WINTER 2018
VOL.16 NO.2

# Wound Care CANADA

THE OFFICIAL PUBLICATION OF WOUNDS CANADA

## Saving Health-care Dollars: Two Stories from LTC

## The Impact of Spinal Cord Injuries

## The Importance of Hydration for Wound Healing

## Embracing Social Media in Health Care

## Feature: Session Summaries from the 2018 Fall Conference

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# Contents




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Wounds Canada (www.woundscanada.ca) is a non-profit organization of health-care professionals, industry participants, patients and caregivers dedicated to the advancement of wound prevention and care in Canada.

Wounds Canada was formed in 1995 as the Canadian Association of Wound Care. The association's efforts are focused on four key areas: education, research, advocacy and awareness, and partnerships.



## Don't Miss Out

Each time a new issue becomes available, subscribers will be notified by an email that contains a live link to the online magazine. If you are not already a subscriber, get on the list by sending an email to info@woundscanada.ca. **It's free!**

# News in Wound Care

## Wounds Canada News

### Year-end Wrap-up

We are happy to report that Wounds Canada had a very successful 2018, with two conferences—one in Winnipeg, MB, and one in London, ON—the launch of our Wounds Canada Institute, the publication of a wide range of tools, documents, publications and other resources, and advocacy activities throughout the country. We were in the media spotlight a number of times providing expert commentary on the issues, as experts on the issues clinicians and patients face every day. We're looking forward to another productive year in 2019.

### 2019 Events

As always, Wounds Canada has a busy schedule of events planned, so mark your calendars for the activities that will help you with your professional development and networking. Visit our website for more details on each of the events.

#### Conferences

- **April 12–13, 2019:** Wounds Canada Spring Conference, Halifax Convention Centre, 1650 Argyle Street, Halifax, NS
- **May 31, 2019:** New for 2019: Wounds Canada Limb Preservation Conference, DoubleTree by Hilton Toronto Downtown, 108 Chestnut St., Toronto, ON
- **October 3–6, 2019:** Wounds Canada Fall Conference, Fallsview Casino Resort, 6380 Fallsview Boulevard, and Niagara Falls Hilton Hotel & Suites, 6361 Fallsview Boulevard Niagara Falls, ON


### Posters at Conference

Watch the Wounds Canada website and your inbox for announcements about the call for abstracts for the Halifax and Niagara Falls conferences. We invite authors to share information about activities/projects related to skin and wound care in a broad range of areas including research, education, health policy and clinical practice. You may be selected to present your poster digitally and/or orally. Share your research and experience by submitting a poster abstract!

### WC Institute Live Events

The Wounds Canada Institute (WCI) uses the opportunity of holding conferences to present other educational events at the same time and in the same place. For example, at the 2018 fall conference, we conducted three live educational events: The skills lab for the Best Practice Approach to Skin Health and Wound Management: Knowledge and Skills program, the skills lab for the Holistic Approach to Diabetic Foot Offloading: Knowledge and Skills program and the Wound Care for Primary Care Practitioners live event.

This year we plan to hold the following WCI educational events (subject to change):

- **April 11, 2019:** Halifax, NS: Skin and Wound Care for Unregulated Care Providers (UCP)
- **April 11, 2019:** Halifax, NS: Focus on the Prevention and Management of Venous Leg Ulcers: Knowledge and Skills
- **April 13, 2019:** Halifax, NS: Wound Care for Primary Care Practitioners
- **October 2, 2019:** Niagara Falls, ON: Best Practice Approach to Skin Health and Wound Management: Knowledge and Skills

Check out the WCI website for complete details on the programs connected to these live events (note: most of the live events have prerequisite online courses). This could be your opportunity to compound multiple learning experiences in one place at one time!

## WCI Programs

Our popular educational programs have been accessed by hundreds of health-care professionals seeking to improve their knowledge and skills and join an integrated community of learners in the area of wound prevention and management. If you haven't looked into these cost-effective, convenient programs, go to www.woundscanada.ca and check them out. New programs are being added regularly, so don't forget to visit the site and see what's been added.

