other indicators of increasing bacterial load, such as increased malodour
- If necessary, recommend a mechanism for the patient to use when carrying the unit (e.g. a bag or belt loop); a strap for use with the SNAP system can be purchased separately if necessary
- Additional drapes may be used to fix the dressing if necessary
- Gentle warming of the SNAP hydrocolloid dressing can help with adhesion and maintaining a seal.

Opportunities for further development in NPWT: the future

Assessment and diagnosis remain the biggest challenges in NPWT, in order to trigger the appropriate and most effective treatment. Education and raising of awareness is still required in order to facilitate the best care for the patient. Diagnostic tests could be developed to identify the most appropriate care for patients.

Advances in NPWT technology have expanded the range of patients that are suitable for therapy, but further work is still required.

While technological advances have also improved cost issues – i.e. disposable and portable units make care significantly cheaper than relying solely on large units in the acute setting, particularly where large units incur rental costs – cost remains an issue.

Gathering and sharing data from clinical experience could help to guide practice and address practical and cost issues by demonstrating efficacy to decision-makers.

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Appendix

APPENDIX 1: GUIDANCE ON DIFFERENTIATING THE SNAP AND NANOVA SYSTEMS IN PRACTICE BASED ON CASE STUDIES

Keith Harding (Chair)

As wound healing therapies develop and become more technology-driven, selecting the right treatment for the right patient at the right time is key. The mechanisms of action in NPWT, plus the practical and patient-centred advantages of dNPWT are clear.

The NANOVA and SNAP Systems both combine dNPWT with advanced dressing technology, but considerations of the individual wound and patient mean that they can be used in different clinical scenarios (Box 1). It is vital to take a patient-centred and holistic approach to selecting the appropriate treatment.

BOX 1 | Selecting the appropriate dNPWT treatment for the individual patient and wound

Factors that may make a wound particularly suitable for dNPWT treatment include:

- Longer than expected duration for the wound type
- Low to moderate volumes of exudate:
 - Up to 120ml per week, consider NANOVA
 - Up to 180ml per week, consider SNAP
 - Levels higher than 180ml per week, consider traditional NPWT
- Thin to medium viscosity exudate
- Wound bed not granulating
- Wound bed granulating but not epithelializing
- Shallow cavity wounds
 - Up to 1cm deep, consider NANOVA
 - Up to 2cm deep, consider SNAP
 - Wounds with depth more than 2cm, consider traditional NPWT.

For a quick guide to the specific differences between Nanova and SNaP therapies, which may influence choice between the two products, see Figure 1.

