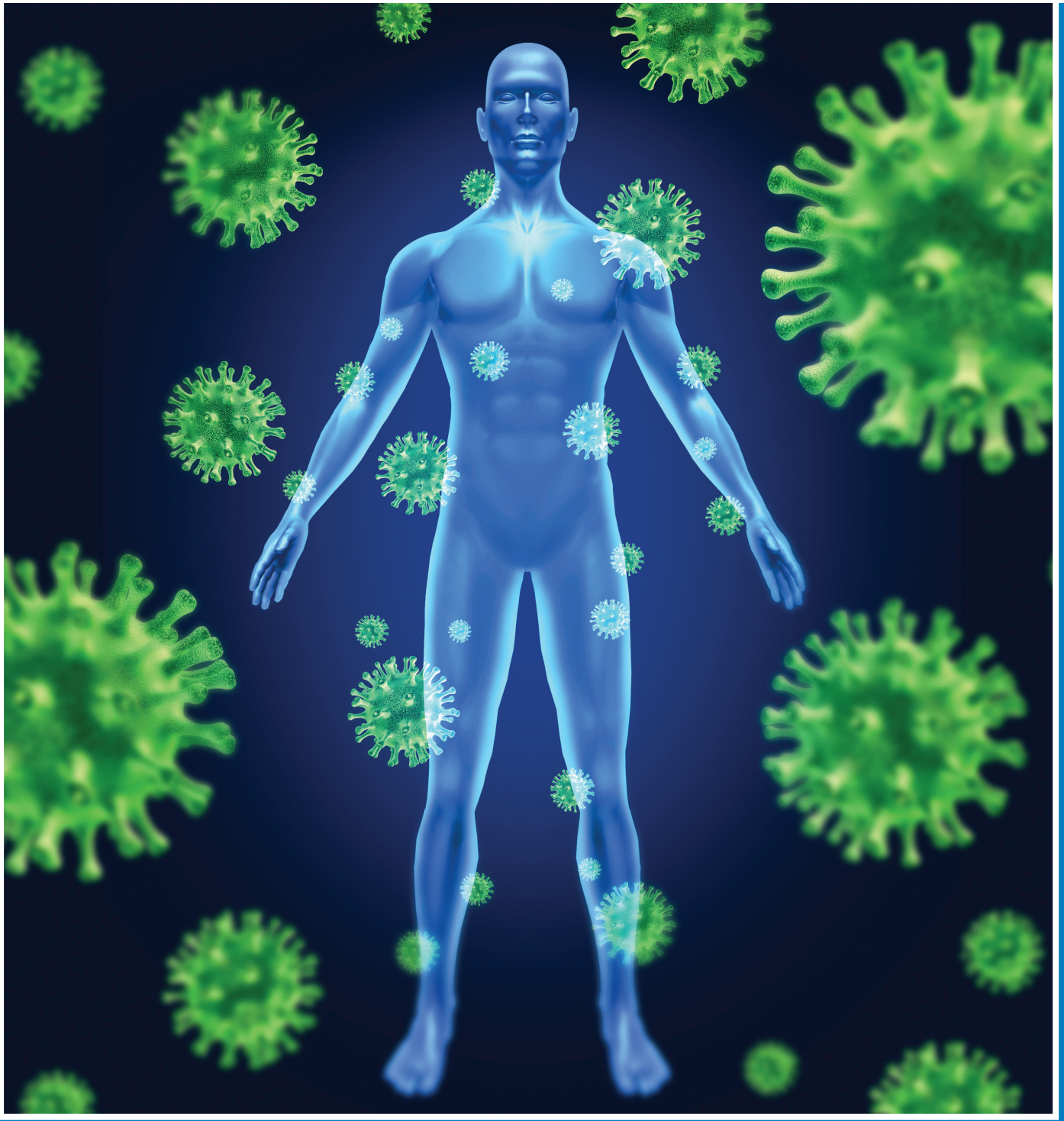
A QUARTERLY REVIEW OF CLINICAL ISSUES FOR THE MANAGEMENT OF INFECTED WOUNDS

Volume, 1 • Issue 1 • Q1, 2013

INFECTED WOUNDS



IN THIS ISSUE:

