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Wound Care



CANADA

THE OFFICIAL PUBLICATION OF THE CANADIAN ASSOCIATION OF WOUND CARE

DEBRIDING AND REDUCING
LOCAL WOUND INFECTION
WITH MAGGOTS

ASSESSING HYPERGLYCEMIA
IN INDIVIDUALS WITH WOUNDS

ACINETOBACTER INFECTIONS IN
WOUNDED SOLDIERS: IMPLICATIONS
FOR CANADIAN HOSPITALS

DETECTING INFECTION
IN THE DIABETIC FOOT



**Deep Tissue Injury:
What, Why
and When?**

Canadian Association
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Association canadienne
du soin des plaies



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Recognizing Infection



Sue Rosenthal

In keeping with our mandate to provide readers with articles that are relevant to the most important areas of concern within their scope of practice, this issue of *Wound Care Canada* is centred around the theme of infection prevention and control—specifically recognizing infection.

This recognition comes in several forms: (1) Recognizing the risk for infection that different patients face and mitigating the factors that place them at risk. Dietitian Chris Fraser's article on hyperglycemia in individuals with wounds provides detailed background information on why individuals with elevated

blood glucose levels have increased risk for developing infection. (2) Recognizing infection when you see it. The enabler developed by Kyle Goettl and Stephan Landis is a handy reminder that infection in patients with diabetes is sometimes difficult to recognize because it may present with diabetes-specific symptoms. (3) Recognizing trends in the development of infection so practice change can be implemented at all stages of patient care. The article by Edie Attrell and Pamela Armstrong demonstrates how a research study revealed gaps that, when filled, identify infection rates in home care.

Other infection-related articles in this issue range from the interview with Stacey Linger, an infection prevention and control officer, through to an article from our Canadian Forces' colleagues outlining the implications for Canadian hospitals that treat wounded soldiers returning from Afghanistan with *Acinetobacter* infections. The Future Watch feature is also infection-related. Rounding out the issue are articles on other topics of interest that I'm sure you'll find useful and applicable to your day-to-day practice. ☺

Sue Rosenthal,
Editor

Savoir reconnaître l'infection

Dans le but de respecter notre mandat face à nos lecteurs, la présentation d'articles pertinents sur des sujets qui les concernent dans leur champ de pratique, ce numéro de *Wound Care Canada* se penche sur le thème de la prévention et du contrôle de l'infection – spécifiquement reconnaître l'infection.

Il y a plusieurs manières de reconnaître l'infection : (1) Savoir identifier les populations de patients à risque de développer une infection et contrôler les facteurs qui les menacent. La diététiste Chris Fraser présente un article détaillé sur l'hyperglycémie expliquant la relation entre l'hyperglycémie, les plaies et le risque

accru de développer une infection pour ces patients. (2) Savoir reconnaître la présence de l'infection. Kyle Goettl et Stephan Landis ont développé un outil qui nous rappelle la difficulté d'identifier l'infection des plaies chez les diabétiques parce que l'infection peut se présenter avec des symptômes spécifiques au diabète. (3) Savoir changer la pratique à tous les stades des soins aux patients en considérant que le développement de l'infection peut provenir de source insolite. Edie Attrell et Pamela Armstrong démontrent qu'une étude de recherche a révélé des lacunes qui, lorsque comblées, identifiaient les taux d'infection dans les soins à domicile.

Dans ce numéro d'autres articles sur l'infection vont d'une entrevue avec Stacey Linger, un officier de prévention et de contrôle de l'infection, à un article de nos collègues des Forces armées canadiennes exposant les implications des hôpitaux canadiens avec les soldats revenant de l'Afghanistan blessés et infectés par *Acinetobacter*. La section Future Watch porte aussi sur l'infection. Pour compléter le numéro, il y a des articles sur d'autres sujets d'intérêt qui, j'en suis certaine, vous seront utiles et applicables dans votre pratique de tous les jours. ☺

La rédactrice,
Sue Rosenthal

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The Canadian Association of Wound Care is a non-profit organization of health-care professionals, industry participants, patients and caregivers dedicated to the advancement of wound care in Canada.

The CAWC was formed in 1995, and its official meeting is the CAWC annual conference held in Canada each year. The association's efforts are focused on five key areas: public policy, clinical practice, education, research and connecting with the international wound-care community. The CAWC works to significantly improve patient care, clinical outcomes and the professional satisfaction of wound-care clinicians.

L'Association canadienne du soin des plaies est un organisme sans but lucratif regroupant des professionnels de la santé, des gens de l'industrie, des patients et des membres du personnel soignant fortement intéressés à l'avancement des connaissances pour le soin des plaies au Canada.

Fondée en 1995, l'ACSP organise, chaque année, au Canada, un congrès qui lui tient lieu de réunion officielle, le Congrès annuel de l'ACSP. L'association consacre ses efforts dans cinq domaines particuliers : les politiques gouvernementales, la pratique clinique, la formation, la recherche et la création de liens avec la communauté internationale directement impliquée dans le soin des plaies. L'Association canadienne du soin des plaies vise une amélioration significative du soin donné au patient, des résultats cliniques et de la satisfaction professionnelle des spécialistes en soin des plaies.

CLINICAL PRACTICE



Deep Tissue Injury:
What, Why and When?10

Acinetobacter Infections in Wounded Soldiers:
Implications for Canadian Hospitals16

Nutrition and Wound Care:
The Importance of Investigating the Presence of Hyperglycemia in Individuals with Wounds20

Something Old is New Again:
Debriding and Reducing Local Wound Infection with Maggots22



Pulling Back the Mask:
Detecting Infection in the Diabetic Foot28

EDUCATION

Black Holes on the Web:
Avoiding the Pitfalls of Online Misinformation30

Time Management:
A Health-care Perspective36

RESEARCH

Surgical Site Infection Surveillance Program in a Home-care Setting44

How to Critically Evaluate a Poster:
A Guide to Analyzing Poster Presentations.....50

Nursing Informatics:
A Valuable New Tool for Nursing in Canada52

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Dressings Destined for Disposal Support Wound Care Centre in Mexico54



Departments



Editor's Message

Recognizing Infection/

Savoir reconnaître l'infection3

News in Wound Care

Upcoming Events and Wound-care-related News8

Puzzling Cases

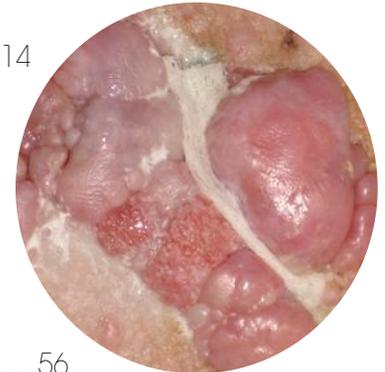
Wound Sleuth14

Interview

Infection and Wound Care:

A Critical Role for

Prevention and Control42



CAWC News

The Latest Association News56

Future Watch

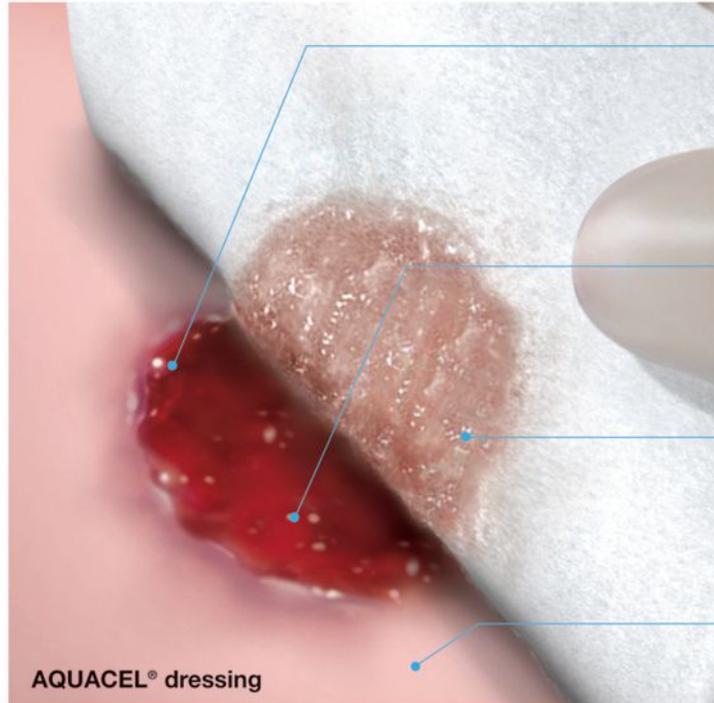
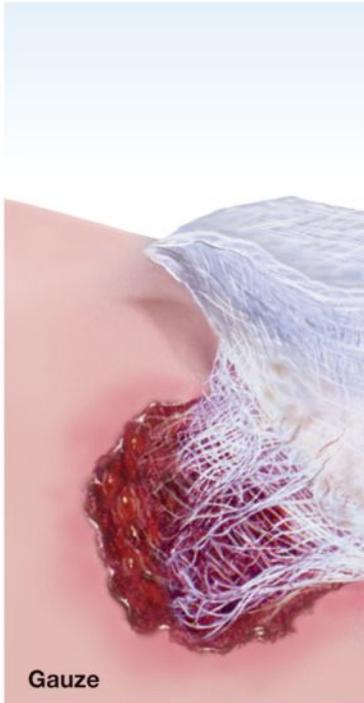
Nitric Oxide: Biofilms Beware!.....60



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CAWC Events

**"Do You Measure Up?
Assessing and
Measuring Outcomes"**

**Thirteenth Annual
Conference of the
Canadian Association
of Wound Care**

November 1–4, 2007
London Convention Centre
London, ON
www.cawc.net

Other Events

**Premier Congrès international
de stomathérapie pédiatrique /
First International Pediatric
Enterostomal Therapy Congress**

October 1–3, 2007
Montreal, QC
Information: Louise Forest-Lalande
(forest.lalande@sympatico.ca)

**The World Union
of Wound Healing**

June 4–8, 2008
Toronto Convention Centre
Toronto, ON
www.wuwhs2008.ca

News

**Venous Leg Ulcers ...
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**Smith & Nephew
Announces Acquisition**

In May 2007, Smith & Nephew announced its acquisition of the BlueSky Medical Group and now adds negative pressure wound therapy (NPWT) to its complete line of wound-care products, strengthening its leadership position in wound care. NPWT is a technology used to treat chronic wounds such as diabetic ulcers, pressure sores, and post-operative and hard-to-heal wounds. NPWT aids the more rapid healing of wounds by the application of sub-atmospheric pressure to an open wound. Smith & Nephew looks forward

to adding the BlueSky range of negative pressure pumps and wound dressing kits to its customer solutions for hard-to-heal wounds.

**New Coloplast Critic-Aid
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For the treatment of perineal skin injury, Coloplast announces the launch of a breakthrough clear barrier for incontinent patients. The difficulty of finding a clear barrier that combines both adhesion to denuded skin and effective protection against moisture has been addressed with the new clear moisture barrier. Critic-Aid Clear has a transparent formulation, allowing clinicians to inspect the skin without having to remove the product.

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Advanced Health Care (AHC) continues to improve its wound-care product offering to better service our clients. AHC recently introduced the Quattro Plus alternating pressure mattress system, the newly designed

V4-146 mattress system and the iPressure and Merlin patient monitoring devices. Each product is cutting-edge technology designed to help treat and prevent wounds. You can learn more about these new products at our booth during this year's Canadian Association of Occupational Therapy, Canadian Seating and Mobility, or Canadian Association of Wound Care conferences, or contact us at 1-800-265-9830.

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Deep Tissue Injury: What, Why and When?



BY Cynthia A. Fleck

Cynthia A. Fleck, MBA, BSN, RN, APN/CNS, ET/WOCN, CWS, DNC, DAPWCA, FCCWS, is a certified wound specialist and dermatology advanced practice nurse, author, speaker, President-elect of the American Academy of Wound Management (AAWM), Member of the Board of Directors of the Association for the Advancement of Wound Care (AAWC), and Vice President, Clinical Marketing for Medline Industries, Inc., Advanced Skin and Wound Care Division.

While believed to be a contemporary occurrence, deep tissue injury (DTI) has been seen in the literature since the late 1800s.¹ Several pressure ulcer staging systems are frequently cited but none defined pressure-related injury under intact skin until recently.² In the past, The National Pressure Ulcer Advisory Panel (NPUAP) recommended using the terms “pressure-related deep tissue injury under intact skin” or “deep tissue injury under intact skin” for describing these lesions. Since their Consensus Meeting and NPUAP Biennial Conference: Charting the Course for Pressure Ulcer Prevention & Treatment, held in San Antonio, Texas, in February 2007, the definition has been updated to reflect accuracy, clarity, succinctness, utility and discrimination. The new definition is as follows:

Suspected Deep Tissue Injury: “Purple or maroon localized area of discolored intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear. The area may be preceded by tissue that is painful, firm, mushy, boggy, warmer or cooler as compared to adjacent tissue.

“Further description: Deep tissue injury may be difficult to detect in individuals with dark skin tones. Evolution may include a thin blister over a dark wound bed. The wound may further evolve and become covered by thin eschar. Evolution may be rapid, exposing additional layers of tissue even with optimal treatment.”³

DTI may herald the subsequent development of a Stage III-IV pressure ulcer.⁴ The incidence and prevalence of these ulcers is unknown due to the mixture of reporting styles.⁵ Deep tissue injury is really a developing

expression that articulates a deviation of pressure ulcers that emerges primarily as bruised or dark tissue.⁶ Previously these wounds have been described as “malignant lesions,” closed pressure ulcers and purple pressure ulcers in the literature.⁷

Case Study

Ms. DZ is a 58-year-old female with progressive multiple sclerosis. She lives alone in an apartment with her support dog, Simone, a black standard poodle. She is able to get around with her power wheelchair and Simone’s assistance. She also has a home health attendant who visits twice a week to help with bathing, cooking, laundry and cleaning.

Ms. DZ’s neighbour hears Simone barking for most of the evening but doesn’t go to check in on her. The home health attendant arrives the next morning to find Ms. DZ on the kitchen floor, lying on her back. She is exhausted from trying to get up and she has a large purple “bruise” on her buttocks. The home health attendant immediately attempts to get her up and then calls 9-1-1 for assistance. In the meantime, Ms. DZ complains of deep pain at her tailbone. When the emergency medical technicians arrive, they ask her how long she was on the floor, and she states “most of the night.”

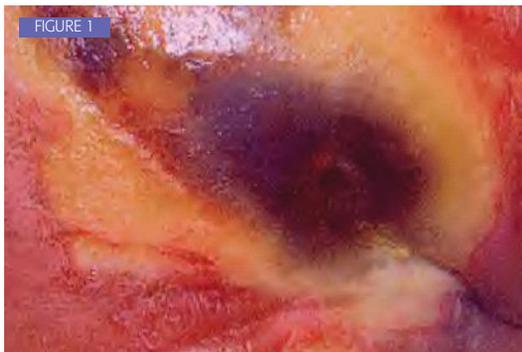
Assessment, Cause and Etiology

These wounds tend to occur on bony prominences and may arise especially when a patient has spent a length of time in one particular physical position. These internal wounds are also known to deteriorate quickly, which differentiates them from Stage I ulcers that can sometimes resolve to normalcy and do not necessarily deteriorate. Unlike a Stage II pressure ulcer that presents as a regular blister or skin tear that heals in a usual progression, a DTI

does not resolve quickly, and the blister or skin tear that appears cannot be repaired. The initial skin condition of a DTI leads to purple colour changes (see Figure 1), with the common occurrence of a thin blister roof on the surface. The frequently understood causes of DTIs include¹

- direct pressure to the skin and soft tissue with resulting ischemia
- muscle injury associated with a fall in the level of nutrients to the arterioles that feed the muscles
- injury or damage to the fascia (the membrane that covers all organs, muscles, bones, blood vessels and nerves)
- shearing injury or torsion of the perforating vessels.

