



NEGATIVE PRESSURE WOUND THERAPY TRAINING

CLINICAL EDUCATION: Clinical NWPT Treatment & Wounds

Introduction

- This training will discuss:
 - History of NPWT
 - 4 Principles of Wound Care
 - Physiological Effects
 - Types of Dressings
 - Types of Therapies
 - Dressing Techniques



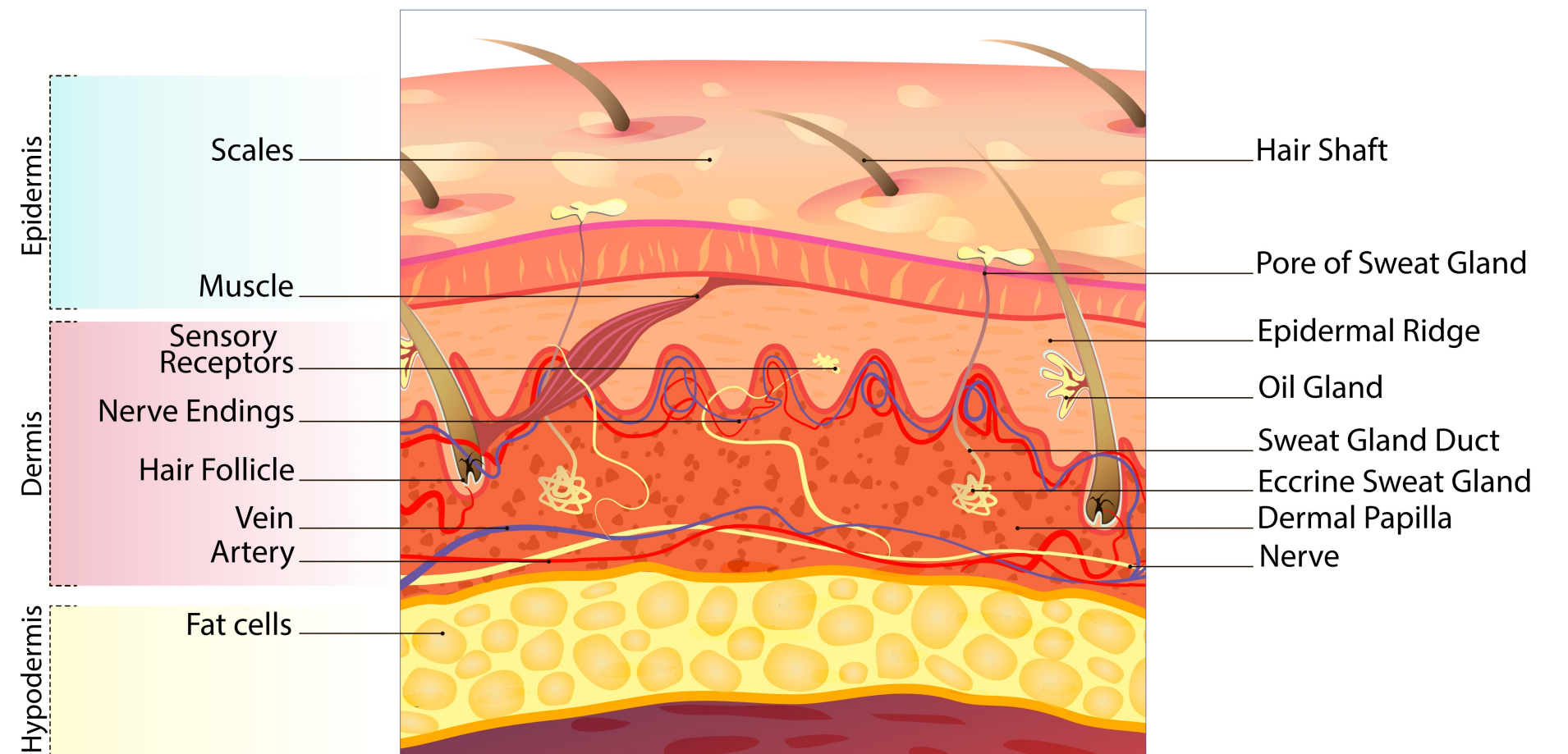
Goals for Training

- When you complete this training you will be familiar with the use of NPWT
- You will be able to demonstrate the application of Cork Medical (CM) NPWT
- You will be able to demonstrate your ability to educate others on the operation of the pump as well as the application of the dressings



Wound Definition

- A wound is an injury or d restricted to those cause means, with disruption o continuity of structures.