FOCUS ON
INFECTED WOUNDS
VOLUME 1 • ISSUE 1 • Q1 2013

EDITOR

Mark O'Driscoll
MD, FRCS(C), LMCC, BMS, BEng, BEd, BSc
Clinical Assistant Professor of Surgery
Staff General Surgeon
Central Newfoundland Regional Health Care Center
Grand Falls-Windsor, NL

Nicole Pitcher, BScN, RN, ET
Wound Care Consultant
Central Newfoundland Regional Health Care Center
Grand Falls-Windsor, NL

Editor's Corner

Welcome to the inaugural issue of ***Focus on Infected Wounds***. Each issue addresses clinical challenges in management of infected wounds. ***Literature Review*** presents a paper of interest to the wound care clinician with an expert commentary. ***Controversies*** in wound care addresses a problematic issue on which consensus does not exist. ***Technical Tip*** provides a practical approach to a clinical problem, and Clinical case presents a challenging patient, plus the editor's commentary. ***Wound Care News*** includes an update of conferences and other topics of interests. Finally, ***Featured Products*** profiles a product of interest to wound care clinicians. We hope this publication provides you with practical and valuable information to help you manage infected wounds.

Literature Review

Silver: What's the evidence?

Vermeulen H, van Hattem JM, Storm-Versloot MN, Ubbink DT. Topical silver for treating infected wounds. Cochrane Database Syst Rev. 2007 Jan 24;(1):CD005486.

Background Background Topical silver treatments and silver dressings are increasingly used for the local treatment of contaminated or infected wounds, however, there is a lack of clarity regarding the evidence for their effectiveness.

Objectives To evaluate the effects on wound healing of topical silver and silver dressings in the treatment of contaminated and infected acute or chronic wounds.

Search strategy We sought relevant trials from the Cochrane Central Register of Controlled Trials (CENTRAL), the Cochrane Wounds Group Specialised Register in March 2006 and in MEDLINE, EMBASE, CINAHL, and digital dissertations databases up to September 2006. In addition, we contacted companies, manufacturers and distributors for information to identify relevant trials.

Selection criteria Randomised controlled trials (RCTs) assessing the effectiveness of topical silver in the treatment of contaminated and infected acute or chronic wounds.

Data collection and analysis Eligibility of trials, assessment of trial quality and data extraction were undertaken by two authors independently. Disagreements were referred to a third author.

Main results Three RCTs were identified, comprising a total of 847 participants. One trial compared silver-containing foam (Contreet) with hydrocellular foam (Allevyn) in patients with leg ulcers. The second trial compared a silver-containing alginate (Silvercel) with an alginate alone (Algosteril). The third trial compared a silver-containing foam dressing (Contreet)) with best local practice in patients with chronic wounds. The data from these trials show that silver-containing foam dressings did not significantly increase complete ulcer healing as compared with standard foam dressings or best local practice after up to four weeks of follow-up, although a greater reduction of ulcer size was observed with the silver-containing foam. The use of antibiotics was assessed in two trials, but no significant differences were found. Data on pain, patient satisfaction, length of hospital stay, and costs were limited and showed no differences. Leakage occurred significantly less frequently in patients with leg ulcers and chronic wounds treated with a silver dressing than with a standard foam dressing or best local practice in one trial.

Author's conclusions Only three trials with a short follow-up duration were found. There is insufficient evidence to recommend the use of silver-containing dressings or topical agents for treatment of infected or contaminated chronic wounds.

Commentary

By Dr. Mark O'Driscoll

The use of topical antimicrobials in the management of complicated wounds has been an ongoing bone of contention amongst physicians who manage such wounds. These wounds, whether they be diabetic ulcers, venous stasis ulcers or wounds in patients who have compromised immune systems are at best times difficult to manage.

