

The VEU™

The Vascular & Endovascular Update

Spring 2019

Advances in Wound Care Management

Use **TIME** to identify an acute wound that could become chronic:

- T** - devitalized or necrotic tissue
- I** - excessive inflammation/infection
- M** - moisture imbalance
- E** - nonadvancing wound edges

It's vital to identify the cause of slow or impaired healing in your patient and select the wound management treatment principles best suited for the situation.

Look for suboptimal nutrition, poor blood sugar control, tobacco use, and inadequate blood supply.

You may recommend increasing proteins, healthy fats and water consumption as a first step. Supplements such as amino acids vitamins A, C, and D, and minerals such as selenium, zinc, copper, iron can also be recommended.

When wounds do not respond to this conservative treatment, the more than 3000 choices of

Acute and chronic wounds in the United States cost \$105 billion in 2017, and the costs to a patient's physical, mental and social well being is estimated to be the same as heart and kidney disease.

While acute wound healing can take about 12 weeks, when healing slows or halts in any of its four stages, the wound is at risk to become chronic. Making informed and appropriate wound management choices helps to reduce this risk.

dressings, biological materials, tissue-engineered substitutes, and mechanical devices can be overwhelming. The traits of the wound itself should guide treatment and dressing selections.

Wound healing begins when a plug of platelets is formed to ease bleeding. That triggers a "coagulation cascade", attracting neutrophils, mast cells, macrophages, and fibroblasts which débride dead and dying tissue. This inflammatory stage lasts for 1 to 3 days. Next is the proliferative stage, about 4-21 days. During proliferation, reepithelialization, extracellular matrix (ECM) formation, and angiogenesis occur. The final stage is the remodeling phase, which can last from 3 weeks to a year. This is when the wound matures and should reach a tensile strength of 80-90% at full maturation.

The properly selected dressing will:

- promote healing through

collagen synthesis, angiogenesis and tissue formation

- protect tissues
- prevent contamination, dehydration and maceration

Film Dressings

Polyurethane, gas permeable dressings created of thin, elastic, and transparent materials are best used for minimally exudative wounds.

They are not absorbant so skin maceration can occur when applied over exudative wounds. These may also harm patients with fragile skin.

Hydrocolloid Dressings (HCD)

HCDs are recommended for abrasions, superficial burns, pressure ulcers, postoperative wounds, granulating wounds, and split-thickness skin graft donor sites. HCDs are available in sheets or gels and form soft gels when combined with exudate to reduce leakage, lower wound pH, reduce bacterial growth,

and promote granulation tissue. HCDs may also improve wound temperatures and moisture. Because HCDs are in place for several days, they are suitable for outpatient use.

Patients may experience contact dermatitis from their use. A foul-smelling yellow gel can develop on the dressing, prompting concerns of infection.

Alginates

Appropriate for highly exudative wounds and over healthy granulation tissue, alginates are created from algae extracts. These extracts contain guluronic and mannuronic acids, sodium and calcium, providing both tensile strength and absorption of up to 20 times their actual weight.

Alginates are also suitable as hemostatic dressings. Alginates dressings can also be kept in place for several days. Lateral wicking may occur when fluid collects under the skin, resulting in maceration.

Hydrofibers (HFD)

HFDs are easier to apply and have superior exudate absorption, resulting in less pain, increased comfort, and reduced trauma in open wounds. HFDs form gels with exudates, cause less maceration and can be left in place for several days. The fibrin material may adhere to the wound, requiring applying saline to facilitate dressing changing.

Hydrogels

Hydrogels are used on wounds with eschar. Available as gels or sheets, soothing hydrogels improve the wound's moisture content and soften, rehydrate and liquify the eschar, aiding the body's own débridement

process. Hydrogels are cause very little harm to the healing wound bed but do require frequent dressing changes to avoid skin maceration.

Dressings for Infected Wounds

Débridement is critical in the healing of infected wounds. While surgical débridement remains the most common method, studies showed that maintaining a moist wound environment reduced pain and infections while improving healing over wounds that dried out, moist gauze dressings became an important tool in débridement therapies of infected wounds.

There are concerns of risks of increased cross-contamination, decreased wound temperature, promotion of vasoconstriction and wound ischemia. These dressings may extend the inflammatory healing stage and cannot prevent evaporation or wound dessication. The careful and appropriate use of these dressings requires use immediately after surgical débridement and frequent changing. Without careful use and supervision, these dressings may actually worsen a wound.