Effects of a Wound

- Several effects may result with the occurrence of a wound:
 - immediate loss of all or part of organ functioning
 - sympathetic stress response
 - hemorrhage and blood clotting
 - bacterial contamination
 - death of cells



Wound Healing

- Wound healing is a biological process that begins with trauma and ends with scar formation.
- There are two types of tissue injury: full and partial thickness.
- Full thickness injury involves loss of the dermis extending down to deeper tissue layers, and disrupts dermal blood vessels.
- Partial thickness injury is limited to the epidermis and superficial dermis, with no damage to the dermal blood vessels.
- Healing occurs by regeneration of other tissues.



Four Principles of Wound Care

- Removal of non-viable tissue
- Provide a moist environment
- Preventing further injury
- Providing nutrition



Removal of Non-Viable Tissue

- The first principle of wound care is the removal of non-viable tissue, including necrotic (dead) tissue, slough, foreign debris, and residual material from dressings.
- Removal of non-viable tissue is referred to as debridement; removal of foreign matter is referred to as cleansing.



Provide a Moist Environment

- The second principle of wound care is to provide a moist environment. This has been shown to promote reepithelialization and healing.
- Exposing wounds to air dries the surface and may impede the healing process.



Preventing Further Injury

- The third principle of wound care is preventing further injury.
- This involves elimination or reduction of the condition that allowed the wound to develop.
- Factors that contribute to the development of chronic wounds include loss in mobility, mental status changes, deficits of sensation, and circulatory deficits.



Providing Nutrition

- The fourth principle of healing is providing nutrition, specifically protein for healing.
- Protein is essential for wound repair and regeneration.
- Scar remodeling will not occur without essential amino acids, angiogenesis, fibroblast proliferation, and collagen synthesis.