Within the hoi polloi of community based physicians, there is an ongoing struggle against old habits and the necessity of justifying the use of these topical agents in the face of inconclusive evidence in the paucity of clinical trials that are available to guide use.

For millennia physicians have been using a broad variety of topical agents in an effort to prevent sepsis of the patient and aid healing; this in the form of various chemicals or even the use of home remedies such a poultices.

One such topical agent that has survived the test of time, if nothing else, has been the use of silver. Its history of use is documented quite nicely within the article provided.

Many of us still use silver in the management of hypergranulation tissue. The use of silver nitrate matches is common place. Silver is also quite commonly used in the management of burns. Until recent times gone by, silver nitrate was often administered to the eyes of neonates in an effort to prevent chlamydial infection or gonorrhea of neonatal eyes.

The use of silver in chronic wounds has taken the form of silver impregnated dressings of late versus the use of pastes or slurries of silver itself. The silver compounds, whether they are metallic, nanocrystalline or ionic, have fairly significant bactericidal spectrum and enjoy the role as topical antiseptic. Its mechanism action is several in that it damages cell walls and membranes and affects respiratory enzymes and ribonucleoproteins within the cells themselves. The silver ions however are rapidly inactivated in the environment of a wound. These dressings must be changed frequently or provided in a form that sustains delivery. This is the thrust of newer silver impregnated dressings.

Efficacy against MRSA and VRE has been documented and also with beta lactamase producing bacteria. There has been reported incidents of resistance particularly in gram negative species but these are rare. There is some suggestion that silver may be active against biofilms produced by bacteria within a wound. Adverse effects to the host tissue are infrequent.

Silver nitrate has been used in either solution or ointment forms or in the form of swabs or matches. Solutions from 0.5 percent to 50 percent have been used and likewise 10 percent ointments, swabs varying between 25 – 50 percent silver nitrate concentrations. There has also been a variety of silver dressings approved for use with different properties. Although the solutions, ointments and matchsticks are relatively inexpensive and thus often overused, there is considerably more cost involved when dressings are made to provide sustained levels of active silver ions.

Currently there is a dearth of clinical trials available designed to show the efficacy of using silver in the management of chronic wounds.

The 2007 Cochrane Review provided for review produced equivocal results in showing any superior efficacy of the silver based dressings versus the non-silver based dressings to which they were compared. These trials are relatively short lived at under four weeks. None of these trials were blinded and their endpoints were not the same.

Part of the problem of the designing of the adequate trials is the confusion around what constitutes a chronic wound and definitions of whether a wound is infected or simply colonized.

Chronic wound management is becoming an important part of clinical practice as our population grows older and we see chronic wounds that develop in this population who suffer from various diseases that preclude patients to the development of chronic wounds. Until such time as appropriate trials are forthcoming then the use of topical silver dressings will be at the discretion of the attending physician. I do believe that silver has its role in many applications and will continue to have a role; however proving this opinion may take some time while the appropriate studies are undertaken. Part of the problem will be lining up silver against the myriad of other topical dressings that are available for use in the world of medicine today.

Controversies in Wound Care

Funding appropriate outpatient wound care

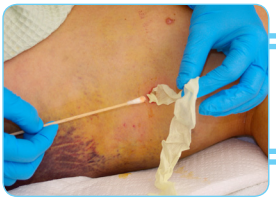
By Dr. Mark O'Driscoll

With the current financial state of affairs in many jurisdictions in Canada, there is a push to minimize hospital stays for acute care patients. In many hospitals, chronic care patients awaiting placement in long-term care facilities are occupying the majority of acute care beds. This situation has produced urgency in determining which complicated wound patients can possibly be discharged home safely with appropriate community care. Of late, many patients with postoperative surgical wounds that have developed complications are being managed as outpatients. Not that long ago, these patients would have spent considerably more time in the hospital. The same can be said for people with non-surgical wounds that require aggressive management by a surgeon.