Co-morbid states, which may contribute to the development of DTI, include ischemic diseases such as arterial disease, peripheral vascular disease and neuropathic diseases, including diabetes.⁵



Example of Deep Tissue Injury of the Sacrum.

Heels present an especially common area for DTIs to develop. The skin of these ulcers tends to present with a purple or “bruised” look to them (see Figure 2). Frequently, this condition may be mistaken as a blood blister. DTIs associated with heels occur after prolonged



Example of Deep Tissue Injury of the Heel.

pressure to the skin and soft tissue around the heels with resulting ischemia, possibly connected with shear and friction from agitation, pain or spasm of the lower extremities. A major question remains, “Are all heel ulcers, deep tissue injury?”

To prevent DTI from occurring, it is important for the clinician to perform daily skin assessments, particularly checking for any changes in the skin’s appearance. This is of utmost significance in the patient who has diabetes or is arterially compromised. The clinician should note any foot deformities, improper footwear, or feet that are covered for long periods of time, which includes the use of T.E.D. hose and other compression garments. Special attention to those individuals who self-propel in wheelchairs is also recommended. Devices such as traction boots, casts and abduction pillows, which can prevent movement and/or inspection, can also contribute to the development of DTI.

Diagnostics

Diagnosis is still vague at best. Laser Doppler blood flow studies and ultrasound showing damaged reticular dermis and subcutaneous tissue under intact epidermis are two proposed diagnostic evaluations for DTI. A tissue biopsy, however, is the only true measure to date, but it has a low risk-to-benefit ratio.

Differential Diagnosis

Not everything that looks like a DTI represents deep tissue injury. Usually DTIs occur over bony prominences, and the patients that display these wounds have a history of time spent in one particular position. These wounds also deteriorate rapidly, which may indicate that the wound being evaluated is a DTI. Additionally, sometimes the skin over and around a DTI site is cooler than surrounding skin and tissue. The usual assessment includes boggy, non-blanchable tissue that is deep purple in colour, may be painful, has a blistered top layer and may present with a mirror image bilaterally.

DTIs can be confused with other wounds and conditions and should therefore be differentially diagnosed from similar looking lesions such as a bruise, calciphylaxis, hematoma, Fournier’s gangrene, and perirectal abscesses. A bruise is the extravasation of blood in the tissues as a result of blunt force or impact or trauma to the soft tissue, which usually resolves on its own in a matter of two weeks. Calciphylaxis is a vascular calcification and resulting skin necrosis that is seen in patients with a long-standing history of chronic renal failure. These lesions, which usually present on the lower extremities, may have a violet hue and be extremely tender and firm. Fournier’s gangrene is an intensely painful necrotizing fasciitis of the perineum and/or groin that may present initially as cellulitis. Perirectal abscesses commonly present as dull, aching or throbbing pain that increases when sitting and prior to a bowel movement in the perianal area. They can open to reveal large cavities. Hematomas are lesions usually associated with trauma and appear as deep seated purple or burgundy raised nodules that form as a result of clotted blood.

Treatment

Treatment should include measures instituted for any pressure ulcer such as frequent turning and repositioning

off the site of injury, good skin care (soap-free, pH-balanced cleansing; high-quality moisturizers; and protection of vulnerable areas with products containing zinc oxide, dimethicone and some of the newer silicone combinations), proper support surface selection and supportive care to the individual, including correcting any systemic issues and/or nutritional deficiencies. Offloading and avoidance of shearing forces is crucial with these ulcers since ischemia and infarction of nutrient supply is thought to be a cause.

Consider using dressings that are non-adhesive and atraumatic to discourage further damage, such as silicone-faced foams. Experts also recommend against debriding too quickly and/or aggressively. Products such as polyacrylate-based moist therapy provide a safe and gentle^{8,9} debridement method that could be utilized if removal of necrotic tissue is the goal. Skin beneath the thin blister should be left in place if the area is stable. Monitor these lesions carefully before beginning forceful removal of any tissue that appears to be necrotic. Check the skin for any breach or opening, paying special attention to bed linens and clothing for any drainage. As with any wound, watch for signs and symptoms of deterioration such as erythema, odour, pain and/or fever.

High-risk Populations

Patients who reside in the following facilities can be at high risk for the development of DTI:

Intensive care (IC). Many IC patients are on ventilators and/or have tubes and wires connected to their body, restricting movement. Additionally, the use of vasopressors is common, which can decrease peripheral blood flow and increase susceptibility for DTIs.

Acute care. Devices such as traction boots, casts, abduction pillows and the like can prevent movement, increasing patients' chances of developing a DTI. T.E.D. hose and other devices that restrict blood flow and inspection can cause problems. Furthermore, heel ulcers are reported in 66 per cent of patients following hip fracture.¹⁰

Long-term care. These residents often have their feet covered for long periods of time, predisposing them to the development of DTIs. Moreover, foot deformities, improper shoe wear and propelling themselves in a wheelchair can increase the chance of developing a DTI.

Hospice. Terminal status and those who are experiencing eminent death will have the tendency to develop new skin breakdown (i.e., skin failure) as other organs fail.¹¹ This includes DTI.

Documentation

Documentation should always include a narrative, full description with suspected DTI mentioned. The speed of deterioration makes DTI conditions prone to litigation. The pace and extensive decline that a DTI follows can be disastrous. Meticulous documentation of skin condition upon admission and at regular intervals is the key to preventing and managing DTIs. Do not hesitate to refer to another practitioner if the wound/condition is outside your scope. The first hint of a suspected DTI should increase awareness and consequent treatment. Informing the patient and family about risk of deterioration due to deep damage is recommended. DTI can decline even when prudent care is rendered.

Outlook

There is no reliable research on outcomes; however, clinical data indicate that DTI can heal without permanent injury or loss of limb or life. We still don't fully understand the etiology of these deep pressure ulcers, prevalence and incidence, costs to treat and diagnostic measures to assess. We do know, however, that ischemic disease with delayed reperfusion may increase the damage due to lack of recovery and that neuropathic disease may increase the time of exposure to pressure.⁵ Both the NPUAP and the Wound, Ostomy and Continence Nurses Society (WOCN) agree that DTI should be the object of intense education.^{4,11} Research into this phenomenon is needed.

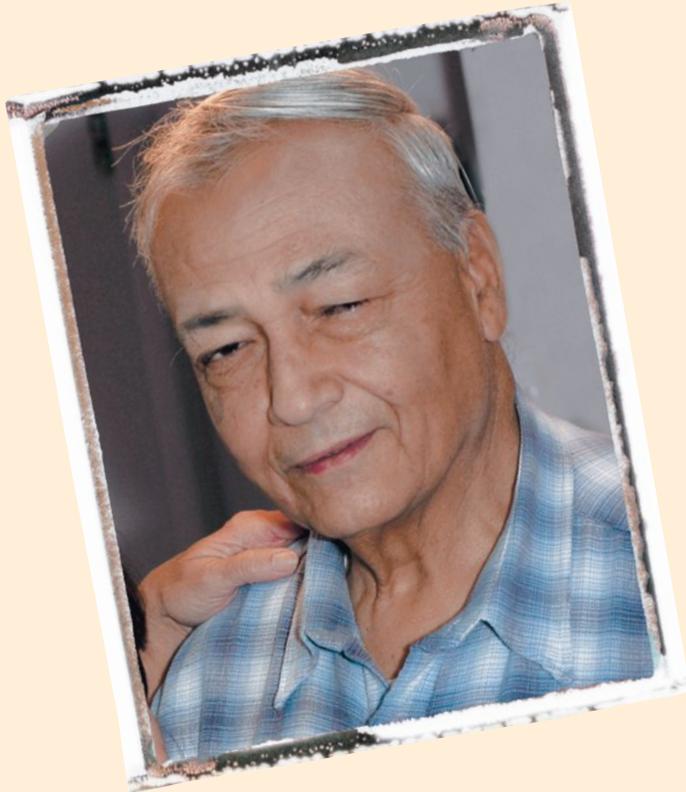
Revisiting Ms. DZ's Case

Ms. DZ is taken to the emergency room where she is evaluated for broken bones and other problems. She continues to complain of pain around her tailbone. When performing a head-to-toe skin assessment, the emergency nurse notices the large purple bruise and alerts the wound-care specialist. The wound-care specialist diagnoses the ulcer as a suspected DTI and begins measures to offload the area, ordering Ms. DZ to remain off her back. She prescribes a low-air-loss mattress to decrease pressure and shear to Ms. DZ's vulnerable tissue. She orders lab tests, including a pre-albumin to check her protein levels and her ability to heal nutritionally.

continued on page 53

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Puzzling Cases: Wound Sleuth



BY Rob Miller

Rob Miller, MD, FRCPC, has been practising dermatology for the past 20 years. He worked as a general practitioner in Ontario, British Columbia and South America before pursuing his studies in dermatology at McGill University in Montreal, QC. He is currently Associate Professor of Medicine at Dalhousie University and Co-director of the Chronic Wound Care Clinic at the QEII Hospital in Halifax, NS.

A 70-year-old male had a malignant melanoma removed from his right lower leg 40 years ago. At that time the surgeons did an extensive lymph node dissection and removed the majority of his lymph glands such that over the intervening decades he has developed chronic lymphedema (see Figure 1).



Question: What is the name given to this form of chronic lymphedema?

Answer: Elephantiasis nostra verrucosa. *Verrucosa* refers to the wart-like quality of all of the small and larger papules and nodules on his leg and is only seen after lymphedema has been present for many years.

Question: What special wound-care problems does this patient face?

Answer: This patient faces many challenges. He has to deal with the increased size and weight of his leg and institute some form of compressive therapy to help minimize his lymphedema. He also has the daily task of proper cleansing and drying of his leg. As seen in Figure 2, there are multiple areas where the skin can harbour bacteria and yeast due to moisture retention

between the “lumps and bumps.” If these areas are not kept dry, maceration will occur with subsequent bacterial and yeast overgrowth, leading to a situation where the skin may become a portal of entry for pathogenic organisms that can result in infection (cellulitis, erysipelas, lymphangitis, septicemia).

Question: What measures does the patient pursue to prevent these complications?

Answer: Fortunately, he is extremely adherent to care plans and follows directions carefully. Despite a few attacks of recurrent cellulitis over the years, he has managed quite well and takes special precautions to prevent his skin from drying out (judicious use of moisturizing creams on his lower legs) and fissuring. He uses a hair dryer to gently dry his lower legs and care-



fully removes any extra moisture between the areas of lumpiness. If he has any moist or weeping areas he has been instructed to carefully compress with strips of gauze between the nodular areas of lymphedema (Figure 2). Strict attention to details of proper skin care and a firm understanding of the importance of keeping the bacterial flora on his skin to a minimum have allowed him to have relatively few leg problems. ☺

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Acinetobacter Infections in Wounded Soldiers: Implications for Canadian Hospitals



BY
Major Anthony
Battad



Major Bruce Kropelin



Major Homer Tien

Introduction

The Canadian Forces are currently conducting military operations in Afghanistan as part of the International Security Assistance Force (ISAF). Unfortunately, these combat operations have resulted in Canadian casualties, including many suffering from wounds. These

In January 2006, the authors were deployed to the Canadian-led Multinational Hospital in Kandahar, Afghanistan. During this deployment, it was noticed that casualties requiring mechanical ventilation frequently developed pneumonia. Although the hospital did not have microbiological testing capability, it was later found that many of the Canadian patients were either colonized or infected with *Acinetobacter*. The organism was grown from wound or from respiratory samples, either at Landstuhl Regional Medical Centre (a U.S. army hospital in Germany) or from their respective Canadian hospitals. Soil samples as well as swabs of the walls, air ducts, and ventilators were taken and were sent to the National Microbiology Laboratory in Winnipeg and to the microbiology laboratory at Sunnybrook Health Sciences Centre in Toronto for analysis. The labs were able to isolate *Acinetobacter* from several samples. This has led to continuing research into *Acinetobacter* infections in returning soldiers.

Scope of the Problem

Acinetobacter wound infections have been recognized in “war wounds” since the Vietnam conflict.¹ Due to

“war wounds” may have been complicated by infection or colonization with *Acinetobacter baumannii*, a fairly ubiquitous organism that is also inherently resistant to many antibiotics. There is a potential for outbreaks of this organism in Canadian hospitals to which these injured soldiers are transferred.

improved battlefield pre-hospital techniques, the ratio of wounded casualties to fatal casualties has increased since the Korean, Vietnam and Persian Gulf conflicts. This increase in wounded casualties has led to a perceived increase in war-wound infections, especially infections caused by multi-drug-resistant (MDR) *Acinetobacter*.² Furthermore, the incidence of bacteremia due to *Acinetobacter* at military medical facilities in the U.S. has also increased.³ With more injured soldiers returning to Canada, we would expect the same phenomenon to occur, albeit to a lesser scale, in Canada.

Acinetobacter is a well-known cause of nosocomial infections. Its ability to survive in dry environments increases the risk for nosocomial infections.^{4,5} The organism has been known to cause pneumonia, bacteremia, meningitis and urinary tract, surgical wound, and soft tissue infections.⁴ Although rare, the development of significant anti-microbial resistance has made treatment more difficult. It is, therefore, an emerging potential problem within hospitals.⁶

As previously mentioned, the emergence of MDR *Acinetobacter* has been a cause for concern. In a recent report on MDR *A. baumannii* infections in U.S. soldiers

treated at various military facilities, there was a four per cent resistance to all antibiotics and a 65 per cent resistance to imipenem.³

Impact on Canadian Hospitals

Currently, wounded Canadian casualties are evacuated from the field to the Canadian-led NATO hospital at Kandahar Air Field (KAF). Damage-control surgery is initially performed at this facility. The casualties are then evacuated as quickly as possible out of "theatre" and into a tertiary care military medical facility in Landstuhl, Germany. From Landstuhl, the soldiers are transferred to a Canadian hospital closest to their place of residence.

Because the Canadian Forces do not have a central medical facility, it has to rely on the civilian medical system for continuation of treatment. As a result, Canadian hospitals across the country are receiving wounded soldiers with the potential for *Acinetobacter* colonization and/or infection.

Currently, the Canadian Forces, in conjunction with the Public Health Agency of Canada, has developed

infection-control guidelines that are being sent to every hospital that receives injured Canadian Forces members. These guidelines outline appropriate infection-control practices to minimize the risk of nosocomial transmission and provide resources and telephone contacts if questions about *Acinetobacter baumannii* arise. As well, Canadian Forces Health Services personnel brief all returning soldiers and their families about the nature of the infectious risk and warn them of the need to maintain contact isolation practice until surveillance cultures are finished. To date, there has been no nosocomial transmission of *Acinetobacter* infections from Canadian Forces members to Canadian civilians at Canadian hospitals.

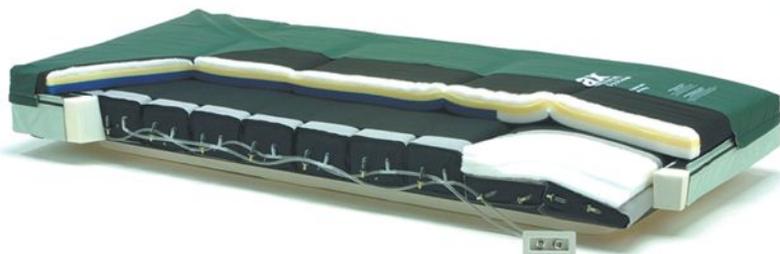
Impact on Wound Care

Currently, there are no special precautions other than the normal procedures that must be taken when tending to the wounds of injured soldiers. Careful washing and debridement of the wounds with frequent dressing changes may be all that is needed. However, vigilance

continued on page 18

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Major Anthony Battad, BSc, MD, CD, FRCPC, is an Internal Medicine Specialist, 1 Canadian Field Hospital, Canadian Forces Health Services.