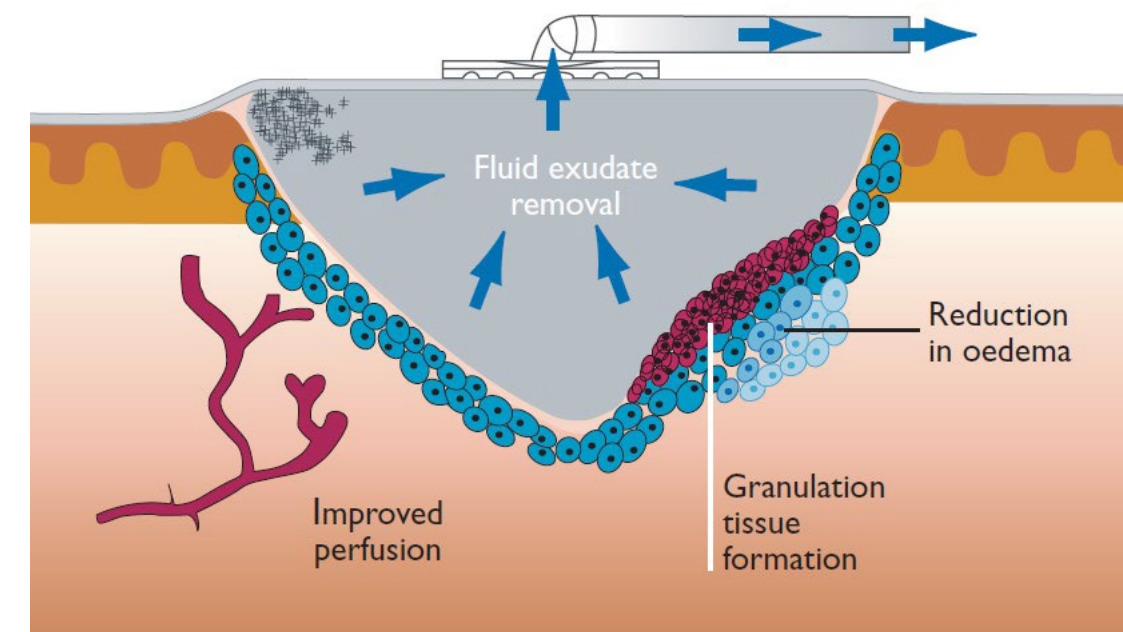
Promoting New Tissue Formation

- The first and most visible effect of NPWT is the removal of exudate (any fluid that filters from the circulatory system into lesions or areas of inflammation) from wounds and the establishment of a fluid balance.
- Studies have shown that NPWT goes far above and beyond just establishing a fluid balance.



NPWT Does More Than Just Remove Fluid

- The application of negative pressure in the wound can cause arterioles (small diameter blood vessels) and capillaries (the smallest blood vessels) in the wound edge tissue to open.
- The opening of these capillaries and arterioles allows more nutrients and oxygen to reach the wound bed, which is imperative for healing.
- The process of nutritive delivery of the blood to the wound bed is known as perfusion.



History of NPWT

- Negative Pressure has been used for over a century.
- For much of the 20th century it was used in the form of open suction to remove fluid and debris from wounds and surgical incisions.
- It wasn't until the 1980s that closed suction was researched and used in treatment.
- This is an important distinction, because closed suction means that the wound is actually sealed (through dressings or other means) around the suction tube so that a true negative pressure environment is achieved.
- In the 1980s several important studies were done to show the efficacy of negative pressure in helping wounds to heal.
- Russian research teams published studies describing the use of funnel or chamber type devices, encircling the wound, and applying suction to the wound at specific time intervals.



First Use of a Dressing Based System

- The first use of an actual dressing based system (not surgically implanted and not an external chamber) was seen in a 1989 study by the American team, Chariker and Jeter.
- This study was done between 1984 and 1986; seven patients were treated with a “closed suction wound drainage system.”



Comprehensive Study

- In 1997, the most comprehensive study was published regarding the use of NPWT by Morykwas and Argenta (two researchers from Wake Forest University).
- They published a study using open cell foam instead of gauze; they sealed the wound with an adhesive drape and applied negative pressure.
- Although this is similar to at least one earlier study, it was a landmark study because they were not only testing the clearance of bacteria from the wound, but they were also testing the effects of NPWT on blood flow, granulation tissue formation, and nutrient flow with the use of negative pressure.



Treatment of the Wound

- Nisus NPWT is a prescription therapy and requires a prescription from a licensed practitioner.

A licensed practitioner is defined as:

- MD (Medical Doctor)
- DO (Doctor of Osteopathic Medicine)
- And in some cases, NP's and PA's



