

► New Technology and Materials Improve and Speed Wound Healing

Wound resolution is too often taken for granted, even though patients and the health care system suffer significant care and financial burdens from delayed wound healing and resulting complications. Infections cause excess length of stay and increased hospital charges, in addition to acute and long-term disability. But improved tools and specialization are permitting convenience and successes in recurring wounds that could not have been achieved before.

“Our ability to resolve nonhealing and chronic wounds keeps getting better with such strides as automated irrigation and improved skin substitutes,” said Christopher LaRosa, DPM, medical director of the Virtua Wound Center - Voorhees. “With advanced technology and more awareness of centers like ours, we are truly saving more lives and limbs.”

Automated, Vacuum-Accelerated Therapy

Negative-pressure treatment with wound-vacuum therapy shortens time for healing and wound closure and is accomplished using a portable unit managed with home care. As an enhancement to this treatment in the inpatient setting, the Virtua team may also now use Veriflow™ therapy, applied in the operating room. The system seals over the site to apply repeated cleansing cycles with topical solutions that dwell in the wound to help dilute and solubilize infectious material. The device draws from the site regularly to remove bio burden.

Secondary debridement and wound closure or graft placement follows a few days of this inpatient therapy. Veriflow reduces bacterial count, promotes granulation tissue thickness (new connective tissue and microscopic blood vessels), decreases need for surgical debridement, quickens wound closure, and shortens length of treatment.

More Options in, and Use of, Skin Substitutes

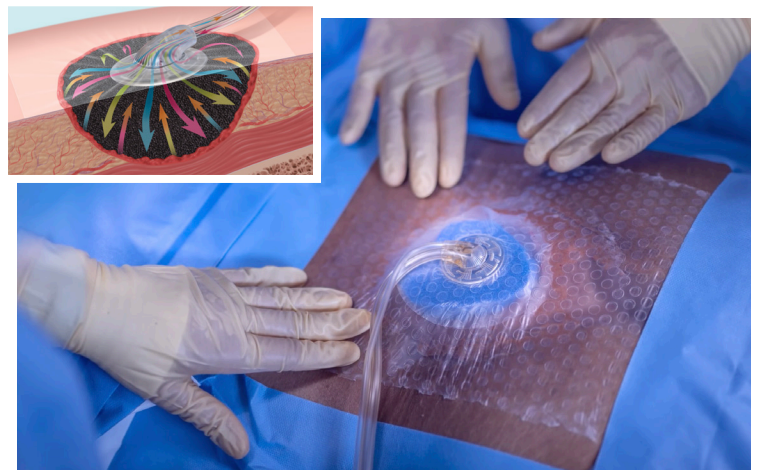
In steadily increasing use and development over the last two decades, skin substitutes have significantly improved wound care. They are a heterogeneous group of biologic and

synthetic materials that can provide temporary or permanent coverage and healing structure in external sites.

Cellular allografts, derived from human and/or animal tissue, variously consist of dermal cells, growth factors, and collagen, and are especially effective for venous leg ulcers and diabetic foot wounds. Longest and most commonly and successfully used in the Virtua program, Apligraf® is a living bilayered human skin equivalent containing bovine type 1 collagen and human fibroblasts. Used similarly and with even broader applications, Graftix® is an allograft derived from the amniotic membrane of cryopreserved human placental and umbilical cells rich in mesenchymal stem cells.

Among **acellular allografts**—which are composed of a collagen substrate or other material into which cells can migrate and initiate tissue regeneration—Kerecis® is under evaluation in the Virtua program. This dermal matrix derived from fish skin is homologous to human skin and serves as a natural microbial barrier. As with cellular allografts, healing sites bioabsorb and bioincorporate these acellular grafts.

Also treating traumatic, pressure, surgical, and radio-necrotic wounds and working closely with home care services, Virtua's three wound centers are located in Voorhees, Mount Holly, and Willingboro. Each provides onsite hyperbaric oxygen treatment for appropriate patients.



Veriflow combines automated wound cleansing with the benefits of negative-pressure therapy to remove wound exudate and other infectious material on a set cycle to achieve prompter wound resolution.

To contact a Virtua Wound Center, call: Virtua Mount Holly Hospital (609-914-6240), Virtua Voorhees Hospital (856-247-7260), or Virtua Willingboro Hospital (609-835-5240). Virtua physicians can use EPIC under “Ambulatory Referrals” to refer patients for Wound Center care.

Case Review: **Hyperbaric Oxygen Key Intervention in Saving Foot, Restoring Mobility**

After Joette Ewen underwent a bunionectomy, her surgical site failed to heal. When she arrived at Virtua's Wound Center in Mount Holly, on referral from her primary care physician, Ewen—an active woman in her 60s—had experienced an open wound for three months. A probe directly to the bone and other tests confirmed that she had developed osteomyelitis at an exposed metatarsophalangeal joint.

“Our prognosis was for amputation, and we had to prepare Joette for that possibility while we undertook everything possible to prevent it,” said Virtua podiatrist Maureen Clinch, DPM, who admitted Ewen and operated on her the next day to debride and disinfect the site and apply a synthetic skin graft—in this case using, Integra®, a manufactured acellular dermal regeneration template composed of a bilaminate sheet of cross-linked bovine tendon collagen and shark glycosaminoglycans (chondroitin-6-sulfate) with a silicone sheet cover.

Then wheelchair bound, Ewen entered into an intensive treatment regimen for two months, coming five days a week to Virtua's infectious disease practice in Mount Laurel for infusions of high-dose antibiotics and then to the wound care center. During visits, the staff removed fibrotic tissue to stimulate healing and decontaminate the location and changed Ewen's dressings as needed. Ewen also benefitted from sealing of the wound with the living cellular skin substitute Apligraf® (see page 1).

The specialized team delivered two other critical adjuncts to Ewen's care: vacuum negative-pressure therapy (see page 1) and hyperbaric oxygen therapy (HBOT). Ewen spent two hours in a hyperbaric oxygen unit to stimulate healing at each visit. Atmosphere in the chamber is 100% oxygen at higher-

than-normal air pressure. A patient's resulting elevated blood oxygen saturation creates a less-favorable environment for bacteria and stimulates angiogenesis and tissue regeneration at the wound site.

Ewen's wound steadily improved and actually closed before she completed this program, with a total of 40 “dives” (a typical number of sessions in the hyperbaric chamber to facilitate healing of underlying bone infection). The team guided her to complete the full course of HBOT to ensure that both the superficial site and the associated osteomyelitis were resolved. She was then, and since, able to resume all of her normal activities, including spending busy time with her grandchildren.

“Joette was highly compliant with her needed course of care, and that makes a huge difference in this type of wound treatment,” said Dr. Clinch. “This was a gratifying outcome, to fully cure a dangerous, long-standing wound that started with granulated tissue and an open joint.”



Virtua's wound program offers HBOT chambers at each of its locations, with a staff at each center that includes certified wound physicians, specialized APNs and RNs, and certified hyperbaric technicians.