Major Bruce Kropelin, MD, FRCPC, has served with the Canadian Forces as an anesthetist and air medevac physician. He is currently an assistant professor of Anesthesiology & Fellow in Critical Care Medicine at the University of Alberta. He currently works in Edmonton at the University of Alberta and Capital Health hospitals. His last deployment to Kandahar, Afghanistan, was from January to March 2006. He is scheduled to return to Afghanistan for the third time in the upcoming year.

Major Homer Tien, MD, MSc, FRCS, has served in the Canadian Forces for 17 years, both as a general practitioner and as a surgeon. He is currently assistant professor of Surgery at the University of Toronto, and works at Sunnybrook Health Sciences Centre as a trauma and general surgeon. His last deployment to Kandahar, Afghanistan, was from January to March 2006.



These photos show wounds that are typical for troops in Afghanistan. (Figure 1) A complicated wound. (Figure 2) An infected wound on an Afghan soldier amputee without proper outpatient follow-up, which, unfortunately, is typical for Afghanistan. (Figure 3) Shrapnel wounds.

by the health-care team must be maintained to prevent incidences of contiguous osteomyelitis, or worse, bacteremia.

Conclusion

Acinetobacter is an important nosocomial pathogen.⁶ Wounded soldiers returning from Afghanistan usually have multiple wounds and may be colonized or infected by the organism. Strict infection-control practices must be maintained in order to prevent possible outbreaks within Canadian facilities. 🙌

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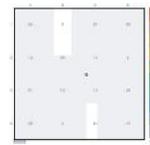
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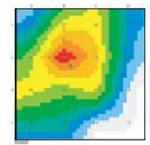
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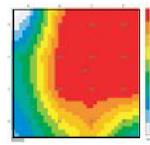
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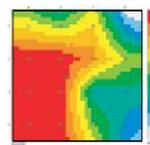
Heel Protector

Sensors included	16
Variation coefficient	36.4%
Standard deviation	28.2
Average pressure	77.5
Maximum pressure	100
Center of pressure	2.8, 2.4



Heel Pillow

Sensors included	16
Variation coefficient	40.5%
Standard deviation	28.1
Average pressure	69.4
Maximum pressure	100
Center of pressure	2.1, 2.5



Nutrition and Wound Care:

The Importance of Investigating the Presence of Hyperglycemia in Individuals with Wounds



by Chris Fraser

Chris Fraser, HBSc, RD,

provides nutrition intervention for patients in the spinal cord injury and acquired brain-injury rehabilitation programs at the Parkwood Hospital site of St. Joseph's Health Care in London, Ontario, and is a member of Parkwood's Chronic Wound and Skin Health Team. She has presented on nutrition and wound management extensively throughout Canada and has been a frequent author of wound-related articles. She is a member of the College of Dietitians of Ontario and Dietitians of Canada.

Individuals with diabetes exhibit significantly impaired wound healing and increased complication rates, including infection, compared with individuals who do not have diabetes.^{1,2,3}

When a wound occurs, gluconeogenesis is initiated in the liver in response to a surge in catecholamines and cortisol. This process may result in the production of excess glucose, which can impair wound healing, particularly in individuals with diabetes and poor glycemic control.³ Infection is a metabolic stressor that contributes further to hyperglycemia; a vicious cycle occurs that results in a wound that does not respond to otherwise effective treatment modalities.

Multiple proposed factors impair wound healing in the presence of diabetes, and these include vascular, neuropathologic, cellular, immune system and biochemical abnormalities.^{2,4}

Increased Risk for Infection

Individuals with diabetes are at greater risk for and have higher incidence of infection because of decreased host resistance.³ When blood glucose levels are persistently elevated, chemotaxis and phagocytosis are compromised.^{1,4} Defects in leukocyte function and other impairments prolong the inflammatory phase of wound healing and delay the resolution of infection in individuals with diabetes.^{1,2,5}

For an individual with diabetes, medication management in conjunction with diet, activity and lifestyle education can be provided to achieve optimal glycemic control to promote wound healing and minimize risk for wound

and other infections. Individuals with hyperglycemia who have not been screened for diabetes are at increased risk for chronic, non-healing wounds and infection, as the hyperglycemia is unidentified and therefore unmanaged.

Achieving Optimal Glucose Control

The achievement of optimal glucose control is the most important factor affecting wound healing in patients with diabetes. It is crucial that clinicians routinely assess for the presence of diabetes and address the issues early.³

The Canadian Diabetes Association Guidelines for the diagnosis of diabetes are as follows:⁶

- Fasting plasma glucose (FPG) ≥ 7.0 mmol/L
(fasting = no caloric intake for at least eight hours)
- OR
- Random (casual) plasma glucose (PG) ≥ 11.1 mmol/L
+ symptoms of diabetes
(random [casual] = any time of the day, without regard to the interval since the last meal)
(classic symptoms of diabetes = polyuria, polydipsia and unexplained weight loss)
- OR
- Two-hour PG following a 75 gram oral glucose tolerance test (OGTT) ≥ 11.1 mmol/L

A confirmatory laboratory glucose test (an FPG, random PG or a two-hour PG in a 75 gram OGTT) must be done in all cases on another day in the absence of

unequivocal hyperglycemia accompanied by acute metabolic decompensation.⁶

It is this clinician's experience that the aforementioned physical signs and symptoms of diabetes do not always accompany the hyperglycemia that is identified by blood tests. The absence of these symptoms should neither be considered evidence of normal blood glucose levels nor preclude appropriate diagnostic tests. A neurogenic bladder as the result of a neurological injury or disease, urinary incontinence, indwelling urinary catheters, decreased thirst response in older adults, cognitive impairment and other factors may contribute to the lack of identification or reporting of these symptoms.

Identifying Prediabetes

Prediabetes is a term for impaired fasting glucose (IFG) and/or impaired glucose tolerance (IGT), which are elevated blood glucose levels that are below the threshold for diabetes but which have clinical consequences. Prediabetes places individuals at risk for developing diabetes and its complications. It is important to note that not all individuals with prediabetes will necessarily progress to diabetes. Early identification is therefore essential to ensure the timely provision of lifestyle intervention education, which has been shown to be highly effective in delaying or preventing diabetes. Plasma glucose levels for the diagnosis of IFG, IGT and diabetes are as follows:

	FPG (mmol/L)		Two-hour PG in a 75 gram OGTT (mmol/L)
IFG	6.1–6.9		NA
IFG (isolated)	6.1–6.9	and	< 7.8
IGT (isolated)	< 6.1	and	7.8–11.0
IFG and IGT	6.1–6.9	and	7.8–11.0
Diabetes	≥ 7.0	or	≥ 11.1

A fasting plasma glucose result of 5.7–6.9 mmol/L in an individual with risk factors for diabetes mellitus warrants an oral glucose tolerance test to rule out prediabetes and diabetes.

Recommended targets for glycemic control for people with diabetes are 4.0–7.0 mmol/L following a period of fasting or prior to consuming a meal, and 5.0–10.0

mmol/L two hours following a meal.

While glycosylated hemoglobin (Hgb A1C) is not a diagnostic tool for diabetes, it is a valuable measure of treatment effectiveness and should be conducted approximately every three months to ensure that blood glucose targets are being met. Hgb A1C levels > 7.0% (0.070) are associated with a significantly increased risk for both microvascular and macrovascular complications.⁶

Referral to a comprehensive diabetes education program, if available, or referral to a registered dietitian and initiation of appropriate medications (oral antihyperglycemic agents and/or insulin) are imperative in order to achieve optimal blood glucose control for wound management and reduction of risks associated with diabetes mellitus.

Effective Management

Treating ulcers is more effective when clinicians understand and implement measures to manage both the wound and underlying factors—such as uncontrolled HgbA1C levels—that may impede successful outcomes. Use of adjunctive and expensive therapies is best initiated after these factors have been addressed.⁷ Controlling serum glucose levels in people with diabetes at the time of injury, surgery and wound healing cannot be overemphasized.³

Assessing for the presence of hyperglycemia in individuals with wounds is imperative and must be considered as an integral component of wound management. ¹⁰

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Something Old Is New Again: Debriding and Reducing Local Wound Infection with Maggots



BY Christine Pearson

Maggot debridement therapy (MDT) is the practice of using live medical-grade fly larvae for removing dead tissue from non-healing wounds. MDT is also known as maggot therapy, larval therapy, biodebridement or biosurgery.

Debridement or removal of dead tissue is a cornerstone of good wound bed preparation. Slough, eschar and debris in the wound are a good food source for bacteria and must be removed to prevent or treat infection and to promote healing.

History of MDT

Using maggots for wound care has been documented since about the 1500s. Throughout centuries of war, physicians have noticed that soldiers with maggot-infested wounds

tended to heal better than those with non-infested wounds. The Confederate army surgeon J.F. Zacharias was one of the first American physicians to intentionally use maggots for infected wounds. In the 1930s, orthopaedic surgeon William Baer spearheaded and promoted the use of MDT in more than 300 U.S. hospitals. Then World War

II brought the advent of antibiotic therapy and better surgical techniques, so maggots were relegated to the back shelf and were rarely used for the next five decades.

We have now found that in some cases antibiotics and high-tech treatments have become ineffective in treating poorly vascularized wounds and necrotic wounds and that some bacteria have developed resistance.

In the 1990s Sherman et al. in the U.S. and Mumcuoglu et al. in Israel reintroduced maggots for treat-

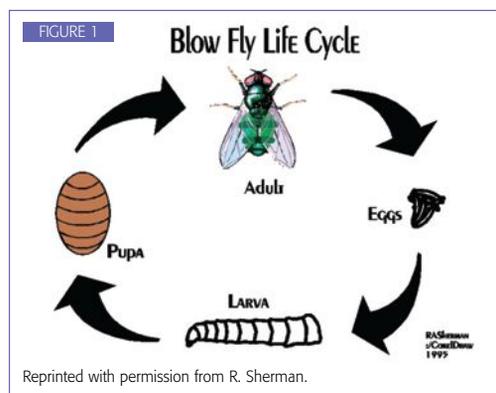
ing intractable wounds. Currently, MDT is successfully used to save lives and limbs in 20 different countries.

About Maggots

Not all flies are created equal; there are thousands of species of flies. The maggots of choice for MDT

are from the species *Lucilia sericata* (green bottle or blowfly). This species has been found to be safe and effective; they eat dead tissue and do not harm living tissue. Blowflies are often metallic green, blue or black in colour.

The life cycle of the fly (see Figure 1) starts with the newly hatched fly, *continued on page 24*

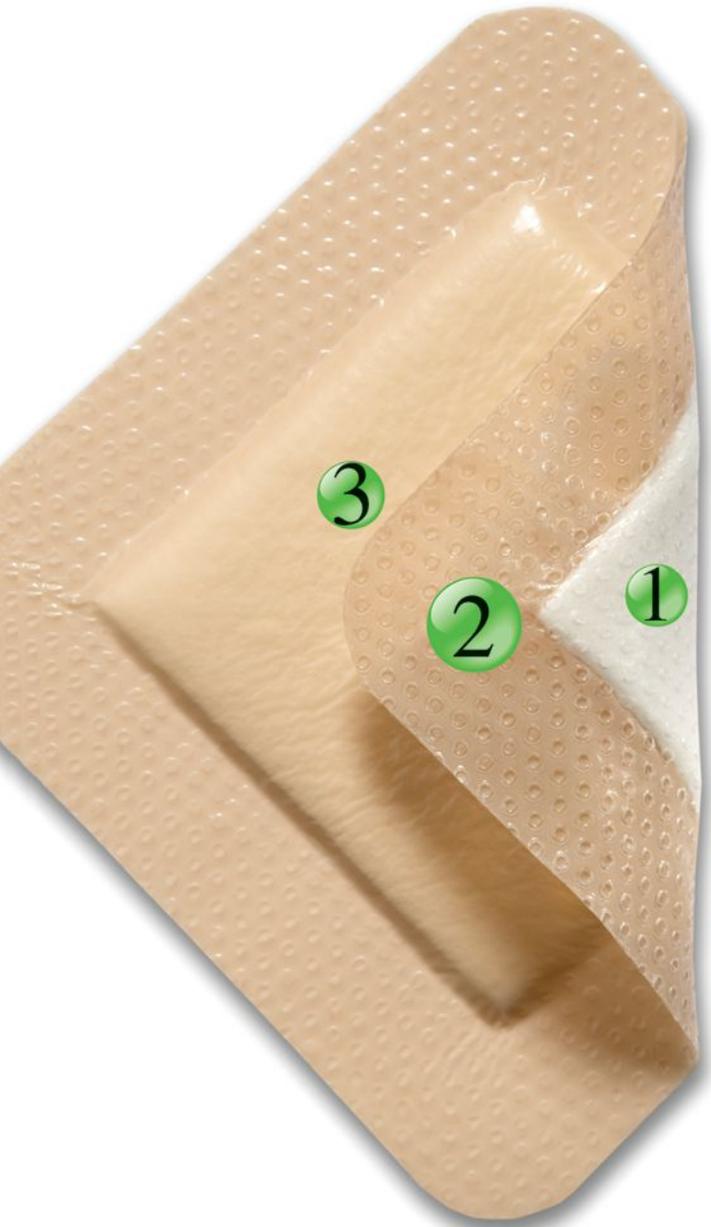


Prior to using MDT you need to assess and optimize the patient's condition (pain managed, nutrition assessed, pressure relieved, positioning/seating addressed, sufficient arterial perfusion present, etc.)

Christine Pearson, RN, IIVCC, is a wound clinician for Vancouver Coastal Health on the North Shore. She has worked in community nursing on interdisciplinary teams for 27 years. She develops and presents wound education sessions and provides consultations on difficult-to-heal wounds for physicians, nurses, students and long-term-care facilities.

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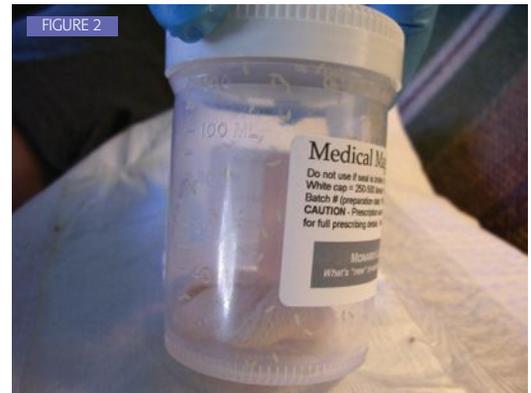
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which matures in one to two weeks. The adult female seeks out a food source (e.g., a dead animal) where she can lay 2,000 to 3,000 eggs. She does this so when the eggs hatch eight to 24 hours later, the new larvae have something to eat. The larvae eat for several days (three to seven) and then look for somewhere warm and dry to burrow (usually into dirt) where they form a hardened shell for the pupating phase. They stay buried in the dirt for seven to 20 days, depending on the temperature and the weather. When they emerge from the dirt they are fully developed flies, and the cycle begins again.

If unclean flies infest a wound there is a risk they could be carrying diseases (e.g., tetanus, cholera or



dysentery) or could be a more aggressive species that could cause harm to the wound. To make maggots "medical grade" they are produced in a sterile laboratory where the eggs are washed in an antiseptic solution and then placed on a clean food source of brewer's yeast and soy. This food source keeps them alive until they can be transported in a sterile jar to the patient (see Figure 2).