### New for 2019

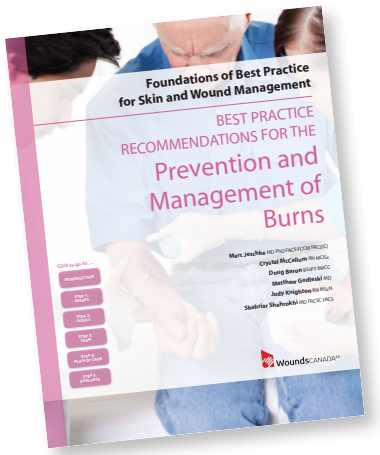
We are pleased to announce that the following programs will be added in 2019:

- Focus on the Prevention and Management of Skin Tears: Knowledge
- Focus on the Prevention and Management of Moisture-associated Skin Damage: Knowledge
- Focus on the Prevention and Management of Burns: Knowledge
- An online version of Skin and Wound Care for Unregulated Care Providers
- An online version of Wound Care for Primary Care Practitioners

## Best Practice Recommendations

Did you know the Wounds Canada best practice recommendation (BPR) articles are Canada's most popular wound documents? Believe it or not, the BPRs have been downloaded over 200,000 times since the first online versions were published in 2017. If you haven't downloaded your copies yet, click here to obtain these essential resources.

### Just Released!




Hot off the virtual presses is our newest BPR: "Best Practice Recommendations for the Prevention and Management of Burns." This comprehensive resource provides clinicians in any setting with the latest information they need on the prevention and management of minor and major burns. Visit the Wounds Canada website to download your copy today!

### New for 2019

More BPRs are currently in the production pipeline and are planned for release during 2019. Over the year we'll be working on:

- "Best Practice Recommendations for the Prevention and Management of Arterial Ulcers"
- "Best Practice Recommendations for the Prevention and Management of Venous Leg Ulcers"
- "Best Practice Recommendations for the Prevention and Management of Moisture-associated Skin Damage"

## New Tools for Clinicians


The Wounds Canada website is a one-stop shop for busy clinicians who want information and tools to improve and support their practices. We've done the work for you by translating the latest research into resources you can use to help deliver the best care to your patients. Check

out our recently published or updated Product Pickers.

**New Tools for 2019**
Coming next year: Advanced Therapies Quick Reference Guide

**Have Your Say!**
What kinds of resources do you want and need? Wounds Canada will be conducting a series of surveys to help determine how we can best support you and your patients. Stay tuned for more information about this initiative and how you can be involved.

## Committees and Task Forces

This year, Wounds Canada created two new groups: National Strategy Committee and the Diabetic Foot Task Force.

The National Strategy Committee is made up of representatives of Canada's health regions and not-for-profit organizations with a stake in wound prevention and care. Its purpose is to "identify, support and advance issues of national importance related to wound prevention and management in Canada and advocate for change to improve patient outcomes."

The Diabetic Foot Task Force brings together stakeholders from across the country to support a national amputation prevention strategy.

## A Place for Giving

We are very pleased to announce that Wounds Canada has created a charitable entity called the Wounds Canada Foundation. The Foundation will enable us to increase our reach into areas such as scholarship, research and, perhaps most importantly, patient outreach. Over the course of 2019, you will receive more information about how you can support the Wounds Canada Foundation and its aims.

# Wound Sleuth

By R. Gary Sibbald, BSc, MD, MEd, DSc (Hon), FRCPC (Med)(Derm), FAAD, MAPWCA, JM, and Patricia M. Coutts, RN, IIWCC

## Recurrent Ulcers on the Site of Previous Trauma and Multiple Surgical Procedures

J.K. is a 64-year-old male employed as a promotions expert. At age five he suffered a traumatic injury to the distal left foot after being run over by a train. He has undergone approximately 20 revision operations and numerous skin grafts since that time.

In 1997, he had successful full skin flap surgery. After this procedure, he participated in a number of competitive sporting activities. In 2002, he developed the first of a number of skin ulcers along the margins of the rotational flap and the adjacent skin. Often these ulcers were associated with localized pain.

### Questions for the reader:

1. What is the cause/diagnosis and how would you investigate this patient?
2. What other diagnoses would you consider?

First, assess for infection. Local infection would have any three of the NERDS criteria:

- **N**on-healing – wound dimensions have not increased in size or decreased in size over the last four weeks
- **E**xudate – the amount of exudate is increased and should be described as serous, sanguineous (bloody), pustular or a combination of two or three types, with the order being based on the most predominant to least predominant component (e.g., serosanguinous pustular). The exudate should also be quantitated as heavy, moderate, light or absent.
- **R**ed, friable tissue is due to increased capillaries on the wound surface. These capillaries are probably stimulated by vascular endothelial growth factor produced from bacteria and produce punctate bleeding points and friable granulation when the wound dressing is removed.
- **D**ebris – the surface of the wound may contain dead cells (black, brown or yellow slough on the wound surface), indicating that the surface of the wound is hostile to cell growth.
- **S**mell is the result of the proliferation of gram-negative and anerobic organisms within the wound.