FIGURE 1 | The SNAP Therapy System

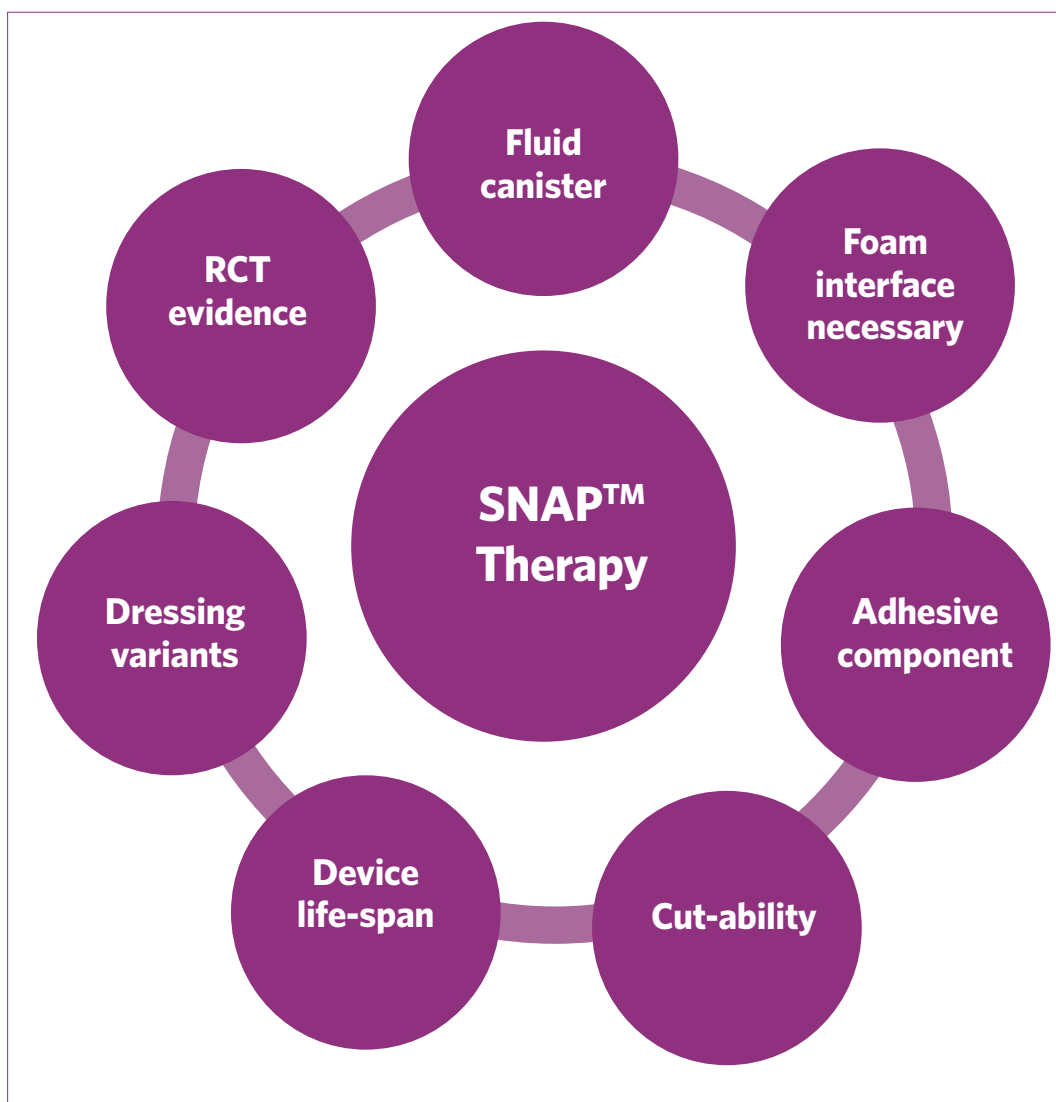


TABLE 1 | The differences between the NANOVA System and the SNAP System

	NANOVA System	SNAP System
Fluid storage/capacity	Absorbent dressing (~25-60ml)	Internal canister* (60ml)
Dressing adhesive	Silicone and acrylic mix	Advanced Hydrocolloid + SNAP SecurRing Hydrocolloid (if required)
Dressing customisation	Cannot cut the dressing	Cut-to-fit dressing
Wound filler	Optional GRANUFOAM (8mm)	Reticulated foam (19mm)
Pressure setting	-125mmHg	Preset options: -75, -100, -125mmHg*
Device lifespan	30 days	7 days

*NOTE: The SNAP PLUS™ Therapy Cartridge (where available) can hold up to 150ml of fluid and is preset to deliver -125mmHg only.

SNAP Case Study 1

PATIENT HISTORY

62-year-old female; insulin-dependent diabetic, peripheral vascular disease, hypertension, hyperlipidemia; medications including Crestor®, Lisinopril, Metformin, Lantus® and Humalog®.

The patient was hospitalised for infected gangrenous toes resulting from her neuropathic diabetes and peripheral vascular disease. She was found to have osteomyelitis of the 2nd and 3rd ray and underwent partial amputations.

SNAP TREATMENT

The patient achieved full granulation of the wound bed and complete soft-tissue coverage of exposed bone as a result of 4 weeks of treatment with SNAP with bi-weekly dressing changes. The wound was then closed with an advanced cellular matrix.

OUTCOME

Wound closure was achieved at 10 weeks post-initiation of SNAP therapy.



Start of SNAP therapy



Week 4



Week 6



Week 11

SNAP Case Study 2

PATIENT HISTORY

68-year-old male; smoker with diabetes mellitus, peripheral vascular disease, coronary artery disease, COPD, hypertension and hyperlipidemia.