How Maggots Work

Five to 10 maggots per square centimetre of wound base are placed in the wound. Using fewer maggots may be ineffective, and using too many can cause pressure as they grow. When the maggots are in the wound they secrete proteolytic enzymes to liquefy the necrotic tissue in the wound, making it easier for them to ingest the slough and bacteria. The bacteria are killed both in the digestive tract of the maggots and by the antibacterial substances the maggots excrete.¹ The maggots also secrete allantoin, urea and other substances that can act as tissue growth factors.²

MDT has three functions: (1) to remove dead and infected tissue (debridement), (2) to eat and kill bacteria and (3) to speed healing. MDT can be used on any non-healing wound that contains sloughy dead tissue: pressure ulcers, venous ulcers, traumatic wounds, surgical wounds and diabetic ulcers. MDT can be used simultaneously with systemic antibiotics with no ill effects. In many cases, maggots have prevented the need to amputate limbs.³ MDT can even be used on foul-smelling, non-healable ischemic wounds to lower the amount of bacteria, thereby reducing the odour and improving the patient's and caregiver's quality of life.

continued on page 26

Applying Maggots to a Wound



FIGURE 3

To apply MDT, use five to 10 maggots per square centimetre of wound base (see Figure 3) and cover the wound with a breathable but secure dressing. Apply gauze and an abdominal pad loosely over the primary dressing to absorb the increased drainage caused by the debridement process (see Figure 4). This outer dressing can be changed as needed. Maggots need air to breathe, so don't use any tight or occlusive dressings. Leave the maggots in the wound for two to three days, after which maggots are usually "full" (see Figure 5) and wanting to leave the wound to pupate (they will have grown four times their original size). The maggots are easily removed by flushing the wound with normal saline. Place the used maggots and dirty dressing in a plastic bag, tie it up and dispose as you would any other wound dressing. The maggots will suffocate without air. Reassess the wound to see if another batch of maggots is needed or not. Depending on the size of wound and the amount of slough present, one to five applications are usually sufficient.

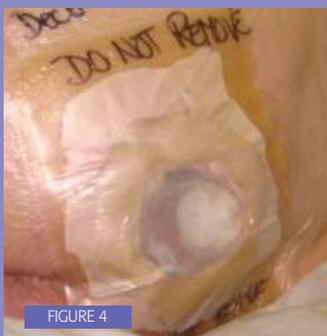


FIGURE 4

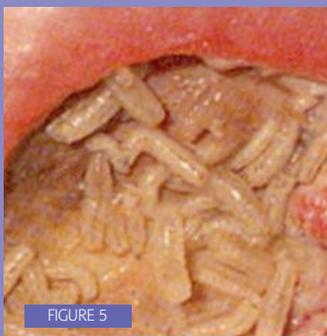


FIGURE 5

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Before maggot debridement therapy (MDT).



After MDT.



Before MDT.



After MDT.

The biggest deterrent to MDT is the *yuk* factor. I have heard of clinicians that will refuse to work with maggots, but I have never yet had a patient refuse the treatment. Most patients with non-healing wounds are frustrated and fed up with myriad treatments that have been ineffective and are happy to accept any treatment that may get their wound healing—even if it is maggots. Patient teaching is imperative so the patient is very aware of what is involved and that some of the maggots may escape from the dressing.

Contraindications for MDT include the following:

- patient does not consent to their use
- a wound that requires frequent inspection
- necrotic bone or tendon
- exposed blood vessels
- bleeding disorders (natural or pharmacological)
- patient allergic to soy or brewer's yeast
- where debridement is contraindicated

MDT is not usually the first treatment of choice, but if other methods of debridement and decreasing the local bacterial load in the wound have failed or are progressing too slowly then MDT may be an appropriate choice. Experience shows that MDT can be an efficient, cost-effective and beneficial treatment for many people with non-healing necrotic wounds. ☺

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Currently in North America, only one place, in Irvine, California, produces medical-grade maggots. To order a batch of maggots for use in Canada you must have an import permit from the Canadian Food Inspection Agency and a border broker to handle issues at customs. This process can be cumbersome and slow at times and it adds to the expense of the treatment.

If you or your facility may be interested in using MDT in Canada, please contact Dr. Chris Harvey-Clark at the University of British Columbia (chclark@interchange.ubc.ca). He is considering producing maggots in Canada but needs to know the level of interest nationally to see if it is feasible.

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Pulling Back the Mask: Detecting Infection in the Diabetic Foot

BY Kyle Goettl, RN, BScN, AND Stephan Landis, MD, FRCP(C)



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In the person living with diabetes, foot ulceration and subsequent infection can be the events that lead to a lower limb amputation. Diabetic foot wound infections must be treated quickly, but identifying wound infection can be a challenge.

Classic clinical signs of a chronic wound infection include

- increased pain
- foul odour
- wound breakdown
- friable granulation tissue

Acute wound infections can also present with

- loss of function

- swelling
- heat and redness

However, in the person with diabetes, the classic signs of infection may be masked by a host of factors. For instance, diabetic sensory neuropathy may negate complaints of pain, while a blunted inflammatory response may decrease redness. Delayed healing could be related to an impaired immune response, and loss of function could be related to a motor neuropathy.

Therefore, diabetic foot wound infections may not present in the “usual way.” Much like a guest at a masquerade party, you must look past the disguise in order to make a positive identification of infection.

Steps for Identifying Infection in Diabetic Foot Wounds

- Examine the old dressings** and peri-wound area noting any increase in wound drainage or a change in the character of the wound fluid.
- Irrigate and debride** the wound if appropriate. (You must be sure there is sufficient blood flow to support healing prior to debridement.)
- Measure** the length, width and depth of the wound in a standardized, reproducible way. Record and compare with earlier measurements. The increasing size of a wound can be a sign of infection.
- Probe the wound.** Probing to the wound base and contacting bone suggests osteomyelitis and should be treated as such until proven otherwise.
- Compare** the patient’s recent **blood sugar readings** to those from the week before and note any erratic changes. Increased impairment in glucose regulation without an obvious reason can be indicative of an infection.

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When the diabetic foot wound is not progressing as it should, even when best practice is being followed, this enabler can be utilized to help cue the clinician that there may be an underlying infection. By “unmasking” an infection, we are then able to proceed with appropriate interventions in the best interest of the people we serve.



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Black Holes on the Web:

Avoiding the Pitfalls of Online Misinformation



BY
Virginia
McNaughton

When Captain James Kirk and his crew boarded their starship, *Enterprise*, to “boldly go where no one has gone before” they were certain that space was, in fact, the final frontier. How wrong they were!

Welcome to the 21st century, the age of information technology. Enter the ever-expanding universe of the World Wide Web. As health professionals, we navigate this universe with our personal computers using many different search engines to seek data, information and knowledge. There are virtually millions of planets (Web sites) to land on and explore. There are literally thousands of health-related Web sites, including those that contain wound management information.

A recent study completed by IBM suggests that the Internet has become the main source of health information for approximately three in 10 Canadians. It further states, “In 2003, the Internet surpassed the physician as Canada’s primary source for health information. While more Canadians are using the Internet for diagnostic purposes, the vast majority feel it is difficult to determine which information found online can be trusted and that the quality of medical information on the Internet needs to be improved.”¹ As the Internet’s audience continues to grow, understanding how people use it to obtain medical information becomes more important to both users and providers. Presently, the health care community has become increasingly aware of and concerned about the credibility of health information available on the Internet.²

As health professionals and wound-care specialists, we must learn how to use the Web to provide ourselves, patients, their families and other health-care providers with accurate, timely and complete health

information regarding different wound etiologies and treatment options. How can we determine the value of the information we find? How can we differentiate trustworthy information from those “black holes” full of information “pretending to be objective but possessing a hidden agenda of persuasion or hidden bias?”³

Health professionals, especially wound-care practitioners, are subject to a great deal of marketing pressure to recommend specific treatments or products.⁴

Marketing information sometimes looks like “best practice” information; therefore, health professionals require highly developed critical-thinking skills to ensure that the information they provide patients is accurate and truthful. Critical thinking is not regular or normal thinking, nor is it emotional or judgmental. It is self-directed, self-disciplined, self-monitored and self-corrective thinking.⁵ When using the Internet as a source of information, a professional may find the following definition of critical thinking to be helpful: “The propensity and skill to engage in an activity with reflective skepticism.”⁶

As the number of health-related Web sites increases, so too does the need for all health professionals to use “reflective skepticism” when using this information for informing professional practice. There has been a marked increase in the number of organizations attempting to increase the reliability of health information found on the Internet. Consumer-protection advocates, led by Ralph Nader in the 1960s, started a worldwide movement toward protecting consumers and workers from unsafe products and misleading advertising. In today’s technological world, many consumer-protection advocates use their Web sites to assist consumers of health information in ascertaining

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the credibility of the information they find on the Web. This article will briefly introduce three of these sites. Readers are encouraged to search them out and, using their own critical-thinking skills, formulate opinions as to how these sites and the information contained therein will impact their practice.

Credibility on the Web

To determine the credibility of Web site content and to make reasonable decisions about what health information we will trust or what products or services we will use or recommend, health-care professionals should know what standards a site employs in developing content. Like accreditation for health-care facilities, there are accreditation processes for health-related Web sites to ensure that content achieves a minimum standard of credibility.⁷

Using a Web site critique template will enable the practitioner to ensure that they have comprehensively assessed the quality and reliability of the site from which they are accessing information. The Health on the Net Foundation (HON) has published a code of conduct that can be used as just such a template. Using this template regularly when “surfing the net” will ensure that clinicians are asking the right questions and not mistakenly integrating misleading information into their practice.

Health on the Net Foundation

HON is an organization promoting and guiding the deployment of useful and reliable online medical and health information. It can be found at www.hon.ch/visitor.html. Created in 1995, HON is a non-profit, non-governmental organization accredited to the Economic and Social Council of the United Nations. Its mission is to “guide the growing community of health-care consumers and providers on the World Wide Web to sound, reliable medical information and expertise.”

HON does not rate the quality of the content, but rather articulates a set of rules to hold content developers to basic ethical standards in the presentation of the information so that readers can be sure of the source and purpose of the information they are reading.

Accreditation is free and voluntary. The process has

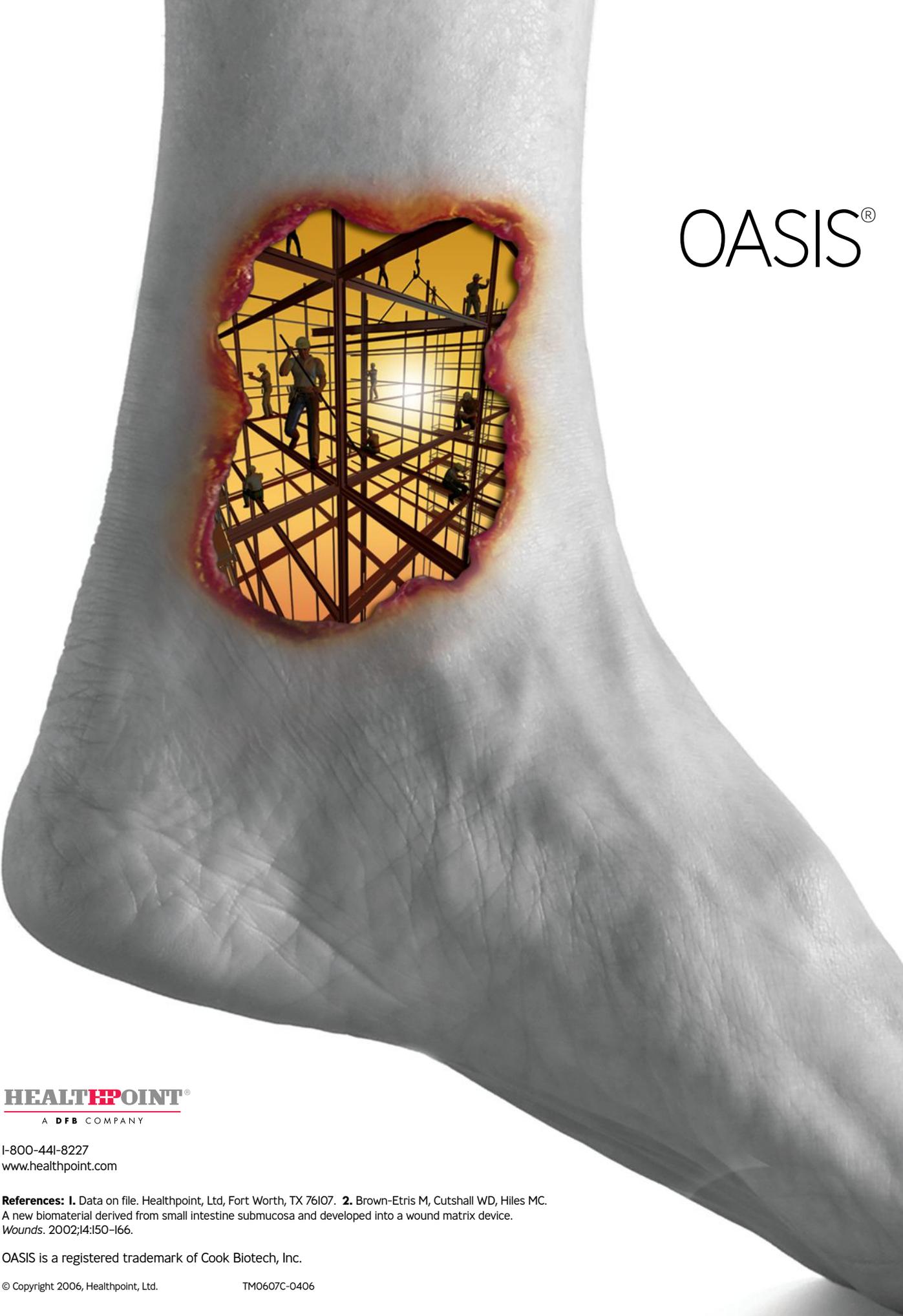
been clearly outlined on the HON Web site, and the publishers of any health-related Web site may apply for accreditation, and, if successful, post the HON logo. Successful accreditation is determined by meeting the following code of conduct standards. Readers can also use these standards to assess Web sites they use.

The Web site must demonstrate

- 1. authority.** This means the qualifications of the authors are clearly indicated and ensures that “any medical or health advice provided and hosted on this site will only be given by medically trained and qualified professionals unless a clear statement is made that a piece of advice offered is from a non-medically qualified individual or organization.”
- 2. complementarity.** This ensures that “the information provided on this site is designed to support, not replace, the relationship that exists between a patient/site visitor and his/her existing physician” or health professional.
- 3. privacy.** This ensures the website respects the “confidentiality of data relating to individual patients and visitors to a medical/health Web site, including their identity ... The Web site owners undertake to honour or exceed the legal requirements of medical/health information privacy that apply in the country and they will state where the Web site and mirror sites are located.”
- 4. attribution.** This ensures where appropriate, “the information contained on this site will be supported by clear references to source data and, where possible, have specific HTML links to that data. The date when a clinical page was last modified will be clearly displayed (e.g., at the bottom of the page).”
- 5. justifiability.** “Any claims relating to the benefits/performance of a specific treatment or commercial product or service will be supported by appropriate, balanced evidence in the manner outlined above in principle four.”
- 6. transparency.** This ensures designers of the Web site “will seek to provide information in the clearest



continued on page 34



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possible manner and provide contact addresses for visitors that seek further information or support. The Webmaster will display his/her e-mail address clearly throughout the Web site.”

7. financial disclosure. Clearly identifies support for the Web site “including the identities of commercial and non-commercial organizations that have contributed funding, services or material for the site.”