The deep and surrounding skin compartment may have infection when:

- Size is increasing in the lateral walls of the wound
- Temperature increases more than 3 degrees Fahrenheit compared to a mirror image reading in the absence of vascular disease or deep inflammation
- Exposed, or probing to, bone
- New areas of breakdown existing around the periphery of the main wound (satellites)
- Erythema and edema of the surrounding skin = cellulitis
- Exudate – as above
- Smell, as above, but if both exudate and smell are present, an additional criterion is needed to define superficial infection (treat topically) or deep and surrounding infection (treat systemically)

If the criteria for infection are not present, then superficial

**Figure 1:** Squamous cell carcinoma appearing along the incision line of the left foot

**Figure 2:** Squamous cell carcinoma with granulation-like tissue appearing in the base of the lesion

**Figure 3:** Hyperkeratotic squamous cell on the left foot associated with localized pain

and/or deep inflammation may be the cause of skin breakdown in this case. Infections should be treated, but if the wound persists, chronic inflammation—superficial or deep—should be suspected. Surface inflammation and infection can be treated with silver dressings, and deep inflammation and infection can be treated with agents such as doxycycline, cotrimoxazole (sulfamethoxazole + trimethoprim), trimethoprim alone or erythromycins.

If the wound still fails to respond to these measures, or if the wound is initially suspicious of malignancy, a skin biopsy should be performed, as persistent inflammation can lead to malignant transformation.

## Management

The initial biopsy was a squamous cell carcinoma, with 11 subsequent biopsies from different locations (12 in total) diagnosed as squamous cell carcinoma. One biopsy demonstrated dysplasia that was not adequate enough for the dermatopathologist to call a squamous cell carcinoma. Three biopsies were consistent with an actinic keratosis, indicating some sun-induced changes, and five biopsies were consistent with non-specific inflammation. In total, 21 biopsies with 12 squamous cells, four premalignant biopsies with an element of sun change, and five biopsies having non-specific inflammation that was probably the precursor of malignant transformation. We avoided radiotherapy because of the possibility of secondary squamous cells due to the radiation in a young patient.

To manage these lesions, topical imiquimod was applied topically along the grafting margins to identify subclinical lesions as well as to treat residual disease after local curetting and electrocautery. The imiquimod was applied sparingly, most often two times per week to avoid excessive inflammation. We tried to avoid surgical excisions due to the prolonged recovery time and the risk of creating more sites for chronic inflammation and malignant transformation. An alternative to imiquimod would be 5-fluorouracil cream that could be applied in a similar fashion or tried daily for one week per month.

J.K. was asked to apply sunscreens if his feet were exposed. The sunscreens should contain an SPF of 30–60 but also have UVA protection, as UVA can penetrate car and other window glass. Sunscreens must be applied before any other cream or ointment. Continued local surveillance and checking for regional lymph nodes (popliteal, femoral, inguinal) was required. Other than the 12 squamous cells on the left foot and ankle, J.K. has had only one other skin cancer: a basal cell carcinoma of the forehead, so that the persistent inflammation is probably most responsible for the malignant transformation in this case.

# RECOGNIZING HS

## DO YOU RECOGNIZE PATIENTS WITH HIDRADENITIS SUPPURATIVA (HS)?

**DR. NEIL SHEAR**
Head of Dermatology, Sunnybrook Hospital

"HS is a chronic, painful, inflammatory skin disease that affects 1-4% of the general adult population. It is characterized by boils usually occurring where certain sweat glands are located, such as under the breasts, buttocks, and inner thighs."

"People with HS come to the emergency room in severe pain and discomfort requiring assistance with the draining of the boils during a flare-up. It's not unusual for patients to go home undiagnosed."

**DR. VU KIET TRAN**
ER physician at University Health Network

**DR. RALPH GEORGE**
Associate Professor, University of Toronto, Division of General Surgery

"There is currently no cure for HS. Early diagnosis and proper management is important for a patient's quality of life. The first step for those with HS is to speak to their dermatologist to get an accurate diagnosis."

**To learn more about HS from these specialists, go to www.RecognizingHS.com/WCC**

## WHEN YOU SEE THESE LESIONS, DO YOU SUSPECT HS? DO YOU ASK ABOUT RECURRENCE?

Photo compliments of Dr. Afsaneh Alavi.