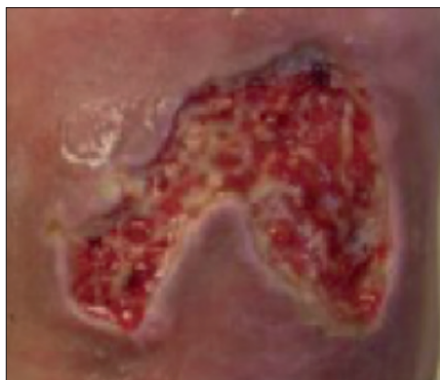
The patient presented with trauma to dorsal foot from door.

SNAP TREATMENT

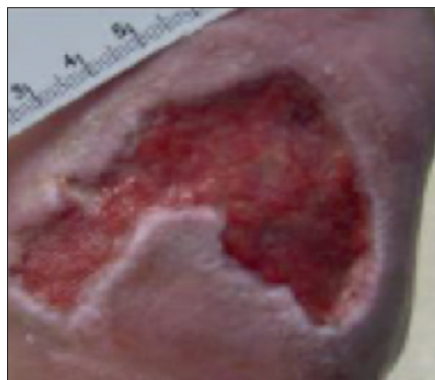
The patient was treated with SNAP for 3 weeks until full granulation of the wound bed was achieved. Then SNAP was used in conjunction with a cellular tissue product for an additional 5 weeks.

OUTCOME

Wound closure was achieved at 9 weeks post-initiation of SNAP.



Start of SNAP therapy



Week 2



Week 8

**APPENDIX 2.
CHECKLIST CRITERIA FOR NPWT - APPLICATION/PATIENT RECORD**

Patient Name: _____ Date of birth: _____
 Patient No: _____ Ward: _____ Consultant: _____
 Wound Type: _____
 Location: _____
 Reason for NPWT _____

**CLINICAL CRITERIA
(Any of these boxes ticked = no NPWT)**

	Y
Untreated osteomyelitis?	<input type="checkbox"/>
Malignancy?	<input type="checkbox"/>
Bleeding?	<input type="checkbox"/>
Compromised circulation?	<input type="checkbox"/>
Any dry necrosis?	<input type="checkbox"/>

(All boxes must be ticked for NPWT)

	Y	
Has wound been de-colonised?	<input type="checkbox"/>	
Is wound site pressure free?	<input type="checkbox"/>	
Patient understands monitoring issues?	<input type="checkbox"/>	
Consultant Agreement	<input type="checkbox"/>	_____
Wound Care Specialist Agreement	<input type="checkbox"/>	_____

Proposed Initial Treatment Period

Proposed Initial Treatment Cost @ _____
 Funding Approved: Yes No
 Date commenced: _____
 Date Discontinued: _____
 Total Time: _____
 Total Cost: _____

**APPENDIX 2.
CHECKLIST CRITERIA FOR NPWT - APPLICATION/PATIENT RECORD**

Patient Name: _____ Date of birth: _____

Patient No: _____ Ward: _____ Consultant: _____

Wound Type: _____

Location: _____

Reason for NPWT _____

CLINICAL CRITERIA

(Any of these boxes ticked = no NPWT)

Y

- Untreated osteomyelitis?
- Malignancy?
- Bleeding?
- Compromised circulation?
- Any dry necrosis?

(All boxes must be ticked for NPWT)

Y

- Has wound been de-colonised?
- Is wound site pressure free?
- Patient understands monitoring issues?

Consultant Agreement _____

Wound Care Specialist Agreement _____

Proposed Initial Treatment Period

Proposed Initial Treatment Cost @ _____

Funding Approved: Yes No

Date commenced: _____

Date Discontinued: _____

Total Time: _____

Total Cost: _____

**APPENDIX 3.
CHECKLIST TO FACILITATE HOSPITAL
DISCHARGE FOR PATIENTS USING NPWT**

	Yes	No
Is the patient registered with a GP?		
Assessment done by hospital consultant and/or wound care specialist and NPWT is the best option to speed up healing?		
Has patient consented to treatment?		
Does patient have a fixed address, not homeless?		
Will patient manage activities of daily living with pump in situ?		
Will patient collaborate with district nursing team for effective outcome?		
Discharge plan available with types of dressing and duration of treatment?		
Communication between community and hospital team established?		

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