8. advertising policy. This ensures that readers can “clearly distinguish advertising from editorial content. ... If advertising is a source of funding it will be clearly stated. A brief description of the advertising policy adopted by the Web site owners will be displayed on the site. Advertising and other promotional material will be presented to viewers in a manner and context that facilitates differentiation between it and the original material created by the institution operating the site.”⁸

Dr. Peter Mansfield, Director of Healthy Skepticism (see below), reminds us conversely, “just because a site has the HON logo does not mean the information it provides is reliable since HON does not check the quality of the content. It is also possible that Web sites might use the logo without authorization. Consequently, it is important to remain skeptical of *all* information regardless of whether the source has the HON logo or not.”⁹

Health professionals have a role to play in increasing the reliability of information on the Internet. By regularly using the eight HON principles as a template for assessing Web sites they use regularly, and contacting Web site masters/owners when they find Web sites deficient, they can actively improve content reliability on these sites.

Quackwatch

HON encourages Internet consumers to contact them and report fraud. They also work with other organizations to monitor health-related Web-site credibility. If you come across a health-care Web site that you believe is either possibly or blatantly fraudulent that displays the HON Logo, please contact them immediately. If the site does NOT display the HON

code you should alert Quackwatch, an HON partner, at www.quackwatch.org.

Quackwatch, with a worldwide network of volunteers, is a not-for-profit organization committed to combating health-related frauds, myths, fads, fallacies and misconduct on the Internet. Dr. Stephen Barrett, a “Ralph Nader” of the Internet, is a retired psychiatrist who has become a renowned author, editor and consumer advocate. As the Vice President of the National Council Against Health Fraud, his activities include “investigating questionable claims, answering inquiries about products and services ... debunking pseudoscientific claims ... improving the quality of health information on the Internet and attacking misleading advertising on the Internet.”¹⁰

Healthy Skepticism

The pharmaceutical industry has a strong presence in health research and health

information available on the Internet. It can be difficult for consumers to disentangle advertising claims from scientific research or to understand the validity/reliability of claims made about the research supporting a specific product or treatment. Treatment recommendations to patients must be based on the best possible scientific evidence.

“Healthy Skepticism is an independent, international, not-for-profit organization for people with an interest in improving health.” Specifically, Healthy Skepticism works to reduce the potential harm resulting from misleading drug promotions because “misleading drug promotion wastes money and harms people’s health.”¹¹ The Healthy Skepticism Web site can be found at www.healthyskepticism.org.

The Healthy Skepticism Web site articulates seven goals:

1. Improving health by reducing harm from inappropriate, misleading or unethical marketing of health products or services, especially misleading pharmaceutical promotion.
2. Investigating and communicating about marketing practices.



Users of health-related Web sites should look for the HON logo.



3. Promoting healthy skepticism about marketing practices via advocacy, research and education.
4. Developing, supporting and evaluating initiatives to reduce harmful marketing practices, including reform of regulations and incentives.
5. Developing, implementing and evaluating educational strategies to improve health-care decision-making, including evaluation of drug promotion.
6. Supporting compassionate, appropriate, sustainable, evidence-based health care provided according to need, for optimal health outcomes.
7. Providing practical opportunities to advance the aims of Healthy Skepticism Inc.¹²

To achieve these aims, the Healthy Skepticism Web site includes a variety of services. There is a free monthly e-mail update service and an active e-mail discussion list for members. There is an international

news section and an online library listing of articles relevant to drug promotion from medical journals,

newspapers and other sources. Many of these are offered free as full-text articles. The Healthy Skepticism authors feel "misleading drug promotion is more common, more influential and more harmful than is generally realized." And because consumers and health-care professionals find it difficult to decide which claims about drugs to accept and which claims to resist," the site offers an advertising "watchdog" service called "Ad Watch" that provides examples of false and misleading advertisements critiqued to illuminate for consumers



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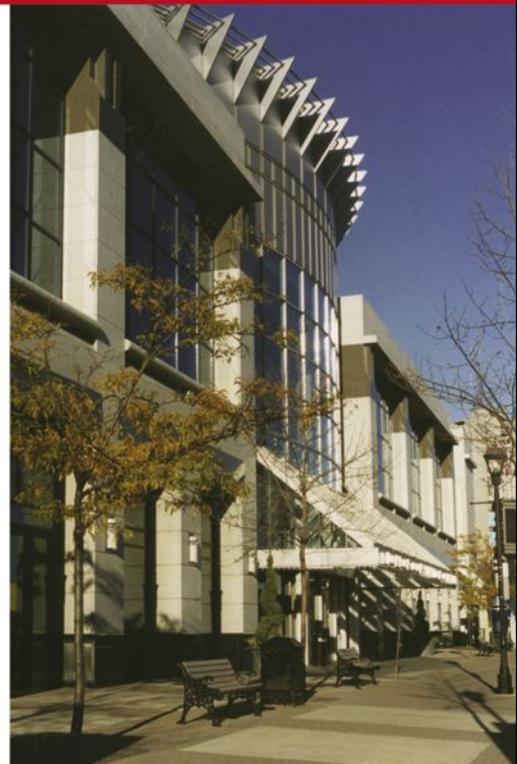
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Time Management: A Health-care Perspective

BY Cathy Burrows,
RN, BScN,
Patricia Coultts,
RN, IIWCC,
AND
Dona Ree,
RN (EC), BScN,
PHCNP

Time has become a precious resource that is often limited by the large demands placed on us both in our work lives and personal environments. As health-care providers, how often do we say "... so much to do, so little time"? Does your workload require that you put in long hours, work on scheduled days off, or work while on vacation in an effort to complete your tasks?

If this sounds familiar, you are not alone. According to Statistics Canada, 31 per cent of adult Canadian workers described themselves as workaholics. Thirty-nine per cent of workaholics admitted working more than 50 hours a week, and 65 per cent felt they did not spend enough time with family.¹ Even more astounding is that Harris reports, "... in a 10-country comparison of time use, Canadian young people ranked first in terms of hours spent on unpaid and paid labour during the school week. Averaged over a full week, including school and non-school days, Canadian teens performed 7.1 hours of labour per day in 2005—a virtual 50-hour work week comparable to that of their adult counterparts aged 20-64."²

Time is a social construct that guides us through our lives. Individuals are programmed from birth onward to learn about time as both a measurement and a concept within social institutions. Historically, our predecessors measured time by the position of the sun, the seasons, and later by the mechanical clock. Their daily tasks were demarcated and performed based on these points of reference. Awareness of time is individual and, according to Allan, there are three different perceptions of time: "...clock time which is linear, sequential, and scheduled phenomena; time as an all-at-once event sometimes referred to as living in the present; and also natural, biological or cyclical time."³ One factor remains constant; there are 24 hours in each day, 168 hours in a week. Each

day, the sun rises and sets, and it is not possible for us to invent, extend or recapture time.

In today's society we are being forced to do more, and to do it in a more timely and efficient manner. Health-care providers as well as all sectors within the workforce are being pressured to improve productivity by better managing their time. Time management by definition is, "... a conscious attempt to control and allocate finite resources."³ Over the last few decades the concept of time management has taken a new perspective. No longer are we constrained to time by geographical boundaries, time zones and language barriers. The result is that we have become accustomed to accessing information and individuals 24/7. If you feel caught in a time trap, Leucke offers eight questions you can ask yourself for self-reflection⁴:

- When you get into an elevator, do you press the close button rather than wait for the door to close?
- Do you regularly calibrate your watch or clock?
- Are 30 per cent of your dinners either take-out or heat-and-serve?
- Do you find yourself multitasking at work (i.e., reading a report while a colleague is making a presentation)?
- Are you too busy to take your midday walk even though you know it is healthy?
- Do you eat lunch at your desk while working or checking your voicemail?
- Do you eat in your car while driving?
- If you got a call about an illness in your family, would your first thought be to go to them immediately, while your second thought is that this is creating a mess in your schedule?

Do any of these scenarios sound familiar? If you have answered yes to any of the above, it is time to seriously evaluate how you manage your time at work and at home.

continued on page 38



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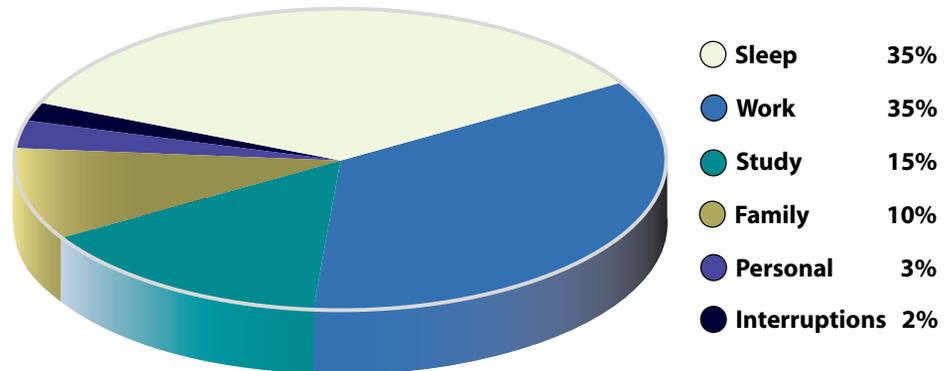
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New



Time Allocation in a Day



Getting Started

Goal-setting is the starting point of effective time management. Goals are "... actionable tasks that focus on what is important, provide direction, limit energy to non-critical tasks, avoid time-wasters, motivate, and can boost overall satisfaction."⁴ Leucke emphasizes that goals differ based on time frames and importance, and he categorizes them as, "... critical goals, enabling goals, and nice-to-have goals." He expands on these terms to define them as, "... critical goals are those essential to success, enabling goals create a more desirable business condition or take advantage of a business opportunity, and nice-to-have goals can enhance your business by making things faster, easier, or more pleasant."

“The bad news is time flies.
The good news is you are the pilot.”

— Michael Altshuler

Once you have written out your goals, you can now begin carrying them out. The following is a checklist of specific steps you can take:

- **Prioritize your goals:** Group them into long-term, intermediate and short-term goals.
- **Break them down:** Begin with the most difficult parts of a project and break them down into manageable, realistic tasks.
- **Schedule:** Write down when you will accomplish your goals and set deadlines for projects or key steps. Don't

forget to allocate personal time, including family commitments. Household duties, maintaining relationships, special celebrations and other family duties should be jotted down in your calendar.

- **Schedule leisure activities:** Exercising, playing music and going out to dinner are activities that will help you recharge.
- **Get started:** Start taking the necessary steps to accomplish your goals.
- **Identify and avoid time wasters:** Keep an activity log, which is a daily list of how you spend your time. Doing so can help you detect areas where persons with whom, or times of day when, you are most vulnerable to wasting time.
- **Reflect daily on your accomplishments,** and assess what you need to accomplish the next day. Tasks may include (1) work responsibilities (2) family responsibilities (3) social commitments.

Don't forget to leave yourself time to manage unforeseen events.

Time-wasters

Time-wasters and interruptions are common occurrences during the day. Collins and Collins suggest, "... when developing a plan for more effectively managing time, ...carefully analyze where time is currently being used and lost."⁵ Activity logs can identify areas, times of day, and people that contribute to wasting your most precious resource: time. Many of our day-to-day activities as clinicians can be time-wasters. Meetings, phone calls, e-mails, project development, preceptoring and mentoring clinicians, and committee

work can all absorb time. Prioritizing your workload and identifying the areas that will hinder you from completing your tasks will improve your time management skills. Have a plan to set timelines for each assigned task throughout the day (e.g., checking your e-mails, returning phone calls, and attending meetings with a set agenda).

Watch out for "switching costs," which is the term used in the business sector to describe the time it takes to return to an activity once it has been interrupted. According to Leucke,⁴ "...the more complicated the task, the longer it will take for you to become fully engaged, and the greater the cost." The next time a co-worker is standing in your office discussing a detailed account of their children's sporting event, consider the cost of getting back on track with your project.

Procrastination is something we can all claim to be guilty of from time to time. Remember your mother saying, "Don't put off till tomorrow what you can do today"? Your mother's words still hold true. Procrastination is just another form of wasting valuable time and is a cause for undue stress. To avoid these intervals of evading the tasks at hand, "... focus on getting the job done in order to give yourself more free time when it is completed, and reward yourself for completing the task on time."⁷

“You will never find time for anything.
If you want time, you must make it.”

— Charles Buxton

A New Perspective

Stephen Covey is a well-known motivational speaker and author whose programs and books offer a new approach to time management. Covey defines clocks, daily planners, and personal digital assistants (PDAs) as first- and second-generation techniques of time management. Third-generation techniques focus on planning and prioritizing goals that unify our values. Fourth-generation techniques suggest that rather than manage time, we need to manage ourselves. Covey recommends, "... rather than focus on things and time, fourth-generation expectations focus on preserving and enhancing relationships and on accomplishing results. Understanding your "compass" (the inner direction) is to know your true meaning or purpose and to stay focused on the direction in which you wish to go."⁶ As clinicians, professional goals demand that we focus on our work and the value we place on accomplishing career objectives. While health-care providers are cog-

continued on page 40



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nizant of promoting a holistic approach for our patients, we often neglect this same paradigm for ourselves. To quote Dr. Marla Shapiro, "... life is about striking a balance between work life and personal commitments."⁸

Conclusion

Getting organized is a skill that requires a concerted effort to master. Staying focused on your goals, putting them in priority, and achieving them while balancing work and family life is a rewarding experience. So the next time you are feeling over-extended and attempting to manage your time effectively, remember the words of a nine-year-old child, "... you just need to get organized, stay focused and get 'er done."⁹ ☺

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Black Holes on the Web: Avoiding the Pitfalls of Online Misinformation

continued from page 35

the way advertising can mislead. Ad Watch is located at www.healthyskepticism.org/adwatch.php.

Conclusion

There is great potential in this new universe of the World Wide Web. Like Captain Kirk stopping off on undiscovered planets, we are able to uncover and evaluate all of the information now available to us. By using the tools previous Internet explorers have developed, we are able to actively engage in Web site assessment to ensure that the information we have discovered is credible. By using our critical thinking skills and taking this information into our practice, we can transform it into knowledge to the benefit of our patients and their families. By promoting health information Web site accreditation and taking an active leadership role in defining and demanding high-quality information, we may reduce the risk of getting lost in the "black holes" of misinformation on the Web. Beam me up, Scotty! ☺

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An Interview with
Stacey Linger

Infection and Wound Care:

A Critical Role for Prevention and Control



Stacey Linger

INTERVIEW BY Catherine Harley, Associate Editor, *Wound Care Canada*

Stacey Linger, RN, BN, ET (WOCN), is an Infection Prevention and Control Officer at Hillsborough Hospital and an ET nurse at the Queen Elizabeth Hospital in Charlottetown, PEI. She is also a clinical educator with industry. She graduated from the University of New Brunswick in 1992 and began her career in Odessa, Texas, in gerontology and received a Certification in Gerontology from ANCC. She received Enterostomal Therapy Nursing (WOCN) training at the MD Anderson Cancer Center in Houston, Texas, and worked at Medical Center Hospital in Odessa as the ET nurse for the wound-care clinic. In 2005, she started working in infection prevention and control and completed the Infection Prevention and Control Course at Centennial College in Toronto, Ontario. She shares with us her clinical experience as it relates to wound care.

Q What prompted you to become specialized in infection control nursing?

I fell into it actually. It was always an interest, because of the link with ET nursing and infection prevention and control (IPAC), but I was asked by the hospital if I would be interested in training, and I jumped at the chance.

Q In your current role, what involvement do you have in wound management?

Are you a part of an interdisciplinary wound-care team?
In my current role, I am an educator for ostomy and wound

care, and I also provide coverage in the IPAC role. These roles frequently cross over. Infection is a huge issue in wound care, and wounds are a huge issue when I am wearing my IPAC hat. In the past I have been a member of an interdisciplinary wound-care team. These teams are very effective in managing patient issues and solving problems with everyone's input.

Q What are some potential wound pathogens?