Photo compliments of Dr. Marc Bourcier.

## ASSESSING PATIENTS WITH RECURRENT BOILS

**Most HS cases can be recognized with high reliability by the presence of 3 main features:**[1-3]

1. **Typical lesions:** nodules, sinus tracts, abscesses, scarring
2. **Typical anatomical location:** axilla, groin, genitals, under the breasts, others (perianal, neck, abdomen, buttocks)
3. **Relapses and chronicity:** ≥2 times per 6 months

**Questions to ask your patients with suspected HS:**[2]

1. Have you had outbreaks of boils during the last 6 months?
2. Where were the boils and how many did you have?

**To confirm an HS diagnosis, please refer your patient to a dermatologist.**

**References: 1.** Zouboulis CC, *et al.* European S1 guideline for the treatment of hidradenitis suppurativa/acne inversa. *JEADV* 2015;29:619-44. **2.** Lockwood SJ, *et al.* Diagnostic workup. In: Kimball AB, Jemec GBE, eds. *Hidradenitis Suppurativa: A Disease Primer.* Cham, Switzerland: Springer; 2016:27-37. **3.** Poli F, *et al.* Clinical presentation. In: Jemec GBE, Revuz J, Leyden JJ, eds. *Hidradenitis Suppurativa.* Berlin, Germany: Springer; 2006:11-24.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# Spinal Cord Injury: An Overview

By Kristyn Campbell, MD, and Chester Ho, MD

The World Health Organization defines spinal cord injury (SCI) as damage to the spinal cord, conus medullaris or cauda equina.[1] Damage to the spinal cord can result in loss of sensation and motor control to the limbs and trunk as well as loss of autonomic control. This in turn can result in abnormal bowel and bladder control, sexual function, breathing, blood pressure, heart rate and temperature control. The extent of these symptoms depends on the level at which the spinal cord injury occurred as well as the extent to which the spinal cord is damaged. *Tetraplegia* (previously known as quadriplegia) is the term used to describe a loss of sensation and motor control in all four limbs and the trunk. Tetraplegia usually results from a cervical SCI. *Paraplegia* is used to describe a loss of sensation and/or motor control in only the lower limbs and sometimes also the trunk. Paraplegia is commonly caused by an SCI in the thoracic or lumbar regions.

The estimated global incidence of SCI is 40 to 80 cases per million annually.[1] In Canada, the prevalence is approximately 1,298 cases per million.[1] Trauma causes include motor vehicle accidents, falls and violence. Non-traumatic SCIs may be caused by degenerative changes of the spine, neoplastic tumours, vascular insults, autoimmune disorders and infections. The incidence of traumatic SCI is higher in adult men, with at least a 2:1 ratio of male to female injuries.[1] The incidence of non-traumatic SCI is also higher in men. Traumatic SCI is most likely to occur in young adults (15 to 29 years) and the elderly (over 60 years), whereas non-traumatic SCI is more common in the elderly. Tetraplegia is slightly more common than paraplegia and accounts for 52% to 57% of SCI injuries.[2]

## How is spinal cord injury classified?

The extent of SCI is described using the International Standards for Neurological Classification of Spinal Cord Injury published by the American Spinal Injury Association (ASIA). The classification is based on a systematic sensory and motor examination of neurological function. The neurological level of injury (NLI) is the lowest segment of the spinal cord with intact sensation and antigravity muscle strength, provided there is normal motor and sensory function above. A level of injury from C1 to T1 results in tetraplegia. A level of injury below T2 results in paraplegia.

The severity of the injury is described by the American Spinal Injury Association Impairment Scale (AIS), which includes five scales from A to E:

**A = Complete:** No sensory or motor function is preserved in the sacral segments S4–5.

**B = Sensory Incomplete:** Sensory, but no motor function is preserved below the neurological level and includes the sacral segments S4–5 (light touch or pin prick at S4–5 or deep anal pressure) AND no motor function is preserved more than three levels below the motor level on either side of the body.

**C = Motor Incomplete:** Motor function is preserved at the most caudal sacral segments for voluntary anal contraction (VAC) OR the patient meets the criteria for sensory incomplete status (sensory function preserved at the most caudal sacral segments [S4–S5] by light touch, pin prick or deep anal pressure), and has some sparing of motor function more than three levels below the ipsilateral motor level on either side of the body. For AIS C, less than half of key muscle functions below the single NLI have a muscle grade ≥ 3.

**D = Motor Incomplete:** Motor incomplete status as defined above, with at least half (or more) of key muscle functions below the single NLI having a muscle grade ≥ 3.