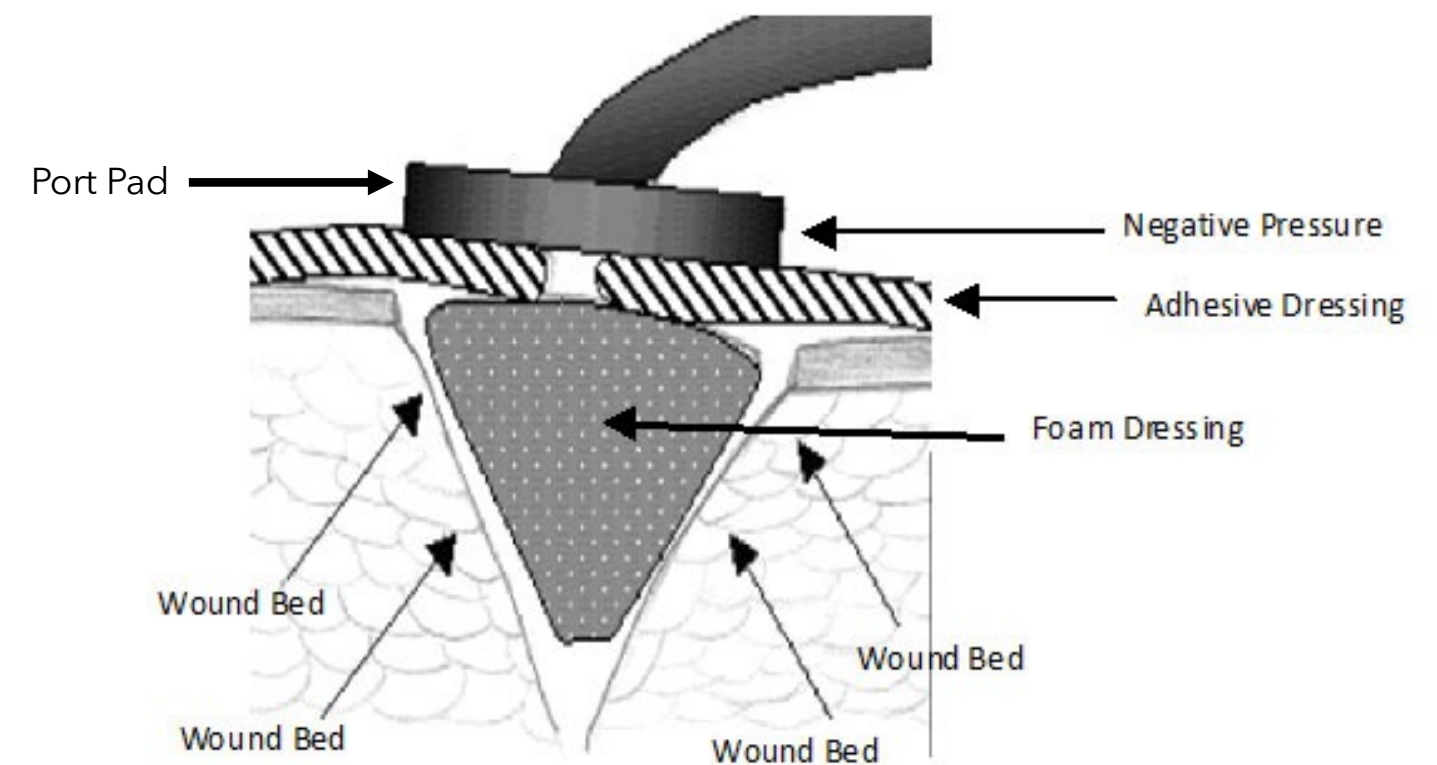
Necrotic Tissue & Debridement

- The first thing a care provider will have to look for is necrotic tissue (the patient to the right shows significant necrosis). Necrosis happens when cells and tissue die prematurely.
- Necrotic tissue does not send the same chemical signals to the immune system as normal cells, so the body will not take care of these cells itself.
- Necrotic tissue can hide exposed vessels and or organs.
- Necrotic tissue should be debrided prior to utilizing NPWT.



Dressing Function

- The dressings used with Negative Pressure Wound Therapy (NPWT) devices transfer the suction from the pump to the wound.
 - Dressings fill the wounds to retain structure
 - Provide a protective barrier
 - Maintain a moist environment
 - Can deliver antimicrobials



Two Types of Dressings

- There are two main types of dressings currently used in NPWT:
 - Foam based dressings
 - Gauze based dressings
- Both have been proven clinically effective in helping to treat wounds.
- The Nisus NPWT System is designed for foam based dressings.