Some of the most common wound pathogens are *Staphylococcus aureus*, *S. pyogenes*, *Pseudomonas aeruginosa*, *Dermatophytes*, *Candida*

sp., Gram (-) bacilli, *Colostridium* sp. There are also pathogens that will be detrimental to the wound and the patient at any number: *Mycobacterium tuberculosis*, *Treponema pallidum*, *Corynebacteria diphtheriae*, *Bacillus anthracis*, *Francisella* species.^{1,2}

Q How do you recognize wound infection?

Wound infection can be recognized with the eyes and the nose. The common symptoms of infection are erythema, edema, odour, pain, change in exudates, and fever. In some of our immunocompromised patients

there will not be some of these classic signs, so we need to look further. Another sign of wound infection or critical colonization is a slowdown in the progress of wound healing. In addition, the granulation tissue may look grey, there may be a biofilm, or there may be friable tissue in the wound bed. If a wound stops progressing or begins to look worse, high bacterial burden should always be suspected.

Q How do you confirm the diagnosis of wound infection?

Wound infection can be diagnosed on the basis of signs and symptoms. There are times

when we want to know more. If there is a need to know what the offending organisms are or how many organisms there are in a wound bed, there are three ways to go about it: a swab culture is the most common, tissue biopsy is considered the “gold standard,” and aspiration of wound fluid, if available.

Q **Is there a difference in how infection presents in chronic wounds versus acute wounds?**

In wounds healing by primary intention (closed surgically), the symptoms are erythema, unexpected tenderness or pain, serous or seropurulent exudates, discolouration, delayed healing, abscess, bridging of epithelium or soft tissue, cellulites, and odour. These symptoms are expected with chronic wounds as well. When a wound is healing by secondary intention, it is open and you are able to visualize the wound tissue, so you have more presentation of deterioration of the wound tissue.³

Q **What are “super bugs” and why are they becoming more prevalent?**

“Super bugs” are what the media call antibiotic resistant organisms. Some of these organisms, such as Methicillin-resistant *Staphylococcus aureus* (MRSA), are not that super, but they have become resistant to the antibiotics that were used

most frequently in the past against them. Penicillin made its debut in the 1940s, and methicillin specifically in the 1960s. The first methicillin resistance was reported in 1961. The frequent exposure to antibiotics and genetic mutation of bacteria are responsible for these hard-to-treat organisms.⁴ The Centers for Disease Control in the U.S. has 12 steps to reduce antimicrobial resistance in hospitalized adults, and included in these is to not treat contamination or colonization with antibiotics. We must use our antibiotics wisely. The antibiotic-resistant organisms are a big problem in all health-care facilities as well as in the community. Here they are harder to treat and are being spread by person-to-person contact. Many people may carry MRSA, VRE (vancomycin-resistant *Enterococci*) or an ESBL (extended spectrum beta lactamases) and not know. They don’t always make you sick, but they can still be spread to someone who will get sick from them.

Q **What is community-acquired MRSA? How is it treated?**

There are antibiotic-resistant organisms that do have increased virulence as well. There is a strain of MRSA called community-acquired or -associated MRSA (CAMRSA) that tends to be able to grow in conditions where regular MRSA would be managed by the host’s immune response. Therefore we are seeing it in

younger, healthier people.

Quite often it presents as a boil or abscess. If the area can be drained, the infection quite often resolves. There are cases of recurrent CAMRSA infections that must be treated with the appropriate antibiotics. Patients have died with pneumonia or septicemia caused by CAMRSA. We are now seeing it more in hospitals.

Q **Could you tell us about ESBL?**

ESBLs are another form of antibiotic-resistant organisms. These bacteria secrete enzymes that render some antibiotics useless. The most common organisms are *E coli* and *Klebsiella*. There have been outbreaks of ESBLs, and the affected patients are placed in isolation while in the hospital to prevent the spread of these organisms.

Q **When should a topical antimicrobial be considered for wound treatment?**

A topical antimicrobial such as silver or slow-release iodine preparations should be considered for wound treatment when there are signs of critical colonization or infection in the wound bed—if the wound appears to be affected by bioburden as discussed previously; with symptoms such

as friable granulation tissue, grey granulation tissue, biofilm, increased nonviable tissue in the wound bed; or any of the classic symptoms of wound infection. They may be used on their own as with critical colonization or in conjunction with oral or I.V. antibiotics.

Q **How can we reduce the risk of wound infection?**

Keeping wounds clean and covered is the basic way to prevent infection. Wound assessment and proper use of antimicrobial dressings is essential to keep wounds from progressing to infection.

Q **What continuing education courses would you recommend to nurses who have an interest in infection control/wound infection?**

There are a number of courses out there. Many of them are online if you are interested in infection prevention and control. A Web site to check is www.CHICA.org under the “education” tab.

Q **What are some of the biggest challenges you have seen as an infection control officer?**

continued on page 62

Health-care workers only wash their hands
30 to 50 per cent of the time—a scary number.

Surgical Site Infection Surveillance Program in a Home-care Setting

By
Edie Attrell
AND
Pamela
Armstrong

This article reviews the implementation and results of a pilot of a surveillance model utilized by Home Care in the Calgary Health Region for patients post-acute-care discharge with surgical incisions. The pilot was based on a region-initiated prospective research study by Heidi Brandstadt, Pamela Armstrong and Elizabeth Henderson.¹ While the application of research study findings generally takes many years, this article demonstrates how one organization fast-tracked research results into a change in practice, resulting in improved patient outcomes.

Introduction

Health-care organizations are more frequently addressing the importance of transforming organizational culture in order to improve patient safety. Research in the area of surgical site infections (SSIs) has clearly shown that SSIs increase mortality, readmission rate,

length of stay and costs for patients.^{2,3}

Although there is a substantial body of literature on surgical site infection prevention and management, these infections continue to rank as the second most common type of adverse hospital event.⁴ The cornerstone of a successful SSI prevention and control program is surveillance. SSI surveillance provides feedback to health professionals that supports evidence-based interventions to improve patient/client outcomes. However, most SSI surveillance is done in hospital settings, and the Brandstadt et al. paper¹ indicates that the majority of SSIs develop after discharge from hospital. This results in the reporting of inaccurate SSI rates and the potential for missing opportunities to reduce the impact and incidence of SSIs, particularly as the diagnosis of nosocomial SSI may be made within one year of implant surgery according to the Centers for Disease Control's (CDC) SSI definitions.

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Pamela Armstrong, BN, is an Infection Prevention and Control Nurse, Calgary Health Region.

SSI research in the Calgary Health Region has initiated several immediate practice changes within Home Care. The model provided by the surveillance project has continued into a permanent program within Home Care, the main benefit of which is the early identification and treatment of SSIs. Home care professionals have an increased awareness of SSIs and related issues in home care, and communication between home care and hospitals has also increased. Surveys of home-care professionals showed that they were eager participants in the surveillance project as the necessary monitoring incurred only a small impact on workload. Continued post-surgical SSI surveillance is integral in improving home-care practice.

– Heidi Brandstadt

Problem

In 2004, The Calgary Home Care's Skin and Wound Assessment and Treatment (SWAT) Team identified what appeared to be an increase in the number of clients with SSIs, which stimulated some discussion:

- Were these infections coming from one hospital site, one surgical theatre, or a specific surgical team? Or was the problem more global?
- Were the infections related to types of surgical interventions?

There were many questions but few answers. The unanswered questions, when presented to the Health Region's Infection Prevention and Control (IPC) department, led to the initiation of a prospective research study. Master's student Heidi Brandstadt took on the challenge of looking at the existing SSI surveillance program in the region, identifying the gaps in that structure and working with a team to develop an innovative approach to capturing post-discharge nosocomial SSI data.

The study results supported the implementation of an SSI surveillance program in home care in the Calgary Health Region (CHR). Home Care developed and tested a surveillance model, for cardiac and orthopaedic implant surgeries, and determined the efficacy of the current hospital surveillance program to determine total SSIs. This included the identification and reporting of nosocomial SSIs in the home-care setting.

Prior to this study, SSI surveillance and reporting were concentrated in hospitals under the direction of the IPC department. Only targeted (cardiac and orthopaedic) SSI surveillance was completed in the home-care project. The acute-care SSI data collection form and standardized definitions of SSI based on the National Nosocomial Infections Surveillance System (NNISS) of the CDC were used.

Aside from hospital readmissions, Home I.V. Therapy Program and emergency visits, reporting post-discharge

SSIs was the responsibility of the attending physician or surgeon. Reporting was found to be inconsistent, and there was no policy related to reporting strategies. Nosocomial SSIs were identified only when the client was seen on or before the scheduled six-week post-operative appointment.

Home-care SSI Surveillance Model Pilot

A literature search found that most SSI surveillance occurred in hospital settings; only 10 published studies actually separated out SSI rates according to pre and post discharge.³⁻¹²

The sensitivity* of hospital surveillance was very low when post-discharge follow-up was not conducted. The newly formed Home Care Surgical Site Infection Committee, composed of Brandstadt, the IPC regional epidemiologist (the research lead), the regional IPC practitioner for home care, the clinical practice specialist for home care and two members of the SWAT Team developed a plan, and the Home Care SSI Surveillance Model Pilot was created. One objective of the model was to include home care in the identification and reporting of nosocomial SSIs and, therefore, perhaps, address the gap of surgical patients who developed an infection after discharge from an acute-care setting into home-care. The prospective research study developed and tested a post-discharge surveillance model in home-care clients who had cardiac or orthopaedic implant surgeries and determined the efficacy of the current CHR hospital surveillance program.³

Several planning meetings took place and a process map was developed to include home care as part of the SSI Surveillance Team.

Methods and Materials

A standardized methodology was created for post-surgical clients discharged to home care. Clients to be

Defining Surgical Site Infections

Surgical site infection is considered nosocomial within 30 days of procedure if no implant and up to one year post-implant surgery. Criteria include a combination of purulent discharge, organisms isolated, deliberately reopening incision, radiological evidence, classification or a physician diagnosis.

– Centers for Disease Control (CDC)

included in the study were identified by the transition home-care co-ordinators in hospital before discharge to the home setting.

The home-care cohort consisted of clients aged 18 years and over who resided in Calgary and were admitted to home care post-cardiac (coronary artery bypass graft [CABG] or valve replacement) or orthopaedic joint replacement (hip or knee) implant surgery between December 1, 2003, and June 30, 2004 (see Tables 1 and 2).

The surveillance program collected baseline data that linked with the existing hospital SSI surveillance program. An SSI kit, containing a data-collection worksheet based on the hospital model, was already in use. The worksheet was piloted for two months prior to the start of data collection and was revised with feedback. The final worksheet covered six aspects of the client experience:

1. client demographics (PHN, sex, age, etc.)
2. hospital and home-care admission, surgery discharge and re-admission dates
3. reported infection site
4. severity (based on CDC definition for SSIs in home care)
5. topical and systemic antimicrobial/antibiotic use
6. Bates-Jensen Wound Assessment Tool (BWAT)

Communication was a key factor to successful outcomes. Dissemination of the project and the roles and

TABLE 1

Efficacy of in-Hospital vs. Total Surveillance

- 1,542 cardiac and orthopaedic implant surgeries
 - 54 (3.5%) total SSIs
 - 27 (1.75%) SSIs captured first in-hospital
 - 27 (1.75%) SSIs captured first in home care
- Sensitivity* = 50% (95% CI, 36.1%-63.9%)
- PV* = 98.2% (95% CI, 97.4%-98.8%)
- Statistically significant difference between efficacy of in-hospital and total SSI surveillance
- SSI rate was underestimated prior to post-discharge patient follow-up.

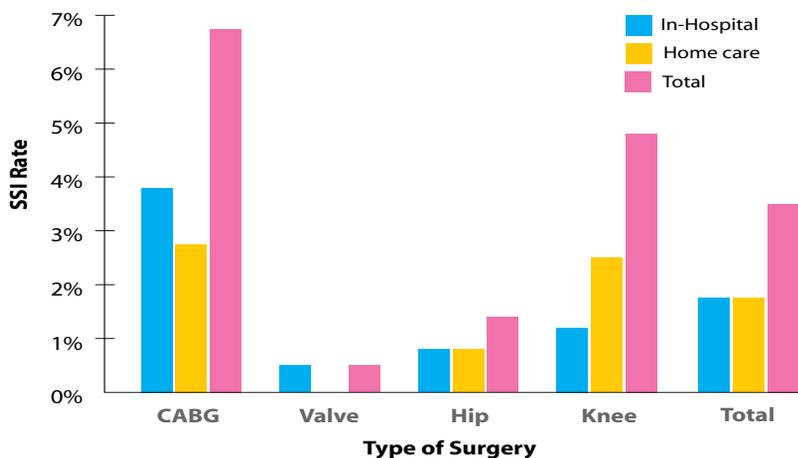
Reprinted with permission, Brandstadt et al.¹

responsibilities of the 600 home-care staff involved was multifaceted; presentations, meetings with middle management, news articles, memorandums, e-mails and voice mails were initiated. The aim was to gain support and awareness of the role of the community-care co-ordinator (home-care nurse) related to the project.

The home-care co-ordinator followed the clients as per routine management. When signs of infection, as identified by the study parameters (as identified by CDC definitions [see sidebar on page 44]), were recognized, the SWAT Team RN completed a home visit to assess the client and the wound. A swab was taken and treatment was initiated using evidence-based wound-care interven-

TABLE 2

Surgical Site Infection Rates



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* *Sensitivity and Negative Prediction Value of In-hospital SSI Surveillance for Detecting Total SSI*

This study defined sensitivity as the probability of the in-hospital SSI surveillance system identifying a SSI, given its presence in the total SSI (see Table 2). The sensitivity of the in-hospital SSI surveillance system for detecting all SSI was 50.0% (95% CI, 36.1%-63.9%). There was a significant difference between the efficacy of the CHR in-hospital surgical site infection surveillance program and the new CHR surgical site infection surveillance program that included both in-hospital and home care data ($p < 0.001$). The negative predictive value was defined as the probability of the total SSI surveillance program not detecting SSI, given that the in-hospital SSI surveillance system did not detect the SSI. The negative predictive value was 98.2% (95% CI, 97.4%-98.8%) for the in-hospital surveillance. Neither specificity nor positive predictive value could be calculated.

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tions. Most frequently a topical antimicrobial wound treatment was initiated—and systemic antibiotics, if not already part of the patient treatment plan, were also prescribed if deep compartment tissue involvement was suspected. There was a feedback loop to the attending physician as part of the process for data collection and collaboration.

Multiple sources were used for case-finding, including review of laboratory reports, rounds and chart reviews on patient-care units, review of emergency department visits and re-admissions, and patients with SSIs admitted to the Home Parenteral Therapy Program. All SSIs were entered into the SSI surveillance database and reported on a regular basis to the Regional IPC committee, the Department of Surgery and the individual surgeons.

Through the reporting and capturing of nosocomial infection data, the committee believed that the project could also achieve the following goals:

- reduce the impact of SSIs through early detection

- initiate timely, comprehensive reporting data
- support best practice wound management in the region

The SWAT Team was given an “Assess and Treat” physician order, allowing the team to initiate evidence-based, timely wound-care interventions based on the wound and client’s needs versus standard discharge orders of normal saline and dry dressings.