**E = Normal:** If sensation and motor function as tested with the International Standards for Neurological Classification of Spinal Cord Injury (ISNCSCI) are graded as normal in all segments, and the patient had prior deficits, then the AIS grade is E.

## Complications Following a Spinal Cord Injury

In additional to motor and sensory impairments, SCI also caus-

es many other impairments and chronic complications, including psychosocial consequences such as adjustment, depression, vocation, and caregiver burden issues, can be significant and complex. For the purpose of this review, we focus on physiological consequences, which include but are not limited to the following.

## Neurogenic Bladder

### The Impact

SCI above the sacral segments results in an upper motor neuron (UMN) bladder. In a UMN bladder, there is detrusor muscle hyperactivity, with patients presenting with urgency, frequency and incontinence. Intravesical pressures may be elevated. Injuries involving the sacral segments from S2 to S4 cause a lower motor neuron (LMN) bladder. In an LMN bladder, the bladder is areflexic and atonic—so the person cannot voluntarily empty the bladder—and it is prone to leaking, but intravescial pressure remains low.

### The Implications

Urinary tract infections are the most common complication in people with SCIs and are often heralded by increased spasticity, fever, incontinence, autonomic dysreflexia and vague abdominal discomfort. Other urinary complications include vesicoureteral reflux, renal and bladder calculi, hydronephrosis and chronic renal failure.

### The Interventions

Management of neurogenic bladder aims to drain the bladder sufficiently, to ensure continence and to maintain normal intravesical pressure to protect the upper urinary tract. Intermittent catheterization is commonly used for bladder management, but where intermittent catheterization is not feasible, some may choose to have an indwelling urethral or suprapubic catheter.

## Neurogenic Bowel

### The Impact

SCI impairs bowel function and can result in poor colonic motility, delayed transit time, chronic constipation and fecal incontinence. Similar to neurogenic bladder, SCI above the sacral segments results in a UMN bowel pattern, while lesions at the sacral segments lead to an LMN bowel pattern. In a person with a UMN bowel, voluntary defecation cannot be initiated, and the anal sphincter may be spastic, leading to stool retention. Intrinsic and reflex-mediated colonic peristalsis are intact, however, which allows stool to move through the colon and rectum reflexively in response to distension. In a person with an LMN bowel, voluntary defecation and the reflexes are impaired. This leads to an even slower colonic transit time. The anal sphincter is often atonic and prone to leakage of

stool, so incontinence may be a problem.

### The Implications

Bowel continence plays a large role in a person's ability to return to former social roles and activities. Neurogenic bowel may also cause chronic constipation, hemorrhoids, rectal prolapse, acute ileus or bowel obstruction.

### The Interventions

Management of a UMN bowel involves using stool-softening laxatives, colonic stimulants to assist in stool propulsion, and a suppository with digital stimulation to trigger the colonic reflexes to stimulate evacuation of stool. Management of an LMN bowel involves using a bulking agent to achieve a stool consistency that allows for manual disimpaction from the rectum. Adequate fibre and fluid intake also assist with developing bulky, formed stool. A bowel program is individualized to each patient but generally occurs at the same time every day and should take less than one hour to complete. The goals of a bowel program are to efficiently evacuate the colon to prevent incontinence, constipation and complications such as hemorrhoids.

## Spasticity

### The Impact

Spasticity is a common complication of SCI characterized by hyperreflexia, velocity-dependent increased resistance to passive stretch and involuntary muscle contractions or spasms. Spasticity occurs in the muscles below the level of injury in SCIs above the cauda equina.

### The Implications

Spasticity may be painful and interfere with activities of daily living, ambulating, positioning and transfers. However, spasticity may also be helpful for ambulation and transfers by providing more rigid support from the lower limbs. Worsening spasticity is often related to other complications, such as a urinary tract infection—hence the importance to rule this out.

### The Interventions

Non-pharmacological treatments for spasticity include proper positioning, stretching and serial casting. Pharmacological treatments include oral baclofen and other anti-spasticity medications. Focal chemo-denervation with botulinum toxin type A is helpful when specific muscles can be targeted. Intrathecal baclofen is another option for those with diffuse, severe spasticity that is not well managed with other conservative treatment options.

## Bone Health

### The Impact

An imbalance between bone resorption and formation occurs following SCI, leading to increased bone resorption in the bones below the level of injury. This may result in symptomatic hypercalcemia typically in the first three to fourth months after SCI, causing symptoms such as nausea, lethargy, abdominal pain, polyuria and anorexia. Bone mineral density declines by six weeks post-injury, and bone loss continues for years.