Within the burgeoning armamentarium of wound care products negative pressure

wound therapy (NPWT) is emerging as a safe, fast, and comparatively inexpensive management modality for wound complications. Its portability allows patients to leave hospital with the expectation that the wound will be managed appropriately and wound healing will continue in the outpatient setting. The use of portable NPWT units has made this treatment approach attractive. Of course, there is a learning curve for the community nurse, but in reality the curve is short. As dressings only need to be changed every second day, less travel is involved for the patient being cared for in a community clinic or for the homecare nurse. The light weight of these units means that patients experience little interference with their daily activities. Infected wounds may also heal faster with instillation of appropriate antimicrobial solutions. It is also important to consider other treatment modalities, as not every wound is optimally managed with NPWT. Various topical agents and dressings are often more acceptable and offer excellent alternatives.

For outpatient care to be maximally beneficial to the patient, a concerted effort needs to be undertaken to ensure that wound care is appropriate both in type and timing. Unfortunately, this is not always the case as home care is at best a misnomer, essentially being available from 8:00 AM to 4:00 PM with sparse coverage over weekends. Of course, there are exceptions. The controversy arises when community care is not adequately funded to accommodate the explosion in the number of wounds being managed in the outpatient setting. Funding for these wounds stays in the hospital budget where it was originally allocated at a time when acute care bed space was not an issue. Community care and hospital managers need to ensure a smooth transfer of patient care from hospital to community. Otherwise outpatient wound management cannot meet the patient's needs for quality care and continued wound healing.



Wound Care Corner

By Nicole Pitcher

A common issue related to the treatment of infected wounds involves the breakdown of periwound skin. Periwound skin breakdown, as evidenced by erythema and erosion is often due to the type and amount of effluent or drainage noted from the wound. These fluids can be very harsh to the intact skin that surrounds the wound. This breakdown can lead to issues with adherence of dressings, reports of pain from the patient, delayed healing time and wound deterioration.

Appropriate treatment of infected wounds should not be delayed due to periwound skin breakdown. Accessibility to an extensive selection of wound care products such as barrier films (cavilon barrier, allkare barrier), hydrocolloids (duoderm extra thin, restore thin) and cohesive barrier seals (eakin seal, adapt rings) can assist with dressing adherence, reduction of pain and improve overall healing time.

Often issues are noted with conventional dressing adherence when periwound skin breakdown is noted.

The use of hydrocolloids on periwound skin is an effective way to prevent breakdown but is of little benefit when skin is already reddened and eroded. Cohesive skin barriers (such as Eakin seal) that are traditionally used for stomal issues can be placed directly on periwound skin that is compromised. These skin barriers have been shown to allow skin to heal and does not cause discomfort to patients. The skin barriers can be placed around the wound and can be extended to all broken down areas; following the placement of the skin barriers the conventional dressing and /or VAC dressings can be completed as per product guidelines. This skin barrier can be left in place

Wound Care News

The 19th Annual Canadian Association of Wound Care Conference
November 7–10, 2013 in Vancouver, BC

American Professional Wound Care Association (APWCA) National Conference 2013
April 4–7, 2013 in Orlando, FL.

European Wound Management Association: May 15–17, Copenhagen, Denmark, in cooperation with the Danish Wound Healing Society (DSFS)

Symposium on Advanced Wound Care (SAWC) – Fall
September 27–29, 2013 in Las Vegas, NV.

28th Annual Clinical Symposium on Advances in Skin & Wound Care:
The Conference for Prevention and Healing: October 24–27, 2013 in Orlando, FL.

with subsequent dressing changes, limiting skin stripping to this area. Use of Stomahesive powders directly on the periwound skin assist with absorption of moisture, increases skin barrier wear time and prevention of skin irritation.