Medicated Dressings

Dressings that are iodine- and silver-based are used to reduce bacteria, prompt neovascularization, and encourage healing. These antimicrobial dressings are used for a short time to reduce side effects. Biomaterial dressings are recent innovations that can be used by themselves or paired with other dressings. Some also include growth factors and antimicrobials.

Negative Pressure Wound Therapy (NPWT)

NPWT prompts healing through subatmospheric negative pressures, removing fluid, decreasing bacteria, and causing micro- and macro-deformation. Because of these actions, the body begins its own inflammatory modulations, mitogenesis, angiogenesis, neovascularization, and granulation tissue formations.

NPWT decreases the need for tissue transfers and maximize the chances of wound closure. Sponges, with different pore sizes depending upon the type and size of wound, are applied over wounds and covered with dressings that enable a vacuum seal. Negative pressure via a suction devicer is applied through tubing which is connected to a fluid canister.

NPWT can be used in a continuous mode for leaky, exudate or painful wounds. Continuous suction is often used in the initial period for wound detersion and to maintain skin grafts. Intermittent suction causes larger increases in blood flow and in the formation of granulation tissue. NPWT is appropriate for diabetic, pressure, venous leg ulcers and acute, subacute, chronic, dehisced, and at-risk surgical wounds,

NPWT should be applied by wound specialists such as vascular surgeons, due to the extreme care that should be taken regarding vascular structures and the need for close monitoring to avoid complications from erosion, exsanguination, blood loss, skin maceration and breakdown, and muscle fiber regeneration

Tissue Expanders and Dermal Apposition

Continuous external tissue expansion (CETE) stretches skin under constant tension, straightening collagen fibrils. These fibrils become taut and permanently elongate. As tissues respond, they stimulate tissue regeneration. Devices prompting these viscoelastic properties of the skin assist with tissue expansion and help achieve wound closure.

CETE devices decrease time-to-wound closures, reduce the need for dressing changes, and lower the risk of requiring a split-thickness skin graft.

CETE complication risks include skin maceration, blistering of skin underneath the device, and periwound ischemia and tissue necrosis.

Extracellular Matrix Products

ECMs contain vital elements that stimulate wound healing. ECMs provide tissue healing structural supports such as fibrillar collagen, cellular attachments like fibronectin, matrix hydrations like hyaluron, signal transductions including heparin, and binding of growth factors such as decorin along with matrix metalloproteinases.

Chronic wounds have damaged ECM but treating the wound with a ECM substitute encourages healing and promote wound closure. ECMPs bind, protect, and improve growth capabilities and stimulate angiogenesis and granulation tissue formation. ECMPs are formulated using biological tissues from human cadavers, animals including bovine, porcine and equine and plants, are synthetically manufactured, or are a composite of synthetic and

biological tissues.

Depending upon the type of ECMP used, this treatment is appropriate for treating diabetic foot ulcers, pressure ulcers, venous and arterial ulcers, irradiated wounds, deep partial-thickness burns, and pilonidal sinus. Do not use a ECMP if there is an infection, exposed bone without periosteum, tendon without paratenon and exposed implant, full-thickness burns, or if the patient has a sensitivity to porcine products.

ECMPs include ACell, Endoform Dermal Template, OASIS, Integra Dermal Regenerative Template and PriMatrix.

Timely and effective wound care prevents amputations, improves the incidence of patient morbidity, maintains or enhances patient quality of life and reduces health care costs and caregiver burdens. Becoming expert at identifying different wound types, understanding the cellular, vascular and molecular biology of healing, and recognizing impaired or halted healing will help you to refer your patient to a vascular surgeon and wound care specialist as soon as possible, to achieve rapid and complete wound healing.



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**Dr. Tanquilut, Dr. Pradhan, Dr. Alhalbouni and Dr. Qureshi
are board-certified, award-winning
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**When you have questions
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Award-winning and recognized as a Vitals Top 10 Doctor and a Patient's Choice Doctor, **Dr. Eugene Tanquilut** is board-certified in both vascular and endovascular surgery. He earned Vascular and Endovascular Fellowships at Cleveland Clinic.

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Wednesday, April 10, 2019 at 6:30 pm

Zachary's Grill

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Jerry Chow, MD

*discussing advanced wound care
management*

Reserve your seat with Ryan Santos
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