Loss of bone density is greater typically in the distal femur and proximal tibia. Tetraplegics may also lose bone density in the distal radius and ulna.

**The Implications**

Osteoporosis in bones below the level of injury may cause fragility fractures during movements such as repositioning in bed or transfers. People with SCIs have twice the risk of a fragility fracture in the lower extremity compared to the general population.[3] Fragility fractures are more common in paraplegics or tetraplegics who are more active and likely to fall.

**The Interventions**

Vitamin D and calcium supplementation is effective in minimizing bone loss. Medications for osteoporosis have been used (e.g., bisphosphonates), but there is no standard guideline for their use after SCI. There is some evidence that standing, and use of functional electrical stimulation, may be helpful.

## Musculoskeletal Complications

**The Impact**

Musculoskeletal complications associated with SCI may cause pain and limit function. Contractures are common in paralyzed limbs due to prolonged joint immobilization. People with SCIs often have very high demands placed on their upper limbs from their work, activities of daily living, and mobilization in a wheelchair. Repetitive motions and recurrent microtrauma can result in overuse injuries, most commonly in the shoulder, causing rotator cuff impingement, subacromial bursitis, osteoarthritis, bicipital tendonitis or capsulitis.

**The Implications**

These are common causes for chronic pain after SCI. Contractures may lead to difficulties in positioning, pressure injuries, or limit the use of a joint if delayed motor recovery occurs. Functionally, these may limit activities such as dressing, hygiene and transfers. Overuse injuries may also limit mobilization and activities of daily living.

**The Interventions**

Prevention of overuse injuries and contractures is key. Prevention of overuse injuries can be achieved by appropriate preservation, optimizing biomechanics and use of upper extremities, as well as strengthening exercises. Contractures can be prevented by daily passive range of motion of all joints, proper positioning, and splinting if necessary. Treatment of established contractures may involve serial casting, surgical tenotomies and/or tendon lengthening.

## Pain

**The Impact**

Pain is a very common complication following SCI, with approximately 50% of people with SCIs experiencing chronic

pain that interferes with activities.[4] The International Spinal Cord Injury Pain Classification organizes pain following SCI into nociceptive, neuropathic and other.[5] Neuropathic pain can occur at or below the level of injury. It is often described as a burning, shock-like, shooting sensation and may be accompanied by allodynia and hyperalgesia.

**The Implications**

Pain following SCI can present acutely and often persists long-term. Chronic pain frequently interferes with activities and work, reducing quality of life.[6]

**The Interventions**

There are a number of non-pharmacologic and pharmacologic treatments for nociceptive and neuropathic pain. Pregabalin and gabapentin are two of the most commonly used medications for treating neuropathic pain. An interdisciplinary approach to chronic pain management is recommended.

## Respiratory Insufficiency

**The Impact**

Respiratory complications are the leading causes of death for people with SCI for all years after injury.[8] Respiratory insufficiency can occur post-SCI due to respiratory muscle weakness, changes in ventilator control and changes in lung and chest wall compliance. The extent of respiratory muscle weakness depends on the severity and level of SCI. Persons with injuries above C3 result in near total respiratory muscle paralysis, requiring mechanical ventilation. Persons with injuries between C3 and C5 result in partial respiratory muscle paralysis and may require mechanical ventilation during acute hospitalization. Persons with injuries between C6 and C8 result in weak forced exhalation, but the inspiratory muscles are functional.

**The Implications**

The risk of pulmonary complications, including atelectasis, pneumonia and pulmonary edema, is high for those with cervical- and (to a lesser extent) thoracic-level injuries. Injuries below the thoracic levels typically have little to no respiratory compromise. Reduced lung and chest wall compliance results in a restrictive ventilatory defect. A lack of supraspinal sympathetically mediated bronchodilation may exacerbate respiratory difficulties.

**The Interventions**

Management of respiratory insufficiency varies depending on the extent of injury but may involve secretion management with assisted cough, lung volume recruitment and ventilator support with non-invasive and/or invasive ventilation.

## Venous Thromboembolism

**The Impact**

Patients with acute SCI have a predisposition to venous thromboembolism (VTE) due to Virchow's triad: immobility causing venous stasis in paralyzed limbs, endothelial injury and alterations in the clotting cascade leading to hypercoagulability.[7] As a result, people with acute SCI have a greater risk of developing VTE than persons with other general trauma.[8]

**The Implications**

Lack of appropriate VTE prophylaxis may result in pulmonary embolism, which may be fatal.

