Case Study: A.R., an 89-year-old man with end-stage non-small cell lung cancer, was evaluated at an oncologist’s office and treated palliatively at home. He received 24-hour care provided by his family; however, the family was overburdened and unable to manage his care. As a result, they sought nursing home placement. Following placement, A.R. developed a stage III decubitus ulcer of his left gluteus region (see Figure 1) and was hospitalized. Standard management of the lesion required surgical debridement and evaluation of the wound. His wound cultures were infectious and revealed methicillin-resistant *Staphylococcus aureus*. A.R. received IV vancomycin for 10 days to treat the decubitus ulcer. The nursing staff caring for A.R. during his hospitalization was challenged by the location of the wound and copious amounts of drainage. The patient was evaluated by the wound care team, which recommended the use of a vacuum-assisted closure ([VAC®](#), KCI Licensing, Inc., San Antonio, TX) system in an attempt to promote healing.

Vacuum-Assisted Closure Therapy

Maureen E. O’Rourke, RN, PhD

**Pressure Ulcers**

Nurses frequently are faced with the challenge of caring for and monitoring an infectious pressure ulcer. Chronic wounds can pose a serious threat to the quality of life for patients because of their slow healing process. VAC therapy is a new addition to the armamentarium available for chronic wound management and offers a treatment option that improves skin care. Argenta and Morykwas developed the cutting-edge equipment in 1997 (see Figure 2). The VAC therapy system promotes healing by removing fluids and other infectious waste materials via a continuous or intermittent negative-pressure feedback control. The therapy demonstrates a hastened wound-healing process by promoting tissue granulation, reducing localized edema and bacterial colonization, improving epithelial migration, increasing regional blood flow, and mechanically enhancing wound closure (Hartnett, 1998).

Studies have demonstrated improved chronic wound management with VAC therapy. In studies that specifically assessed patients’ chronic wound management after use of the VAC system, faster wound healing and fewer courses of antibiotic therapy were reported (Chen, Li, Li, & Xu, 2005). In addition to the benefit of promoting wound healing with a VAC system, data support the benefit of using a VAC GranuFoam® (KCI Licensing, Inc.) dressing application with pressure ulcers. Evaluation of the foam sponge has revealed high levels of granulocytes, CD4, CD5, and helper T cells, indicating that GranuFoam acts as a habitat for immune cell recruitment (Lambert, Hayes, & McCarthy, 2005). Mustoe (2004) suggested that chronic wounds exist because of three contributing factors: cellular and system alterations associated with the aging process, ischemia-reperfusion injury, and bacterial colonization with resultant inflammatory host response. Nurses must understand chronic wound development in their efforts to provide optimal therapy for patients. Various types of wounds can benefit from the VAC system, but in the case study, a pressure ulcer is the focus. The VAC system has been used successfully in patients after resection of large musculoskeletal tumors and those with partial-thickness burns, acute and chronic wounds, diabetic ulcers, flaps, and compromised skin grafts (Argenta & Morykwas, 1997).
Vacuum-Assisted Closure System

The VAC system uses two types of foam-dressing applications, with the most common being GranuFoam. A porous black polyurethane foam, GranuFoam is considered the most effective dressing application in assisting with stimulation of tissue granulation. The foam dressings are packaged individually as a sterile kit. In A.R.’s case, the manufacturer recommended the use of GranuFoam for deep pressure ulcers and chronic wounds (see Figure 3).

Before using the VAC system, nurses should obtain direction from a physician in compliance with institutional policies and procedures. Once the physician order has been obtained, the wound should be cleansed as directed.

Prior to applying the foam, the wound dimensions must be noted per institutional guidelines. The foam should be trimmed so that it can be embedded easily into the wound and should cover the entire wound; no material should be loose. A drape should be sized to cover the foam dressing prior to applying the VAC unit. The transparent dressing should be applied directly over the sponge with an additional 3–5 cm border of intact skin (Lambert et al., 2005).

After securing the drape, the tubing is applied to the foam dressing and a hole is cut through the transparent drape and foam for proper placement of the VAC unit. The tubing is placed in the hole, secured, and connected to an evacuation container, where an electric pump generates negative pressure. The pump has two designated pressure settings: intermittent and continuous negative pressure. The pump’s built-in alarm alerts clinicians to potential leaks or a full canister that requires emptying. Leaks form because of failure to seal the occlusive dressing; therefore, if a leak is suspected, the nursing staff must check the tubing site and apply excess transparent dressings.

Nursing Implications

Clinicians using the VAC system have an essential role in the application of the unit. Nurses must measure accurately and fit the sterile sponge into the wound. Failure to effectively apply the VAC therapy may result in poor wound healing.

Chronic wound management with the use of the VAC system often is extremely painful, and dressing changes exacerbate the pain. Nurses should assess patients’ pain level prior to performing chronic wound care with the VAC system. Dressing changes should be performed every 48 hours. However, in the case study, A.R. suffered from an infected chronic pressure ulcer that required more frequent dressing changes (i.e., every 12–24 hours). Nurses must clean wounds according to physician and institutional protocols. Because of pressure changes, the VAC system settings can contribute to patients’ pain. Lambert et al. (2005) recommended using the intermittent cycle (i.e., five minutes on and two minutes off) to reduce pain. If patients complain of discomfort during a dressing change, the pressure should be decreased in increments of 25 mmHg until the target pressure range is achieved. Patients requiring the VAC system should use a skin barrier product to protect the surrounding skin (Patel, Kinsey, Koperski-Moen, & Bungum, 2000).

Patients should not be disconnected from the VAC system for more than two hours per day because doing so places patients at risk for developing deep venous thrombosis and compromised pulmonary function (Lambert et al., 2005).

Nurses should identify diversionary activities for patients requiring the VAC system to combat deterioration of their psychological state.

Discussion

The VAC system offers a cutting-edge approach to the management of troublesome, acute, and chronic wounds. Nursing implications for care include proper sterile technique, effective pain management, and careful monitoring of the wound. In an effort to optimize the benefits of the VAC therapy, nurses should consider using a team approach. Many institutions employ a wound specialist, and nurses should refer to this individual to promote proper wound healing.

Author Contact: Maureen E. O’Rourke, RN, PhD, can be reached at meorourk@uncg.edu, with copy to editor at CJONEditor@ons.org.

References