Foam Dressings

- Hydrophobic reticulated foam and hydrophilic reticulated foam
- The term reticulated is used to describe the foams ability to return to its original shape once pressure or vacuum is removed from it



Hydrophobic Foam

- 'Hydrophobic' means afraid of water
- Hydrophobic foam does not absorb water, repels water



Hydrophilic Foam

- 'Hydrophilic' means attracts water
- Hydrophilic foam absorbs water
- Used in tunnels or exposed structures



Silver Dressings

- The argument for the use of silver dressings in conjunction with NPWT is that the silver will impede the growth of bacteria in the wound bed regardless of the vacuum being applied.
- If the vacuum were interrupted for any length of time the presence of silver in the dressing would reduce the colony count of bacteria in the wound.



What is a Contact Layer?

- The contact layer reduces the risk of in-growth into the packing material. In-growth is a result of the granulating tissue formation taking place inside the packing material.

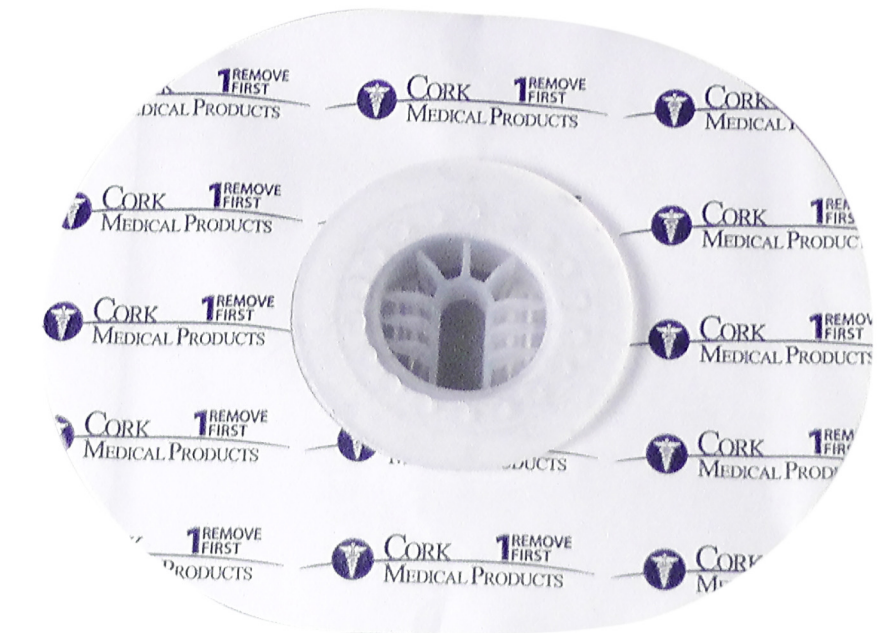
There are a number of contact layers available in the market today - some of the more common dressings are:

- Adaptic Gauze Dressings
- Oil Emulsion Gauze Dressings
- Tegaderm Contact (a nylon material)
- DeRoyal Dermanet (a nylon material)



Cork Medical Port Pad

- A Port Pad (a.k.a Suction Flange) is a drain that is applied on the outside of the wound dressing. A small hole is cut into the transparent film dressing and the suction flange is applied over the hole.
- The advantage of this drain is that they are very easy to apply.
- Typically used with Foam Based Dressings



Indications for Use

- The Nisus Negative Pressure Wound Therapy pump may promote wound healing through the drainage and removal of infectious materials and other fluids from the wound site using continuous or intermittent negative pressure.
- Patients with chronic, acute, traumatic, sub acute and dehisced wounds, partial-thickness burns, ulcers (such as diabetic or pressure), flaps and grafts may benefit from the use of this device.



Contraindications for Use

- NPWT is contraindicated and should never be used in the presence of the following:
 - necrotic tissue with eschar encompassing more than 20 percent of the wound bed
 - untreated osteomyelitis within the vicinity of the wound
 - cancer present in the wound
 - a fistula to an organ or body cavity within the vicinity of the wound
 - an unexplored fistula
 - exposed blood vessels or organs



Patient Risk Factors

- If NPWT has been prescribed for patients with an increased risk for bleeding/hemorrhage, the patient should be closely monitored by the treating physician.