Application of NPWT in large, heavily exudating wounds can be a cost effective treatment when taking into account healing time, frequency of dressing changes and potential reductions in nursing time. Decreasing the frequency of dressing changes through the NPWT dressing schedule (dressing changes 3 times per week as opposed to 1 to 3 times daily) can assist with the management of periwound skin breakdown by limiting skin stripping from dressing application and removal. In addition, adequate wound exudate management will be achieved by using this treatment modality, therefore limiting the amount of exudate sitting on the periwound skin.

Although infection is an important factor when determining dressing selection, it is only one of the many considerations when treating complex wounds.

Technical Tip

Management of a draining wound with undermining

By Dr. Mark O'Driscoll

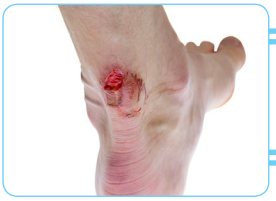
It is not unusual for one to be faced with small dehiscences of wounds, particularly in the midline, post laparotomy. One can be faced with a single opening that has undermining cranially and caudally. Another not uncommon scenario would be two small openings, some distance from each other, with undermining connecting the two openings.

These wounds are fairly difficult to manage through small openings and often times these openings have to be lengthened to allow adequate access to the undermined areas.

If the undermining is in a dependent part of the wound, a counter incision is often required to allow adequate drainage of the wound. I try and determine which position the patient will be in for the foreseeable future to determine where dependency will be most often. If the patient is adequately ambulatory then I choose the incision caudally so that when they stand wound drainage comes through the counter incision. If the patient is bedbound then I choose to make my incisions as laterally as possible to allow for appropriate drainage of the undermined area.

The small openings can be made larger to accommodate a negative pressure wound therapy device. If using the VAC Ulta system the use of white foam for the undermined area is appropriate as the foam will stay in one piece and will not break off and leave foreign materials in the wound bed. The use of black or grey foam could result in pieces of foam breaking off and staying in as a foreign body.

I generally find that when faced with a scenario of two openings with a long area of undermining, that incorporating the two openings into a single incision will often speed healing. The wound is opened and I generally apply a negative pressure wound therapy device to speed healing. Making the wounds bigger to speed healing is counter-intuitive but it works.



Clinical Case

Diabetic calf abscess with Achilles tendon excision

By Dr. Mark O'Driscoll

Patient: 76-year-old male with hypertensoin, peripheral vascular disease, type 1 diabetes, coronary artery disease, mitral insufficiency and decreassed vision. Surgical history: coronary artery bypass graft, right foot toe amputations, femoral-popliteal bypass, and skin graft.

Diagnosis: Patient presented with severe leg infection with abscess and subsequent breakdown of left heel. Would cultured positive for Alpha-hemolytic *Streptococcus*, vancomycin-resistant enterococcus (VRE), *Enterococcus faecium*, methicillin-resistant *Staphylococcus aureus* (MRSA) and *Proteus mirabilis*. Osteomyelitis was present and a partial calcanectomy was performed to remove the infected bone prior to placement of a V.A.C.Ulta™ Negative Pressure Wound Therapy System.

Prior wound treatments: The ulcer was part of a significantly larger ulcer extending up the calf, most of which had been closed. V.A.C.® Therapy had been instrumental in closing the majority

of the large ulcer, but a small part did not respond. Other therapies were incorporated to treat this wound included the following:

- Outpatient intravenous antibiotic therapy with vancomycin, imipenem, and cilastatin
- Split-thickness skin graft
- Pulsed lavage daily with silvadene and gauze
- Pressure-relieving device on the heel

V.A.C.Ulta™ Negative Pressure Wound Therapy System placement: This system was prescribed primarily for its ability to provide localized negative pressure and to irrigate the wound with silver nitrate, 0.5%, for antimicrobial cleansing. The wound had already responded to V.A.C.® Therapy, but it had not responded to antibiotic therapy at home. Primary goals of the therapy were to treat infection, remove exudate, and stimulate granulation to prepare for a skin graft closure.

