WOUND VACUUM ASSISTED CLOSURE

The wound Vacuum Assisted Closure (wound V.A.C.) is a device that assists in wound closure by applying localized negative pressure to draw the edges of a wound together. V.A.C. accelerates wound healing by promoting the formation of granulation tissue, collagen, fibroblasts, and inflammatory cells in order to completely close or improve the health of a wound in preparation for a skin graft. The use of negative pressure removes fluid from the area surrounding the wound, thus reducing local peripheral edema and improving circulation to the area. In addition, after 3 to 4 days of therapy, bacterial counts in the wound drop.

In essence the technique is very simple. A piece of foam with an open-cell structure is introduced into the wound and a wound drain with lateral perforations is laid on top of it. The entire area is then covered with a transparent adhesive membrane, which is firmly secured to the healthy skin around the wound margin. When the exposed end of the drain tube is connected to a vacuum source, fluid is drawn from the wound through the foam into a reservoir for subsequent disposal.

Wound V.A.C. may be used to treat acute and chronic wounds. The schedule for changing wound V.A.C. dressings vary. An infected wound may need a dressing change every 24 hours, whereas a clean wound can be changed 3 times a week. As the wound heals; the wound base becomes redder and granulation tissue will line the surface of the wound. The wound has a stippled or granulated appearance. Last, the surface area of the wound may increase or decrease depending on wound location and the amount of drainage removed by the wound V.A.C. system. As the wound heals, paler areas in the wound may develop. This indicates an increase in fibrous tissue.

Assessment

1. Assess location, appearance, and size of wound to be dressed. Rationale: Provides information regarding status of wound healing, presence of complications, and the proper type of supplies and assistance needed to apply a new transparent dressing.
2. Assess client’s comfort level using a scale of 0 to 10. Rationale: Data will determine effectiveness of comfort control interventions before, during, and after dressing change.
3. Assess client’s knowledge of purpose of dressing change. Rationale: determines level of support and explanation required.
4. Determine the need for client or family member to participate in dressing wound. Rationale: Prepares client or family member if dressing will be changed at home.
Planning
Expected outcomes focus on preventing infection, promoting healing, pain control, and client and family education.

Expected Outcomes (Patient Goals)
1. Client’s wound shows evidence of healing by smaller size and less drainage, redness, or swelling.
2. Client reports pain less than previously assessed level (scale of 0 to 10) during and after dressing changes.
3. Dressing remains intact with airtight seal and prescribed negative pressure.
4. Client or family demonstrates correct method of dressing changes.

Equipment
♦ V.A.C. unit (requires physician order)
♦ V.A.C. foam dressing
♦ Tubing for connection between V.A.C. unit and V.A.C. dressing
♦ Gloves, clean and sterile
♦ Scissors (sterile)
♦ Skin prep/skin barrier
♦ Moist washcloth
♦ Plastic trash bag
♦ Linen bag

Implementation for Wound Vacuum Assisted Closure
Steps
1. Position client comfortably, and drape to expose only wound site. Instruct client not to touch wound or sterile supplies. *Rationale: Maintaining client comfort assists in completing skill smoothly. Draping provides access to wound while minimizing unnecessary exposure.*

2. Place disposable waterproof bag within reach of work area with top folded to make a cuff. *Rationale: Facilitates safe disposal of soiled dressings.*

3. When V.A.C. is in place, begin by pushing therapy on/off button. *Rationale: Deactivates therapy and allows for proper drainage of fluid in drainage tubing.*
   a. Keeping tube connectors with V.A.C. unit, disconnect tubes from each other to drain fluids into canister.
   b. Before lowering, tighten clamp on canister tube.

4. With dressing tube unclamped, introduce 10 to 30 ml of normal saline, if ordered, into tubing to soak underneath foam. *Rationale: Facilitates loosening of foam when tissue adheres to foam.*

5. Gently stretch transparent film horizontally, and slowly pull up from the skin. *Rationale: Reduces stress on suture line wound edges and reduces irritation and discomfort.*
6. Remove old V.A.C. dressing, observing appearance and drainage on dressing. Use caution to avoid tension on any drains that are present. Discard dressing, and remove gloves. Wash hands. **Rationale:** Determine dressings needed for replacement. Avoids accidental removal of drains because they may or may not be sutured in place.

7. Apply sterile or clean gloves. Irrigate the wound with normal saline or other solution ordered by the physician. Gently blot to dry with sterile gauze. **Rationale:** Irrigation removes wound debris.

**Nurse Alert:** If this is a new surgical wound, sterile technique would be an appropriate measure. Chronic wounds may use clean technique.

8. Measure wound as ordered: at baseline, first dressing change, weekly, and discharge from therapy. Remove and discard gloves. **Rationale:** Objectively documents wound healing process in response to negative pressure wound therapy.

**Nurse Alert:** Wound cultures may be ordered on a routine basis. However, when drainage looks purulent, there is a change in amount or color, or drainage has a foul odor, wound cultures should be obtained even when they are not ordered for that particular dressing change. An order can be obtained at a later time.

9. Depending on the type of wound, apply sterile gloves or new clean gloves. **Rationale:** Fresh sterile wounds require sterile gloves. Chronic wounds may require clean technique. However, do not use the same gloves worn to remove old dressing because cross contamination may occur.