Results

The home-care program was effective at detecting SSIs missed by the in-hospital surveillance, capturing 50 per cent of all SSIs identified during the study and identifying common surgical interventions that resulted in infection (see Tables 1 and 2). In some cases, clients’ SSIs were identified early in their development, and treatment was managed in home care without additional costs to the region for items such as re-admission to hospital or I.V. therapy. *continued on page 48*

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Participation in the Home Care SSI Surveillance Program had additional benefits:

- improved collaboration between acute-care hospitals and home care
- recognition that post-discharge wound infections are an important consideration
- increased early identification of SSIs
- increased awareness of surgical history when assessing wounds
- increased teaching opportunities
- improved observation of and responsiveness to signs of infection
- SSI surveillance easily integrated into everyday practice

Limitations of the study:

- clients were followed for only six months
- sample size
- combination of cardiac and orthopaedic surgeries
- home care LOS data incomplete
- survival analysis
- no data on non-home-care post-discharge patients
- reliability of home-care form not tested
- limited data on some variables
- comparisons limited at present

Discussion

The success of the project was directly linked to a surveillance system that utilizes home-care co-ordinators and the SWAT Team as a means of identifying and reporting nosocomial SSIs. By utilizing a team approach, the system minimized the use of limited health-care resources through early detection and timely interventions of evidence-based wound-care practices. Other successful strategies identified by the study included the development of a home-care worksheet and staff education that enhanced buy-in and supported accuracy and consistency of the documentation.

On a broader level, this project was a model of non-funded quality improvement activity that produced both inter-hospital comparative data and predictor data. The project was not limited to data collection. It supported multidirectional dialogue and collaborative communication between acute-care sites and home care, which in turn has opened discussions for expanding the home-

care surveillance efforts to other types of infections, such as urinary tract infections. It also provided feedback to our regional administration, highlighting the problem and stimulating infection- and prevention-control activities. In addition, the work has opened discussions on reviewing existing surgical practices with a goal of working toward decreasing SSI incidence and prevalence with the potential to generate policy and procedure development from existing best practice guidelines.

The success of this work is now part of home care's routine practice known as the Home Care Surgical Site Infection Program. Ongoing education and reminders to the program staff and managers have been identified as a needed process to sustain awareness and ensure continued success. ☺

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How to Critically Evaluate a Poster



BY
M. Gail Woodbury

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Posters are a highlight of a conference as they raise our awareness of our peers' work. In a recent issue of *Wound Care Canada* in an article on how to develop a poster, it was stated that posters provide "an opportunity for researchers, clinicians, educators, and policy-makers to share ... their latest passion, burning questions, innovative practices or new paradigms for delivering care."¹ Many posters are very well prepared and professional, and they contain good content. Posters at wound conferences usually present research reports, educational information, public policy issues, and clinical practice tips and reports. Some are prepared by wound-care companies either to report on research that supports their products or to market their latest product.

Conference attendees may have a difficult time distinguishing a good poster with relevant and recent information from one that is not so good or is purely for marketing. How would one know?

Consider the following:

Authors. Who are the authors and what are their credentials? If you don't know them, ask your colleagues. Have you seen this poster at a conference before? Is it old material being flogged?

Abstract. The poster's abstract is a good place to start; it might be included on the poster or it will be in the conference syllabus. It will give you the two-minute version of the poster and will help you determine if the poster is of interest to you. The abstract should address four key questions:²

1. What was the problem?
2. How did the authors solve the problem?
3. What was discovered?
4. What can be learned from the experience?

Appearance. If it's a mess or hard to read, why should you bother reading it? How does it look? A poster's appearance should be professional but not flashy. Sometimes posters look great but have no substance or contain a pitch. There should be a natural flow to the purpose, methods, results and conclusions. It seems obvious but you'd be surprised what people do especially if there are charts, photographs, etc. Posters take time and thought; sometimes people rush to finish their posters by a deadline, and often it shows. Is the poster complete? Look for all the content elements indicated below.

Content. If your interest is piqued by the reputation of the authors, the abstract, and the appearance, you will want to evaluate the content of the poster and ask yourself if you believe it. To do this, one could use the CRAP tool.³ The items listed in the CRAP tool are intended for evaluating abstracts but apply equally well for detecting bias in the content of reports and posters. The wording has been changed (see sidebar on next page) to make it more generic to posters of any type. For




Questions to Ask about the Content of a Poster

Are the **title** and **objectives** stated clearly and in terms of PICO (population, intervention, control, and outcome)? Perhaps not all the PICO items are relevant for a particular poster, but you, the reader, want to know specifically what the poster is about.

Does the **background** information provide good rationale for whatever was done? Does it allow you, the reader, to understand usage or potential application? Does it grab your interest?

Are the **methods** clear and complete? The methods will differ depending upon the poster type. (See CRAP tool.) In general, you will want to have confidence that you understand what was done and agree with the approach. If details are missing, you cannot assume a project was done well. Is the intervention or educational program appropriate to achieve the desired outcome? Is it clearly explained with sufficient detail to be reproducible? Is it feasible?

Do the **results** correspond with the study objectives, and are the details specified?

Do the **conclusions** relate to the objectives? Have the limitations of the work been considered? Are the results generalized appropriately (e.g., to patient populations and clinical or educational situations)? Are the project outcomes and benefits clearly stated and pertinent?

Have **conflict of interest** and/or study sponsorship been disclosed? This point is important because there are different reasons why companies sponsor and otherwise get involved in projects. If employees of a company have prepared the poster, you the reader, need to decide if it is purely a marketing device. If one company's product is being promoted at the expense of that of another company, you must decide if those results are biased. If the poster has been sponsored, you need to decide the extent to which you think the sponsor has influenced the content of the poster or if the authors have been free to voice their own opinions.

specific types of posters, refer to the CRAP tool.

Perhaps one of the most important ways to evaluate the credibility of a poster is to talk to the poster presenters, who will help you understand their approach. Most conferences allocate a time when the poster authors are available and eager to discuss their findings. You will get more information and you can help them by giving feedback about your impressions.

In summary, sometimes it is difficult to evaluate the information provided in posters. One needs to have a critical eye and take a systematic approach. Consider the authors, abstract, appearance and content. Let's discourage our colleagues from presenting the same posters at multiple conferences. Perhaps we should

date them as publications are dated. Let's also encourage good quality studies that promote our own efforts but not at the expense of the work of others. ☺

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This year, the CAWC is expecting up to 100 poster submissions for the annual conference in London, Ontario, November 1-4.

Copies of the CRAP tool will be available to enhance attendees' critical evaluation of posters.



Nursing Informatics: A Valuable New Tool for Nursing in Canada



BY
Virginia
McNaughton

Virginia McNaughton, BA, MPA (Health), RN, ET, is the Clinical Consultant for Wound, Ostomy and Continence Care at Saint Elizabeth Health Care. She is the Canadian Association for Enterostomal Therapy (CAET) Regional Director for Ontario and CAET Co-Program Leader for Informatics and Research.

If you were asked what you did to contribute to the overall health of your patient/clients, how would you respond? What if you asked 100 of your colleagues the same question? Would you get a consistent answer?

What if your pay was directly linked to the health outcomes of your patient/client? Could you differentiate your care from the overall care they received from all the providers that provided services to them? If asked how you contributed to patient/client care and why your job should be secure, could you clearly articulate your value to the Chief Finance Officer of your hospital or organization?

If you were to ask the public, politicians or other health-care providers what contribution nurses made to patient/client care, what would they say? Did you know that because nursing care is considered part of the "hotel costs" of care and not captured on the patient discharge sheet in a standardized way (Nursing Minimum Data Set) it is assumed that nursing has had no concrete effect on patient outcomes no matter what level of practice or what discipline? In the words of Katherine Hannah, the Health Informatics Advisor to the Canadian Nurses Association (CNA), "If we cannot name it, we cannot control it, finance it, teach it, research it, or put it into public policy."¹

Informatics revolves around data acquisition, storage and analysis. Nursing informatics, a relatively new specialty, has been defined by the American Nursing Association as "the combination of nursing, information, and computer sciences to manage and communicate information to support nurses and health-care providers in decision-making."²

Florence Nightingale knew the importance of nursing informatics. "She used information she gathered through careful observation and documentation to represent the health problems she encountered while pursuing her goals for improving and reforming hospitals and health care."³

Kathryn Hannah states, "The CNA has taken the position that registered nurses and other stakeholders in health-care delivery require information on nursing practice and its relationship to client outcomes." This is essential for human resource planning, to expand our knowledge and to set research agendas.¹

It is inconceivable that in the year 2007 nurses cannot fully articulate standardized constituents of their care that impact the health outcomes of their clients.

Nurses and all health-care providers must become familiar with the methods of analyzing and manipulating information to improve the care of our clients, describe and evaluate what we do and market our value to the public.² Nurses especially will have to re-educate themselves about nursing informatics, as many members of this profession did not learn this information during their academic preparation.

Wound care in Canada is delivered by a wide variety of "wound specialists." As wound-care specialists we intuitively know (think, hope) that we bring value to the Canadian health-care system by improving healing outcomes of our patients/clients and supporting cost-effective practices. However, we have not "proven" this value nor can we differentiate the values different disciplines bring to the patient. The Canadian Association for Enterostomal Nursing (CAET) has taken

the lead in assessing the cost effectiveness of ET Nurse interventions in a recently sponsored "Cost Outcomes Study" to provide this valuable data. This is an excellent first step. I urge the membership of the CAWC to make this a priority for future research.

To learn more about nursing informatics and the utility of databases, please check out some of the following sources:

- Canadian Nursing Informatics Association, www.cnia.ca
- What is nursing informatics and why is it so important? [www.cna-nurses.ca/CNA/documents/pdf/publications/NursingInformatics, Sept_2001_e.pdf](http://www.cna-nurses.ca/CNA/documents/pdf/publications/NursingInformatics_Sept_2001_e.pdf)
- Canadian Institute for Health Information Web site http://secure.cihi.ca/cihiweb/dispPage.jsp?cw_page=hrdata_nursing_data_e

- The Players: Getting Nurses into the Equation by Jan Carter http://secure.cihi.ca/cihiweb/en/downloads/event_partner_apr04_equation_e.pdf. 📄

This article was originally published in The Link, April 2007, on page 13, and has been adapted with permission from the Canadian Association for Enterostomal Therapy.

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Deep Tissue Injury: What, Why and When?

continued from page 12

Ms. DZ is admitted for observation and treatment of the DTI, which could decline rather quickly. She is given a high-protein diet due to her pre-albumin level being slightly decreased at 15 g/L. She is also prescribed a 100 per cent RDA multiple vitamin-mineral supplement to make sure she is receiving optimal levels of crucial elements for wound healing. Skin care consists of gentle phospholipids cleansers, an amino acid and vitamin enhanced skin-repair cream and a protective cream containing a silicone blend to prevent further damage. A silicone-faced foam dressing is ordered for the DTI since it is slowly oozing serous fluid and remains very tender to touch.

The wound does not open—rather sloughing the necrotic tissue after Ms. DZ is discharged to a long-term care facility. The physiotherapist is also contacted to assess Ms. DZ's wheelchair and cushion. She eventually is able to rehabilitate and go home. Simone, her support dog, is taught to alert 9-1-1 via a special phone that she can operate, making sure that this unfortunate accident never happens again. 📄

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Dressings Destined for Disposal Support Wound Care Centre in Mexico

By
 José Contreras-Ruiz, MD,
 Heather Trowell, BSc OT(c),
 Penny Bickerton, RN, IWCC,
 Susan Christensen, RN,
 Patricia Coufts, RN,
 Marjorie Friedheller, RN, BScN, MSc(c)

The Interdisciplinary Wound and Ostomy Care Centre at the “Dr. Manuel Gea González” General Hospital in Mexico City is a clinic dedicated to education, research and patient care. This hospital depends on the Health Secretariat for its operational budget and serves all those patients without any other form of health-care coverage.

Care is a challenge. The average income of the patients treated at this centre is two minimum wages (approximately \$10 CAN/day).

The budget given to the hospital by the health authorities does not cover all of the advanced dressings these patients need. The only material provided for the last six years has been normal saline, tape, gauze, povidone iodine and surgical scrubbing soap. Patients have had to pay for their own dressings, and if they came to the clinic they had to leave with nothing but gauze and povidone iodine. Home care is not even close to being a reality.

A few wound-care companies have been working with the centre in Mexico to create a “wound care closet.” These companies provide their products at the lowest cost they can manage, and the clinic sells them without making any profit. While this has been of great help, it has not entirely solved the problem because a lot of patients can’t afford even these lower-priced dressings—especially those needing the products that are the most expensive in each line.

Something was needed to fill the gap.

One of the most important advantages of the annual Canadian Association of Wound Care (CAWC) conference is the opportunity to network. Some time ago, while talking about this situation, some members of the CAWC mentioned how health-care policies in Canada created some “waste” that could be useful in clinics in developing countries. Some examples of this are

- dressings that have gone beyond their expiration date
- partially opened dressings that would otherwise be disposed of*
- the unused materials from an instrument tray that don’t come into contact with patients—which otherwise are destined for disposal*
- whole boxes of dressings that have gone to patient’s homes, even if unopened and not expired, that cannot be returned to the home-care agency



Wound-care patients in Mexico are receiving better care thanks to the generosity of Canadian companies and health-care professionals.

Through planning and the generosity of organizations and individuals, an

opportunity arose for collaboration to change this “waste” into a priceless resource in another setting.

Nurses from Canada have been actively saving all these dressings, bandages, wrappings, instruments, etc., and shipping them (at their own expense) to the Wound Care Centre in Mexico. As amazing as it may seem, this has allowed patients to receive a dressing change at least every time they come to the clinic. A single dressing change may seem insignificant, but it is not; once patients see the improvement provided by these products they often decide to invest their

scarce resources in the dressings prescribed for them. Furthermore, patients who come for the first time would otherwise have to be dressed with gauze, then sent to buy their dressing and then come back to be properly dressed, making the clinic very inefficient and creating inconvenience for patients. Another great advantage of this aid is that the centre can now make deals with the patient such as, "we can give you this one for free, but you must continue on with your treatment as per indicated ...," which encourages them to adhere to the plan of care. In the case of very poor patients, the centre can now even provide whole packages of dressings; however, this is the exception rather than the rule.

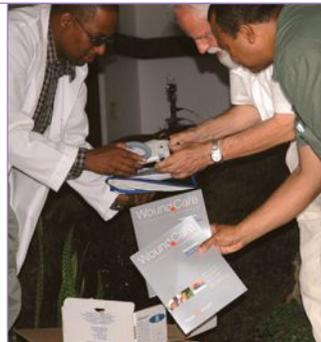
Thanks to the altruistic nature of these nurses and to the opportunity for networking provided by the CAWC, the centre is fully operational and providing state-

of-the-art wound care, even though it is located in a country that is far away from reaching Canada's stage of development. Once again the benefits of networking and the focus of the CAWC on connecting with the international wound-care community has provided a tangible benefit for patients abroad. ☺

Disclaimer: Policies regarding the use of outdated or opened dressings are left to the discretion of the clinicians in Mexico who receive these items.

Acknowledgements: Dr. Contreras-Ruiz would like to thank Sunita Coelho and Marilena Amarelo for having saved dressings during his stay at Women's College. Those dressings were carried to Mexico and allowed the clinic to care for patients for over a year.

Surplus Product Boon to African Partners



The CAWC solicits product to use in demonstrations at various educational programs, and as a result sometimes has surplus product. To prevent this product from going to waste, in 2007 the CAWC seized an opportunity to put the items to good use. Based on conversations with Daudi Mavura, the winner of the 2006 R. Gary Sibbald International Scholarship, the CAWC sent a shipment to the Regional Dermatology Training Centre (RDTC) in Moshi, Tanzania, at which Mavura is a faculty member.

The photo on this page shows Mavura and colleague Henning Grossman unpacking the boxes. Here are their comments:

"Greetings from a happy RDTC team in Moshi!

"Unbelievable, but the parcel safely arrived yesterday and was unpacked by members of our team today. It was enthusiastically received.