DAY 1: Following surgical debridement of tissue and bone, the V.A.C.Ulta™ Negative Pressure Wound Therapy System was initiated. For the first 15 days of therapy, the unit was set to deliver silver nitrate, 0.5%, with 1000 mL of sterile water over 30 seconds, allow 3 minutes of dwell time and then deliver 6 hours of negative pressure set at 125 mm Hg. The V.A.C.® Granufoam™ dressing was used.

DAY 12: The wound was free of clinical infection. The bone was covered by granulation tissue and the wound dimensions decreased.

DAY 16: The instillation solution was changed to normal saline with 5 million units of polymyxin and 50,000 units of bacitracin to treat bacterial colonization per physician order. All other settings remained the same.

DAY 19: Wound dimensions decreased dramatically.

DAY 23: V.A.C.Ulta™ Negative Pressure Wound Therapy System was discontinued and the wound was subsequently grafted with 100% take and subsequent re-epithelialization.

TABLE: WOUND AND THERAPY SUMMARY

	DAY 1 Excision and V.A.C.Ulta™ placement	**DAY 3** Dressing Change	**DAY 12** Dressing Change	**DAY 19** Dressing Change Debridement	**DAY 23** Split-thickness Skin Graft
Organisms Present	*Enterococcus, E. faecium*, VRE, MRSA, *Staphyloccus, Sreptococcus, Proteus mirabilis*	*Staphyloccus, Sreptococcus, Proteus mirabilis*	Free of clinical infection	Free of clinical infection	Free of clinical infection
Wound Length	5.0 cm	4.5 cm	4.0 cm	3.5 cm	3.2 cm
Wound Depth	1.0 cm	1.0 cm	1.0 cm	0.75 cm	0.6 cm
Wound Width	5.0 cm	4.5 cm	3.7 cm	4.2 cm	4.2 cm
Granulation	Slight, no granulation over bone	Minimal, no granulation over bone	Medium, granulation over bone	Increased	Increased
Exudate	Serosanginous	Serosanginous	Serosanginous	Serosanginous	Serosanginous
Necrotic Tissue	None	None	None	None	None
Wound Colour	Pinkish red	Pinkish red	Pinkish red	Reddish pink	Reddish pink
Periwound Colour	Medial maceration	Medial maceration	Medial maceration	Medial maceration	Medial maceration
Undermining	1.5 cm centre 1.0 cm medial and lateral	1.4 cm centre 1.0 cm medial 0.5 cm medial	1.4 cm centre 0.5 cm lateral 0.5 cm lateral	None	None

MRSA: methicillin-resistant Staphylococcus aureus VRE: vancomycin-resistant Enterococcus

Commentary

This case is complicated but not unusual in the elderly population with multiple comorbid disease processes. This patient has peripheral vascular disease, most likely on the background of his diabetes. As the femoral-popliteal bypass has not significantly reduced the distal circulatory complications, a microvascular problem is most likely. One must wonder whether the left heel problem didn't evolve from a pressure sore, as the patient was likely relatively immobile after the right toe amputations. The left heel wound is complicated by the presence of multiple-drug-resistant bacteria, specifically VRE and MRSA.

The patient needs the benefit of a hospital with multiple surgical services, given the involvement of general surgery, vascular surgery, likely orthopedic surgery, and plastic surgery. This wound would be a very difficult case to manage in a community hospital.

The application of the V.A.C.Ulta™ Negative Pressure Wound Therapy System with antibiotic infusion is a bit delayed in my opinion. My solution of choice would have been gentamicin, 160 mg in 500 mL of saline. Serum levels at this concentration are undetectable. The local concentration, however, is high and can adequately control bacterial growth and odour. As serum levels are too low to measure, it is safe to exceed the minimum inhibitory concentration; the gentamicin will likely kill all bacteria present. This approach has a similar rationale to washing the abdomen with an antibiotic solution, which eradicates all the bacteria, whether they are Gram positive, Gram negative, aerobic, or anaerobic. The gentamicin solution has a bedside

lifetime of approximately 3 days; thus each batch should last two dressing changes.