10. Prepare V.A.C. foam. **Rationale:** Black polyurethane (PU) foam has larger pores and is most effective in stimulating granulation tissue and wound contraction. White polyvinyl alcohol (PVA) soft foam is denser with smaller pores and is used when the growth of granulation tissue needs to be restricted.
   a. Select appropriate foam.
   b. Using sterile scissors, cut foam to wound size. Proper size of foam dressing helps maintain negative pressure to entire wound. Dressing must be cut to fit the size and shape of the wound, including tunnels and undermined areas.

**Nurse Alert:** Clients may experience more pain with the black foam because of excessive wound contraction. For this reason they may need to be switched to the PVA soft foam.
11. Gently place foam in wound, being sure that the foam is in contact with entire wound base and margins and tunneled and undermined areas. **Rationale:** Maintains negative pressure to entire wound. Edges of the foam dressing must be in direct contact with the client’s skin.

12. Apply tubing to foam in the wound. **Rationale:** Connects the negative pressure from the V.A.C. unit to the wound foam.

Nurse Alert: For deep wounds regularly reposition tubing to minimize pressure on wound edges. In addition, clients with restricted mobility or sensation must be repositioned frequently so that they do not lie on the tubing and cause further skin damage.

13. Apply skin protectant, such as skin prep or Stomahesive wafer, to skin around the wound. **Rationale:** Protects periwound skin from injury that may result from the occlusive dressing.

14. Apply Wound V.A.C. dressing. **Rationale:** Ensures that the wound is properly covered and a negative pressure seal can be achieved.
   a. Cover the V.A.C. foam, 3 to 5 cm of surrounding healthy tissue.
   b. Apply wrinkle-free transparent dressing.
   c. Secure tubing to transparent film; aligning drainage holes to ensure an occlusive seal. **Note:** Do not apply tension to drape and tubing

15. Secure tubing several centimeters away from the dressing. **Rationale:** Prevents pull on the primary dressing, which can cause leaks in the negative pressure system.

16. Once wound is completely covered, connect the tubing from the dressing to the tubing from the canister and V.A.C. unit. **Rationale:** Intermittent or continuous negative pressure can be administered at 50 mm Hg to 200 mm Hg, according to physician order and client comfort. The average is 125 mm Hg.
   a. Remove canister from sterile packaging, and push into V.A.C. unit until a click is heard. **Note:** An alarm will sound if the canister is not properly engaged.
   b. Connect the dressing tubing to the canister tubing. Make sure both clamps are open.
   c. Place V.A.C. unit on a level surface, or hang from the foot of the bed. Note: The V.A.C. unit will alarm and deactivate therapy if the unit is tilted beyond 45 degrees.
   d. Press in green-lit power button, and set pressure as ordered.

18. Inspect wound V.A.C. system to verify that negative pressure is achieved. *Rationale: Negative pressure is achieved when an airtight seal is achieved.*
   a. Verify that display screen reads: THERAPY ON.
   b. Be sure clamps are open and tubing is patent.
   c. Identify air leaks by listening with stethoscope or by moving hand around edges of wound while applying light pressure.
   d. If a leak is present, use strips of transparent film to patch areas around the edges of the wound.

**Evaluation**
1. Compare appearance of wound with previous assessment.
2. Ask client to rate pain using a scale of 0 to 10.
3. Verify airtight dressing seal and proper negative pressure.
4. Observe client or caregiver’s ability to perform dressing change.

**Unexpected Outcomes and Related Interventions**
1. Wound appears inflamed and tender, drainage has increased, and an odor is present.
2. Client reports increase in pain.
3. Negative pressure seal has broken.
4. Client or caregiver is unable to perform dressing change.
   a. Provide additional teaching and support.
   b. Obtain services of home care agency.

**Recording and Reporting**
1. Record appearance of wound, color, characteristics of any drainage, presence of wound healing augmentation, such as wound V.A.C., and response to dressing change.
2. Record date and time of dressing change on new dressing.
3. Report brisk, bright bleeding, evidence of poor wound healing, evisceration or dehiscence, and possible wound infection to physician.

**Sample Documentation**
1100 client and wife in wound clinic for V.A.C. dressing change. Wound on lower abdomen is pink, moist, and without edema in periwound region. Size decreased to 2 x 2.2 cm. Client states that there is less pain in wound area. Comfort achieved by 600 mg Motrin. Dressing is still changed every 48 hours. Wife correctly performed dressing change and activated wound V.A.C. to 125 mm Hg; continue with dressing changes every 48 hours.
**Special Considerations**

**Pediatric Considerations**
1. This wound application is not appropriate for fragile neonatal skin
2. Parents need to actively participate in wound V.A.C. treatment

**Geriatric Considerations**
1. Use skin care practices to protect periwound tissue.
2. Transparent film may be irritation to fragile skin. Skin protectant is one method to reduce the risk of tissue injury.
3. Visual impairment may prevent self-care and require home care services.

**Home Care Considerations**
1. When wound V.A.C. is used in the home, the client and caregiver may benefit from initial visits with home care agency to monitor initial treatment.
2. Provide information to family and caregiver regarding proper disposal of contaminated product.