**The Interventions**

VTE prophylaxis with mechanical methods of thromboprophylaxis and anticoagulation is recommended. Mechanical thromboprophylaxis with intermittent pneumatic compression devices with or without graduated compression stockings is recommended as soon as feasible after acute SCI when not contraindicated by lower extremity injury. Anticoagulation with a low molecular weight heparin (e.g., enoxaparin) is recommended in the acute care phase after SCI once there is no evidence of active bleeding and if there is no medical contraindication. In the post-acute and rehabilitation phase, low molecular weight heparin, oral vitamin K antagonists (e.g., warfarin) or a direct oral anticoagulant (DOAC) (e.g., dabigatran) may be used for anticoagulation. Anticoagulant thromboprophylaxis should be continued for at least eight weeks after SCI for those with limited mobility. People with chronic SCI who are re-hospitalized for medical illnesses or surgical procedures should also receive thromboprophylaxis during the period of increased risk.[7]

## Orthostatic Hypotension

### The Impact

Low resting blood pressure and orthostatic hypotension can occur due to interruption of excitatory descending sympathetic input.[9] Pooling of venous blood in the lower extremities also contributes to lower ventricular end-diastolic pressure and stroke volume. Orthostatic hypotension is more common acutely following injury but may persist chronically.

### The Implications

Orthostatic hypotension can lead to lightheadedness and syncope. These symptoms may impair mobilization and increase the risk of falls.

### The Interventions

Symptomatic orthostatic hypotension is treated non-pharmacologically with compression stockings and abdominal binders to prevent venous pooling, or pharmacologically with medications that raise blood pressure, such as midodrine.

## Autonomic Dysreflexia

### The Impact

Autonomic dysreflexia (AD) is a syndrome caused by imbalanced reflex sympathetic discharge in response to a noxious stimulus, resulting in a sudden onset of excessively high blood pressure. Patients with a T6 level injury or above are at risk. Symptoms of AD include a pounding headache, blurred vision, sweating above the level of injury, goosebumps and cool skin below the level of injury, a flushed face, and usually bradycardia.

### The Implications

AD is a medical emergency that, if untreated, can result in cerebral hemorrhage, seizures, arrhythmias, myocardial damage and even death. Triggers of AD are most commonly genitourinary or gastrointestinal issues such as bladder distension or fecal impaction but may range from ingrown toenails to childbirth.

### The Interventions

Treatment is aimed at first correcting the trigger. General measures include emptying the bladder or rectum and loosening tight clothing. If hypertension persists after these measures, antihypertensive medication may be necessary. It is important for patients and caregivers to recognize the symptoms of AD and know how to manage them.

## Sexual Dysfunction

### The Impact

SCI can affect the psychological, physiological and practical aspects of sexual function and fertility. Men and women with SCI may experience reduced sensation, impaired ability to achieve orgasm and difficulties with self-positioning.

### The Implications

Men may experience complete or impaired ability to achieve an erection and ejaculation, which has implications for fertility. Infertility in men with SCI is common due to low sperm viability and motility. Women may have disrupted menstruation acutely following injury, but it usually returns after a few months, and fertility is unchanged. Pregnancy in women with SCI is associated with greater risks of complications such as venous thromboembolism and premature labour, which requires special considerations.

### The Interventions

Oral and injectable medications as well as surgical implantations are available for erectile dysfunction. Fertility treatments

may require semen retrieval and insemination. Management of sexual dysfunction involves careful discussion with the individual and their partner. Patients should be educated on preparation for sexual activity, management of autonomic dysreflexia, fertility and family planning.

### Pressure Injuries

#### The Impact

People with SCI have a high risk of pressure injuries due to poor sensation, immobility, compromised nutrition, muscle atrophy over bony prominences, incontinence, spasticity and contractures. Fifty to 80% of people with SCI will develop a pressure injury.[10]

#### The Implications

Pressure injuries are the second leading cause of hospitalization acutely and long-term[11] and can lead to serious complications including osteomyelitis, septic arthritis, endocarditis and amputation.

#### The Interventions

Prevention of pressure injuries involves the use of appropriate surfaces for wheelchairs and mattresses, frequent weight shifting, proper transfer techniques, as well as adequate skin care, moisture control and nutrition. The Braden Scale is often used to predict the risk of pressure injury and address underlying causes. Treatment of pressure injuries involves local management of the wound, as well as systemic management such as nutritional treatment, with a patient-centred approach. Treatment of associated soft tissue or bony infections may also be required.