Therapies

- There are currently three types of Negative Pressure Wound Therapy:
 - Continuous
 - Intermittent
 - Variable Intermittent
- Currently, there is not a clear accepted philosophy on when to use each of these therapies.



Continuous Therapy

- As the name implies, continuous therapy is the continuous application of negative pressure to the wound bed.
- The system monitors the pressure to ensure that it stays at the set point.



Variable Intermittent Therapy

- Variable Intermittent Therapy is defined as being able to set both the high pressure and the low pressure as well as how long each is applied.
- The theory behind Variable Intermittent Therapy is that it reduces cellular memory.
- This therapy offers the most options.



Intermittent Therapy

- Intermittent Therapy is basically 'On' or 'Off'.
- It alternates between 125 mmHg and 0 mmHg.
- The downside to Intermittent Therapy is that the drainage will pool in the dressing when it is at 0 mmHg.
- When drainage pools, it tends to break the seal surrounding the wound necessitating a dressing change.



Cork Medical Dressing Kits

- Each Dressing Kit contains the following:
 - Cork Medical Silicone Port pad
 - Cork Medical Black Foam
 - Cork Medical Drape



Dressing Application Guidelines

- All disposable components of the Cork Medical dressing kit are packaged sterile and are latex free.
- All disposable components are for single use only.
- The decision to use clean vs. sterile/aseptic technique is dependent on institutional protocol and physician/clinician preference.



Dressing Changes

- Wounds should be monitored on a regular basis and the dressing in a non-infected wound should be changed every 48 to 72 hours but no less than 3 times per week.
- Infected wounds must be monitored often and closely as the dressings may need to be changed more often than 48 to 72 hours.



Wound Preparation

- Remove and discard previous dressing per institutional protocol. Thoroughly inspect wound to ensure all pieces of dressing components have been removed. If removing the Cork Medical dressing please follow these steps:
 - Raise the tubing above the level of the therapy unit
 - Clamp close the dressing tubing
 - Disconnect the canister from the unit by disconnecting the luer lock
 - Turn off the Nisus NPWT unit and wait for the foam to decompress
 - Remove Cork Medical drape from the skin, gently stretch the drape horizontally to release the adhesive from the skin
 - Gently remove foam from the wound



Wound Preparation Continued

- Discard disposables according to institutional protocols
- Debride all necrotic, non-viable tissue, including bone, eschar or hardened slough
- Perform thorough wound and periwound area cleaning
- Ensure adequate hemostasis has been achieved
- Prior to foam placement, protect vessels and organs
- Sharp edges or bone fragments must be eliminated from wound area or covered
- Use a skin preparation product on the periwound skin



Foam Application for Single Wound

- Assess wound dimensions and pathology, including the presence of undermining or tunnels. Cork Medical black foam may be used for wounds with shallow undermining or tunneled areas where the distal aspect is visible.
- Cut Cork Medical black foam to the dimensions that would allow the foam to be placed gently into the wound without overlapping onto skin.
- **Note:** Do not cut the foam over the wound as fragments may fall into the wound.
- Gently place foam into wound cavity ensuring contact with all wound surfaces. Do not force the foam into any area of the wound.
- **Note:** Ensure foam-to-foam contact between adjacent pieces for even distribution of pressure
- **Note:** Always count the number of pieces of foam used in the wound and document in the patient chart
- **Note:** Superficial or retention sutures should be covered with a single layer of nonadherent material placed between the sutures and the Cork Medical Drape.



