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# Vacuum-Assisted Closure:

## State of the art treatment for wound bed preparation

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Delayed wound healing is a serious issue because it causes discomfort, morbidity, delayed therapy, and the need for extensive reconstructive surgery, all of which place a heavy social and financial cost on society. Every effort must be done to optimize the wound management includes the assessment of wound, wound bed preparation, dressing, and finally, the wound closure. Wound bed preparation is a process which aims to eliminate barriers on the wound surface which will allow healing to take place in an optimal time. As a moist environment is believed to accelerate healing, variety of dressing method from traditional (moist to dry gauze) to modern (foams, hydrofibers, crystalline sodium chloride, alginates, hydrocolloids, hydrogel) dressing are utilized depend on the characteristic of the wounded tissue. However, no single dressing meets all the requirements.[1,2]

Vacuum-assisted closure (VAC) is an alternate technique for managing wound, which uses negative pressure to get the wound ready for natural healing or simpler reconstructive measures. VAC is a technique for lowering air pressure around a wound in order to speed up healing. VAC is also known as NPWT (Negative Pressure Wound Therapy), MDWT (Microdeformational Wound Therapy), TNP (Topical Negative Pressure), SPD (Sub-atmospheric Pressure), VST (Vacuum Sealing Technique), or SSS (Sealed Surface Suction wound). It has transformed the way that many different types of wounds are treated during the past ten years. This negative pressure system's therapy employs a vacuum approach to set off a chain of biological events that will eventually hasten wound healing.[3]

Thorough debridement, proper hemostasis, and application of sterile foam dressing are all components of the VAC application technique. An open wound is covered with a foam bandage during a VAC operation and the foam is punctured with a fenestrated tube. The wound is airtight with adhesive tape. A vacuum pump creates negative pressure all around the wound. This indicates that the pressure above the wound is lower than the atmospheric pressure. The edges of the wound are pulled together by the pressure. The vacuum pump has a fluid collection container which is attached to the fenestrate tube. The device provides 50 to 125 mmHg of continuous or intermittent suction. On the third day, the VAC dressings are changed.[4]

The wound environment is stabilized, wound edema/bacterial load is decreased, tissue perfusion is improved, and granulation tissue and angiogenesis are stimulated by negative pressure therapy. All of this increases the likelihood that wounds will heal on their own and lessens the need for plastic surgery. Regarding the decrease of wound volume, depth, treatment time, and cost, VAC therapy appears to be easier and more efficient than standard dressings for the care of severe wounds.[5]

Technology comes with price. The technology-driven products contribute to the health care system's high costs, especially since this relatively new technology is still imported. It will put the hospital or patient into a financial burden, particularly in this pandemic situation. Orthopaedic Department of Sardjito General Hospital in collaboration with Faculty of Medicine, Public Health and Nursing Universitas Gadjah Mada created a portable VAC machine – RZ-VAC. This machine is expected to make it easier for patients to get routine wound care without having to put a big burden on the hospital because patients have to stay in the hospital for a long time.

**Figure 1. Application of VAC. A and B) Wound condition with large defect. C and D) Abdominal flap was performed to cover the skin defect. E) Sterile adhesive polyurethane film is attached carefully around the edge of the wound. The VAC system was**

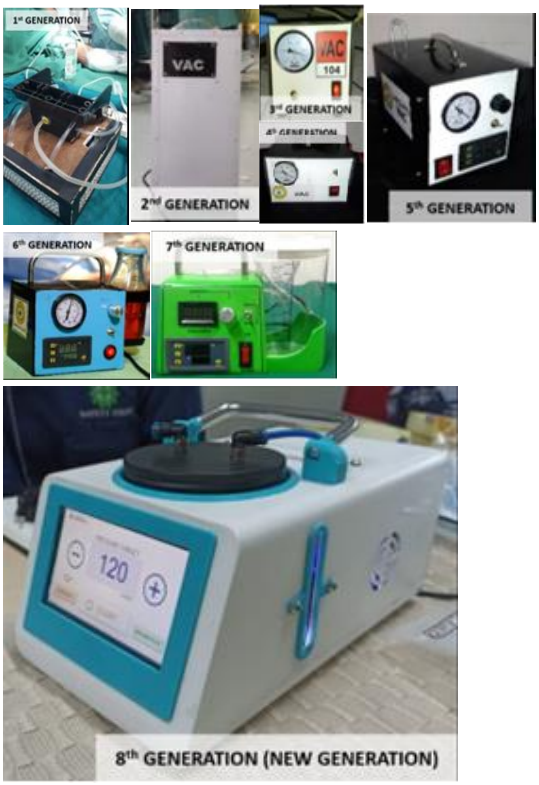


**Figure 2. RZ-VAC machine. First generation to the latest generation.**

This locally-made machine has developed to its current form and is utilized in our center to assist wound healing by preparing the wound bed with healthy and aseptic granulation tissue that will be readily managed by secondary closure by grafts or flaps. The latest (8th) generation is more compact, sturdier and sophisticated than the previous generation. With touchscreen technology, this machine is more user-friendly. Moreover, we can treat the wound individually with the availability of vacuum options (intermittent and continuous mode) and modified pressure settings. The battery is of utmost importance in this device which enables this machine to be used everywhere (portable).

The aim of developing this machine is to help manage the wound, reduce the hospital length of stay, lower the economic burden on the hospital and the patient, and finally, improve the national economy by using domestic products. It is also hoped that VAC treatment can be affordable for all levels of the population, especially the lower- and middle-class economy people.

## References


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