The patient has also had an Achilles tendon excision, so his use of the left leg is questionable. He is likely headed for long-term care. In my hospital he would have been offered a below-the-knee amputation or even above-the-knee amputation, as he is bound to have recurrent foot ulcers and problems given the medical history and advanced age. Foot care by a qualified nurse or podiatrist would be integral to long- term management should he choose not to have an amputation.

Featured Product

V.A.C.Ulta™ Negative Pressure Wound Therapy System

The V.A.C.Ulta™ Therapy System is an integrated wound management system that provides both V.A.C.® Therapy (NPWT using V.A.C.® GranuFoam™ or V.A.C.® WhiteFoam Dressings) and V.A.C. VeraFlo™ Therapy (NPWTi using V.A.C. VeraFlo™ or V.A.C. VeraFlo Cleanse™ Dressings).

- V.A.C.® Therapy is the form of NPWT that uses a hydrophobic reticulated open cell foam under subatmospheric pressure to promote wound healing. It is indicated for patients with chronic, acute, traumatic, subacute and dehisced wounds, partial-thickness burns, ulcers (such as diabetic, pressure, and venous insufficiency), flaps and grafts.
- V.A.C. VeraFlo™ Therapy consists of NPWT coupled with automated, controlled delivery to and removal of topical wound treatment solutions from the wound bed. The soak time and automated volumetric delivery differentiate V.A.C. VeraFlo™ Therapy from other commercially available instillation systems that either provide instillation solutions under continuous flow (without a soak time) or use gravity to instill solution into the wound. V.A.C. VeraFlo™ Therapy is also unique in that it uses dressings specifically designed for instillation therapy with NPWT. The dressings are less hydrophobic than the current V.A.C.® Therapy Dressings and provide improved fluid distribution within, and removal from, the wound bed.

The V.A.C.Ulta™ System is designed to provide therapeutic options that can be customized for different wound care needs. The user can select the appropriate topical wound solution needed for each wound to be treated (such as normal saline or wound irrigation solutions and cleansers) as well as adjust the instillation fill volume and soak time. NPWT parameters, such as negative pressure settings, mode of applying negative pressure [continuously or intermittently (called Dynamic Pressure Control™)], and duration of negative pressure therapy between instillation cycles, can also be customized.

More importantly, the system can potentially be used for a variety of indicated wound types (Table 1). Because these are open wounds, it is not uncommon for them to become contaminated or infected. Such wounds may benefit from removal of infectious materials and controlled instillation of topical wound cleansers, topical antimicrobial or antiseptic solutions.

Wounds differ not only in size and shape, but also in amount of exudate, edema, and presence of inflammatory mediators, pathogens, or physical contaminants. Wound severity and comorbidities of the host (e.g., immunocompromised, malnourished, poor perfusion, smoking, chronic medical conditions, and advanced age) also influence wound healing. All of these factors influence the healing rate and should be considered in selecting optimal wound therapy for each patient. V.A.C.Ulta™ Therapy can be a helpful tool in managing a wide variety of wounds through application of V.A.C.® Therapy and/or V.A.C. VeraFlo™ Instillation Therapy (Table 1).

TABLE 1. INDICATED WOUND TYPES

Indicated Open Wound Types	Factors That May Compromise Healing	Benefits of V.A.C. VeraFlo™ Therapy
Acute, traumatic	Contamination or infection	Instillation of topical wound cleansers and topical antimicrobial or antiseptic solutions
Dehisced	Susceptible host (poor immune system)	Removal of infectious material
Chronic	Comorbidities (e.g., diabetes and smoking may affect patient's ability to fight bacteria and heal)	Controlled, protected environment for flushing and cleansing wounds
Pressure ulcers	Edema	Protection from external contamination sources
Diabetic foot ulcers	Resistant bacteria	
Venous ulcers	Poor hygiene or wound care	

Source: V.A.C.Ulta™ Negative Pressure Wound Therapy System Monograph. KCI 2012.

This publication is made possible by an unrestricted educational grant from KCI Medical Canada.