"Many thanks indeed. Not only the pocket Doppler but also the excellent supply of silicone, burn antimicrobial dressings and transparent adhesive films and others were very much welcomed."
— *Henning Grossman*

"We really need the leftovers because they will help in our daily wound-care management—especially Dopplers to confirm our diagnoses and for teaching purposes. We really need compression products ... to provide the compression required as well as ideal dressings."
— *Daudi Mavura*

As a result of this experience, the CAWC is now working on a plan to become an official clearinghouse of product in Canada with the hope of providing it to legitimate wound-care organizations in countries in which the donation of product would result in improved patient outcomes. ☺

Canadian Association of Wound Care News

CAWC President Cathy Burrows Wins Excellence in Clinical Practice in Nursing Award

CAWC President Cathy Burrows recently received the Excellence in Clinical Practice in Nursing Award after being nominated by her peers and selected by a panel at the

College of Registered Nurses of Nova Scotia. The award recognizes an individual who "advances and promotes the practice of nursing by contributing to nursing and health policy through participation on committees ...



promotes the image of nursing by acting as a positive role model ... acquires new learning and incorporates this in the practice environment ... demonstrates strong leadership and interpersonal skills ... demonstrates commitment to evidence-based and/or best practice.

"This award was quite an honour for me," says Burrows, "especially on the 30th anniversary of my career. Throughout my career working in an operating room, burn unit, and cardiovascular surgery, I did not think my experience would prepare me to work in wound care. I have been very fortunate to have many mentors who supported my practice and who gave me the knowledge and confidence to pursue the dream of developing a Vascular Leg Ulcer Clinic at the QE II Health Sciences Centre in Halifax. I work in a multidisciplinary setting, and my colleagues are an integral part of my award as they collaboratively work to promote and advance the quality of wound care for our patients."

Get Ready for the Biggest Year in Wound Care in Canada

2008 is shaping up to be the biggest year in wound care that Canada has ever seen. Are you ready? Regardless of where you live or what your interests are, 2008 has something for you.

If you're looking for fundamental education in wound care, the S-Series is a great place to start, with three sessions for 2008—in Thunder Bay, Edmonton and Quebec City (in French). The first day, the S1, is knowledge learning from Canada's premier wound-care educators. Day two, the S2, consists of hands-on workshops facilitated by regional wound-care experts. An exhibit area provides participants with the opportunity to mingle with our corporate partners to ask questions and learn about products and services that can help provide patients with the best possible care.

If you're interested in being part of the largest wound-care event in the world, your choice should be the Third Congress of the World Union of Wound Healing Societies, being held in Toronto, June 4-8. Up to 5,000 participants are expected, with colleagues from all over the world attending. Experience the thrill of networking and learning at the largest wound-care gathering anywhere!

For a completely different experience consider the CAWC's offerings. As the premier hosting society of the 2008 World Union, the CAWC agreed to cancel its annual conference and instead will be offering two extraordinary theme meetings in 2008. Located in two of Canada's most beautiful locations, Halifax and Victoria, these more intimate meetings will offer participants a unique, interactive, hands-on learning experience, where the CAWC will deliver the most compelling ideas in wound care in our most unique agenda ever.

Some of you will be able to do it all, and you'll be in for the best professional development year of your life. But for most, choices must be made. The good news is that every choice is a great choice!

Visit the CAWC Web site at www.cawc.net for more information on each of these options and start planning now to maximize your 2008 wound-care experience. It's just around the corner!

Pressure Ulcer Awareness Program (PUAP) is Creating a Positive Buzz

The CAWC has very positive news on the PUAP front as facilities continue to sign up to improve patient care as well as their bottom line!



Team Leader Hired

Kimberly Stevenson has been hired as the first national Team Leader for the PUAP. The Team Leader is responsible for overseeing the implementation and sustainability of the PUAP, the country's most exciting new health-care initiative.

Spend a Little, Save a Lot

Can implementing the PUAP prevent patient suffering and save money for your facility? Yes it can! New results from the pilot program suggest that reduced prevalence can lead to reduced spending. According to the Champion of one of our long-term-care pilot sites, costs for dressings in the 385-bed facility were \$89,436 in 2004-2005. In 2006-2007—the year the PUAP was piloted—they spent only \$55,118, for cost-savings of \$34,318. With a price tag of about \$6,000 dollars per year—and savings of over \$30,000 in this case—the PUAP has demonstrated that it is a wise investment in improved patient care and cost-effective management. Can your facility afford NOT to have it?

PUAP Web Site a Valuable Resource for Clinicians and Patients

Visit the PUAP Web site at www.preventpressureulcers.ca for more on the program and for useful information on preventing pressure ulcers. The site also contains sections for patients at risk for developing pressure ulcers and for people caring for someone at risk. The language is accessible, the information is based on the best available evidence, and the tips are easy to implement.

Facilities Keen to Implement PUAP

The rollout for the program is picking up steam, with several "cohorts" already up and running. Is your facility one of them? If not, don't let another day go by without investigating how your facility can benefit. Just pick up the phone and give us a call at 250-764-6283. We'll help by answering your questions, providing detailed resources and speaking directly to your manager, director of care or CEO.

Special Announcement: Supporting the Ethical Delivery of Wound-care Education

In response to concerns expressed to the Canadian Association of Wound Care (CAWC) and the Canadian Association for Enterostomal Therapy (CAET) from our members, our corporate partners and other stakeholders in wound care, the CAWC and CAET are working to address the issue of delivering ethical and effective wound-care education. Over the next year or so, we will turn our attention to creating a position statement for each of the following areas vis-à-vis education: (1) Industry Responsibility, (2) Individual Educator Responsibilities and (3) Accreditation. The focus of this article is Industry Responsibility.

The key areas of concern involve the ethics surrounding the delivery of corporately sponsored educational programs. Two principal issues have been identified as potentially problematic:

- Is the education based on current evidence-based literature that supports best practice recommendations?
- Is the education obligation-free or is it tied to buying protocols?

These issues are not new, but they continue to resurface and create confusion and concern in clinicians who sometimes feel ill-equipped to evaluate the programs on their own or who feel the programs have been imposed on them by decision-makers who are unaware of best-practice principles in education. To address the problem, we are taking a multi-pronged approach:

1. The CAWC and CAET are currently working with our Canadian wound-care industry partners to develop an Industry Code of Ethics for industry-sponsored education.

2. We continue to offer support to agencies, institutions, industry and governments through existing educational programs that provide information on how to critically evaluate wound-care information.
3. The CAWC is developing new educational programs, including a wound-care symposium aimed at decision-makers in health care, such as facility and agency executives, government and private policy-makers, and purchasing department administrators. By providing education to decision-makers, the CAWC aims to improve the capacity of individuals in key positions to make informed decisions about education in their facilities/agencies.
4. The CAWC is planning to develop tools to assist clinicians, agencies and governments in accurately assessing proposed educational programs to ensure they conform to best practice recommendations and adhere to evidence-based practice.
5. The CAWC is considering offering clinicians, industry, agencies and governments a review of their educational programs and accrediting the programs appropriately.

Through these and other initiatives, the CAWC and CAET will continue to support and promote ethical, best-practice-based wound-care education. If you have thoughts on these initiatives, please visit the CAWC Discussion Forum at www.cawc.net/open/forums/discussion_forum.html and share your opinions. As well, please e-mail us directly at cawc@sympatico.ca with your comments or direct experience to help us better understand your concerns.

Where Does Your Money Go?

BY
Christine Pearson
AND
Rob Stephen

As members of the (volunteer) Board of Directors of the CAWC, we're often asked to explain how the association works, especially how money is generated and spent.

In the area of finances, in particular, the CAWC differs from other similar non-profit associations. How? The operations of the CAWC have been self-financing since its inception. The CAWC does not receive any federal or provincial government support for its ongoing operations. The association conducts business in a fiscally responsible manner with a balanced budget each year while providing for financial contingencies and future strategic initiatives through an annual contribution to a reserve fund. Some of the key programs include

- **an annual national conference** every fall that has diversified educational sessions and presentations by national and international speakers to satisfy those looking for basic or advanced information, a research stream, poster presentations and product exhibitions
- **the S-Series**, a popular educational program delivered in different locations around the country each spring, with a focus on fundamental knowledge of wound care and hands-on skill development
- **Wound Care Canada**, Canada's first publication devoted entirely to wound care
- **an interactive, bilingual Web site** (www.cawc.net) that carries a wealth of information, with everything from a discussion forum, job postings, and links to wound-care events and other wound-care organizations, to information about educational programs put on by the CAWC, a resource library with free down-

loads of important wound-related articles, a boutique for the purchase of wound-care essentials, and more

- **the administration of scholarships** for the improvement of wound-care research and practice
- **international partnerships** and initiatives for furthering wound care in Canada and around the world
- **the recently launched Pressure Ulcer Prevention Program**, a quality improvement initiative designed to improve patient care, reduce clinician workload

and save the health-care system, and participating facilities, money and participating facilities, money

- **ongoing CAWC member communication** through e-bulletins, a members-only section of the Web site, and an in-the-works member directory

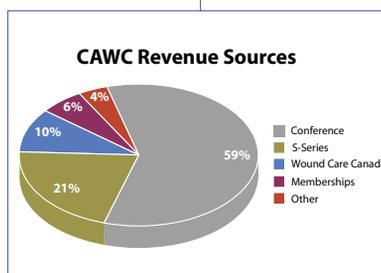
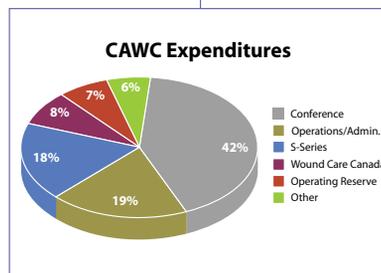
How does the CAWC support

these and other initiatives? The charts on this page show the significant sources as conferences, education initiatives, *Wound Care Canada* and memberships. The expenditures of the CAWC are primarily in conference, education, *Wound Care Canada* and operations.

CAWC membership is a great way to contribute to the advancement of wound care across Canada—and it provides tremendous value to the individual. CAWC members have access to

incomparable networking possibilities, a free subscription to *Wound Care Canada* and other select health-care publications, access to the members-only section of the CAWC Web site, and a discount on CAWC events, programs, and merchandise. For more information on membership, please e-mail cawc@sympatico.ca.

For more information on the CAWC, visit the Web site at www.cawc.net. ☺



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Rob Stephen, CA,

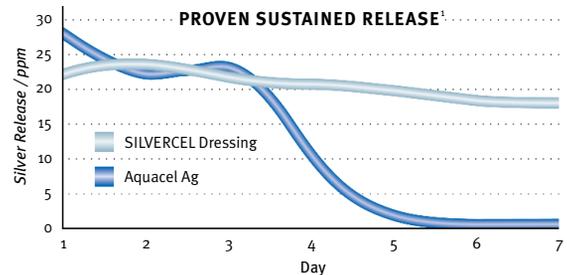
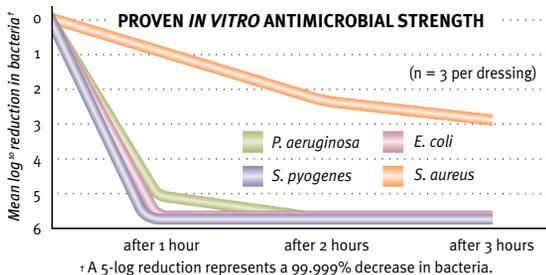
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Nitric Oxide: Biofilms Beware!

BY
Catherine Harley

Chronic wounds of the lower extremity, as defined by showing no evidence of healing after a six- to 12-week period of best clinical practice,¹ are a challenge to both health-care professionals and patients. Several factors can impact the normal healing process, including infection, the presence of necrotic tissue, impaired tissue perfusion and the use of steroids.² Research has shown that the presence of bacterial biofilm or critical colonization—which is a complex, organized network of bacteria and tenacious film that is difficult to treat with conventional antibiotics³—can also disrupt the normal healing process. Sharp debridement and topical antimicrobials are often used to deal with these biofilms, but they are often ineffective.⁴ Introduced gaseous nitric oxide (gNO) may provide a new option for eradicating these biofilms.⁵

Nitric oxide (NO) is a very small free-radical gas that has now been identified as a key secondary messenger molecule for many basic biochemical reactions within body systems. NO, as a result of various stimuli, is regulated by three nitric oxide synthases (cNOS, iNOS and eNOS) that are each responsible for various concentrations and the duration of NO produced. NO is

synthesized in the presence of oxygen and calcium by cleaving a NO molecule off a precursor amino acid (L-arginine). The molecules of NO produced, because of their lipophilic nature and small size, readily pass through cell membranes. NO, acting as a secondary messenger molecule, reacts with chemical targets such as oxygen to form reactive oxygen/nitrogen species or enzymes containing heme or iron (Fe), resulting in the genesis of major cytokinetic activity.

For example, within the circulatory system, NO acts as a powerful and selective vasodilator by up-regulating cyclic guanosine monophosphate (cGMP), which prevents the influx of calcium ions that results in smooth muscle relaxation-vasodilatation. These characteristics of NO have led to extensive human studies with inhaled gaseous NO and its approval as a drug for reversing pulmonary vasoconstriction for treating “blue baby syndrome.” NO is also a neurotransmitter that helps in the processing of nerve signals as they cross synapses. Within the innate immune system, NO is produced by macrophages and neutrophils and plays a key role as a frontline non-specific antimicrobial agent against a wide variety of micro-organisms, including

continued on page 62

Catherine Harley, RN, IIWCC, is the Associate Editor of *Wound Care Canada* and Executive Director of the Canadian Association for Enterostomal Therapy.

Glossary of Terms

Angiogenesis: The growth of new blood vessels that restore blood flow to tissues after injury.

Amino Acids: Building blocks of proteins.

Biofilm: Micro-organisms that adhere to surfaces.

Guanosine monophosphate: A nucleotide found in RNA.

L-arginine: A protein amino acid present in the proteins of all living beings.

Lipophilic: Having the ability to dissolve, be dissolved in, or absorb lipids (fats).

Macrophage: A type of white blood cell that ingests foreign material and plays a major role in the immune response to foreign invaders such as infectious organisms.

Neutrophil: A type of white blood cell that helps to kill micro-organisms in the blood.

Proline: An amino acid.



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bacteria and viruses. With so many roles, it is not surprising that NO is associated with the regulation of wound healing; in fact, when there is a lack of NO the normal wound-healing process is impaired.

The specific benefits of introduced nitric oxide gas in wound healing are associated with anti-microbial and anti-inflammation properties.^{6,7} Recently it has been suggested that availability of L-arginine resulting in NO synthesis is necessary for the proper cross-linking of collagen fibres to one another, via proline, to minimize scarring and maximize the tensile strength of healed tissue.⁸ Early research shows that NO may regulate gene expression, which can play an important role in the wound-healing process.⁹ At low levels, NO has an impact on keratinocyte proliferation, while at higher levels there is an inhibition of cellular proliferation and differentiation occurs. In addition to its antimicrobial properties, NO has been seen to play a role in angiogenesis (the formation of new blood vessels).¹⁰

Clinical case studies have shown that gaseous NO can be delivered nocturnally at home with good patient adherence. There have been no side effects noted for this treatment, and preliminary clinical studies demonstrate results that look promising. Clinical research with NO is in progress, and in the future you may see it as an adjunct therapy for non-healing, chronic wounds.

For further information on the use of nitric oxide in wound healing, visit www.baromedical.com/HBO2006/handouts/Boykin-HBO_Nitrix_Oxide.pdf. 

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Infection and Wound Care: A Critical Role for Prevention and Control

continued from page 43

Hand-washing is the single most important infection prevention tool there is. Alcohol hand rinses have helped to decrease the amount of time it takes to clean hands, but the statistic remains that health-care workers only wash their hands 30 to 50 per cent of the time where it would be appropriate for them to do so.⁵ That is a scary number.



Do you see any future trends related to the infection control of wounds?

I think we will continue to see new antimicrobial dressings on the market, and hopefully resistance to these will not happen any time soon. However, when it does, we will have to look for other ways to manage microbes in our wounds. 

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