Drape Application

- Trim the drape to cover the foam dressing with an additional 3 - 5 cm (1 -2 Inches) border of intact periwound tissue. Cork Medical Drape may be cut into multiple pieces for easier handling. Use excess drape to seal difficult areas.
- Pull back on side labeled '1' to expose adhesive
- Place the adhesive face down over foam and apply drape to cover foam and intact skin with a 3-5 cm (1-2 inch) border around the wound
- Remove remaining side labeled '1' and pat down to ensure an occlusive seal
- Remove the backing side labeled '2'
- Remove the backing labeled '3'
- Remove the purple perforated handling tab



Port Pad Application

- Choose an application site with consideration to fluid flow, tubing positioning and avoid placement over bony prominences or within creases in the tissue
- Pinch Cork Medical drape and cut a 2.5cm (1inch) hole through the drape. Do not cut into the foam.
- Remove backing layer on the Cork Medical Silicone Port Pad and apply pad directly over the hole in the drape and apply gentle pressure on the disc and outer skirt of the pad to ensure adhesion



Y-Connectors

- Y-Connectors can be utilized when multiple wounds are present. Each wound must be dressed separately and checked for seal integrity before being joined by the y-connector. This application allows multiple wounds to be treated with one Nisus unit.
- It is recommended to not Y-connect flaps or grafts.
- Avoid using a Y-connector in wounds that do not have the same etiology.
- It is recommended to change the Y-connector weekly or as often as required.



Bridging

- Can be utilized when wounds of the same etiology and in close proximity to each other are present;
- Protect the periwound skin as well as the area between the wounds where the bridge is going to be as to avoid the foam coming in contact with good skin; lay a track with transparent film to protect intact skin;
- Place the foam in each wound as described in the dressing application section;
- Connect the 2 wounds with another piece of foam creating a bridge, ensure all the foam pieces are in contact with each other;
- Cover all the foam with the transparent film as described in the dressing application section;
- Place the Port Pad in the center of the bridge to avoid drawing exudate from one wound to the other.



Application for Tunnels

- Do not place foam into an unexplored tunnel or sinus tract
- Measure the length of the tunnel
- Cut the white foam slightly smaller than the width of the tunnel and ensure the end going into the tunnel is cut in a 'v' shape to allow for easier placement into the tunnel
- The first application gets inserted into the tunnel until it touches the end of the tunnel; ensure to leave part of the white foam sticking out into the wound bed for complete contact with the rest of the foam
- Subsequent dressing change, place the foam into the tunnel to the end then pull back a few cm's with each change
- Repeat this procedure until the tunnel is closed



Application for Undermining

- Measure the undermined area
- Cut the white foam to sit nicely into the undermined area starting at the distal end, avoid packing the undermined area too tightly
- Pull the foam out about 1-2 cm's leaving part of the foam in the wound bed to ensure good contact with the foam in the rest of the wound
- Each subsequent change will be the same procedure as above ensuring the distal end of the undermined area is clear of foam so the negative pressure can allow the free area to collapse them together



Application for Small Wounds

- Protect the periwound area with the transparent film ensuring the film is larger than the Port pad
- Cut the foam to fit inside the wound
- Cut a second piece of foam larger than the size of the Port Pad and place it on top of the foam in the wound
- Seal the dressing and place the Port Pad as in previous dressing applications



Meshed Grafts / Flaps

- Place a single layer of a non-adherent dressing over the graft site plus a 1-2 cm border
- Cut the Cork Medical black foam the same size as the non-adherent dressing, place the foam over the non-adherent layer, be careful to not have the foam touch good skin
- Cover the foam with the Cork Medical Drape and place port pad, connect to the Nisus Pump, set the desired pressure
- Setting should be set to continuous mode to maintain the constant bolster
- The dressing stays in place for 4-5 days
- You should see the amount of exudate taper off after the first 24 hours. If exudate increases or there are signs of infection, the dressing should be taken off and the wound assessed by a clinician.



When to Discontinue Therapy

- Nisus NPWT therapy should be stopped immediately if sudden, active or large amounts of bleeding occur or if frank red blood is seen in the tubing or canister:
 - The therapy should be stopped immediately
 - Leave the dressing in place until the wound can be assessed by the physician
 - Take measures to stop the bleeding
 - Provide immediate medical assistance if required





Questions & Discussion



NEGATIVE PRESSURE WOUND THERAPY TRAINING

CLINICAL EDUCATION: Clinical NWPT Treatment & Wounds