# Ultrasonic-Assisted Wound Treatment: A Novel Technique for Wound Debridement

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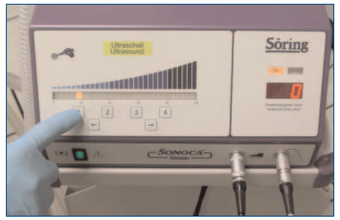
Soring Sonoca machine set-up




Monitor screen with settings for intensity and treatment timer

Infection control personal protective equipment for the practitioner. Fluid resistant gown, shoe covers, mask with shield or goggles, gloves and absorbent pads

## INTRODUCTION

Low-frequency ultrasonic wound treatment (UAW) is emerging as an alternative method for wound bed preparation and debridement. Current surgical and sharp debridement techniques are limited in their effectiveness due to incomplete removal of necrotic debris or overaggressive removal of viable tissue, as well as patient intolerance secondary to pain issues. Low-frequency ultrasound when applied to the wound bed via a wound treatment solution allows for deep tissue penetration of the solution, with associated micro-cavitiations causing bacterial destruction, as well as a gentle flushing of the wound cleansing it of fibrin deposits and bacterial growth. This debridement technique allows exceptional debridement of tunneling and undermining wounds via superior access to these tissues with custom sonotrode probes. In addition, UAW improves selective debridement by preserving granulation tissue and discriminating between tissue structures. Patients report less pain with UAW compared to mechanical procedures. Ultrasonic wound treatments can be performed at bedside without sedation and in some cases, prevent costly surgical intervention. We introduce this revolutionary wound care technology and demonstrate the debridement technique.

## TECHNIQUE

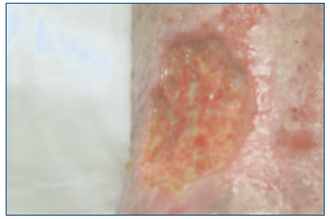
Debridement plays an essential role in the wound healing process. By reducing the bioburden of the wound, debridement aids in controlling and potentially preventing wound infection. Current methods of debridement include enzymatic, mechanical, autolytic, and sharp debridement. Surgical and sharp debridement is often limited in effectiveness due to incomplete removal of necrotic debris, over aggressive removal of viable tissue, patient intolerance, and or the need for anesthesia/ analgesia.

Over 70 years ago the interaction between high frequency sound waves (ultrasonic) and living tissue was first researched. Ultrasound has since been utilized to treat a wide variety of disorders from injured tendons to malignant tumors. Many research studies have demonstrated positive physiologic effects of ultrasound on living tissue. Some of the documented results of ultrasound treatments include earlier resolution of inflammation, accelerated fibrinolysis, stimulation of macrophages and fibroblast recruitment, accelerated angiogenesis, increased matrix synthesis, creation of dense collagen fibrils, and increased tissue tensile strength.

Low frequency ultrasonic wound treatment (UAW) is now emerging as an alternative method for wound bed preparation and debridement. When applied to the wound bed via a wound treatment solution, (coupling medium), ultrasound produces deep tissue penetration of the solution. The fibrinolytic properties cleave the necrotic slough and biofilm from the underlying viable tissue without removing healthy tissue. The design of the sonotrodes provides the practitioner with the ideal tool to debride in areas of undermining and tunneling.

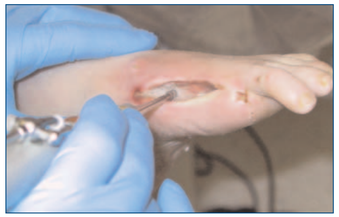
## CONCLUSION

Low frequency ultrasonic wound treatment is an advanced technology that is rapidly gaining acceptance as an alternative method to surgical and sharp debridement techniques. The benefits of this technology include selective tissue debridement with preservation of granulation tissue, exceptional access to tunneling and undermining wounds, micro-cavitations causing bacterial destruction, improved patient satisfaction due to decreased pain and cost effectiveness related to decreased requirement for invasive surgical procedures. This advanced wound care technology has the potential to revolutionize wound care practice by enhancing clinical outcomes while maintaining cost efficiency.



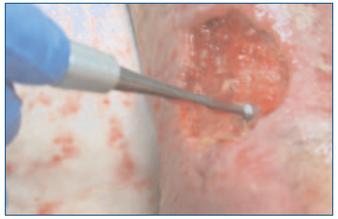
Pre-debridement, note adherent fibrin, biofilm and necrotic tissue interspersed with granulation tissue. Sharp debridement is unable to discriminate and healthy tissue may be removed with the detritus.

Ultrasound conduction/interface liquid is the irrigation solution which provides gentle cleansing, cooling, and in some cases topical antibacterial action. Drip rate is set from the probe to wet the surface and provide a constant slow flow or fill a cavity.

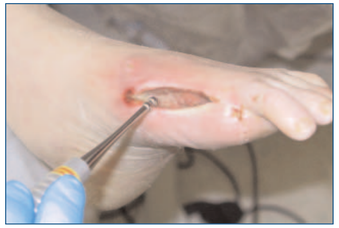


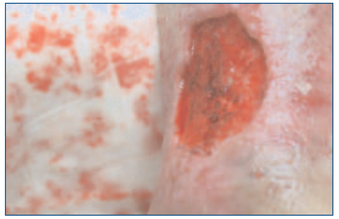
The probe is activated at the desired intensity and powered by using the foot pedal. Treatment is timed. Moving the probe across the wound bed slowly and steadily elimi-nates the chance for "hot spots" and allows for penetration into peri-wound tissue.

The ultrasound waves create agitation or effervescence of the coupling medium as it separates the nonviable proteinaceous material from the wound base. Splashing and aerosolization may occur.



Ultrasound penetrates into the tissue surrounding the wound increasing absorption of the topical antibiotic, stimulating angiogenesis, fibrinolysis, and collagen fibril formation. By passing the probe along the wound edges wound contraction is stimulated.





Post-debridement. Note the increase in granulation tissue evident in the wound base.

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