## Functional Limitations Following SCI

The functional limitations that result from SCI vary depending on the level of injury. While every patient is unique, there are general functional outcomes that can be expected based on the level of SCI.[12] Since incomplete injuries have variable neurological involvement, these generalizations are made based on a motor complete injury.

- People with C1 to 4 injuries are expected to be independent in a power wheelchair but dependent on others for transfers and most activities of daily living.
- People with C5-level injuries require assistance for most activities of daily living and transfers but are independent in a power wheelchair. Those with a C5 or lower injury are able to drive independently in a specially adapted vehicle.
- Those with C6-level injuries are independent for eating, hygiene and dressing the upper limbs using adaptive technologies after receiving assistance with set-up. They require assistance for other activities of daily living. They are able to mobilize independently in a manual wheelchair indoors and use a power wheelchair outdoors.
- People with injuries at the C7 to C8 level are independent for most activities of daily living but may require assistance for bowel and bladder care, dressing and cleaning their lower limbs. They are independent in transfers and manual wheelchair mobility.
- People with T1 to T9 injuries are independent in all basic activities of daily living, transfers and manual wheelchair propulsion.
- People with T10 to L5 injuries are able to do the same activities as the T1 to T9 level. In addition, they may have some functional ambulation with assistance or even independ-

ently using knee-ankle-foot orthoses or ankle-foot orthoses and forearm crutches or a walker.

People with SCI use assistive technologies to achieve optimal independence to get around and perform their daily activities. Wheelchairs are the most commonly used assistive technology and can be manual or powered. Powered wheelchairs may be propelled by a joystick or head or chin, or be breath-controlled for those who have inadequate hand function. The wheelchair is often customized based on the person's functional goals, environment, age, cognitive abilities, spasticity, skin and cardiopulmonary endurance. Wheelchairs may recline or tilt-in-space to accommodate pressure relief for the prevention of pressure injuries. Transfer aids such as sliding boards and mechanical lifts allow people with SCI to safely move from one place to another with or without the help of others.

A variety of orthoses can be used to assist with activities such as eating, grooming and ambulating. Upper limb orthoses include static and dynamic splints. Static splints provide hand and wrist positioning to prevent contractures. Dynamic splints support weak muscles to facilitate hand function. Lower limb orthoses include knee-ankle-foot orthoses and ankle-foot orthoses that can help support weak leg muscles to facilitate walking with or without other gait aids.

Numerous adaptive self-care devices can be used to compensate for weak grip, poor co-ordination or limited range of motion, and allow the completion of activities of daily living with little to no assistance. Some examples include a universal cuff, built-up handle on a utensil, skin inspection mirror and digital stimulator. Home modifications may also be required to allow people with SCI to safely and efficiently function and move around.

## Conclusion

Spinal cord injury is a medically complicated and life-altering condition. Although there is no cure for SCI, advances in clinical practice have reduced morbidity and increased the life expectancy of those with SCI. Through effective rehabilitation and health interventions, assistive technologies and more accessible environments, people with SCI can live full and productive lives.

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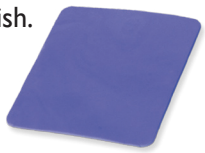

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# The NPWT PRO Advantage

## #SimultaneousIrrigation #Effective #Simple: A Plastic Surgeon's Perspective

*This is a brief summary of a presentation at the annual fall conference of Wounds Canada, in London, Ontario, on November 8, 2018. It has been produced with the financial support of Cardinal Health. The presenter was Dr. Kenneth J. Moquin, plastic and general surgeon, senior staff surgeon at Henry Ford Health System, and clinical assistant professor at Wayne State University School of Medicine (Detroit, MI).*

## Negative Pressure Wound Therapy (NPWT)

Negative pressure is the controlled application of sub-atmospheric pressure to the local wound environment using a sealed dressing connected to a pump. Negative pressure wound therapy stimulates cellular proliferation and inflammation, affects local perfusion (angiogenesis and edema reduction), stimulates development of granulated tissue, protects the wound from the external environment, assists in wound contraction and may reduce bioburden. While this technology has existed for many decades, the addition of simultaneous irrigation into NPWT is a relatively new advancement in the treatment.

## Combining NPWT + Simultaneous Irrigation

Challenges associated with NPWT include the following:

- Wounds are difficult to cleanse at the time of dressing change.
- Foam can have a slimy appearance when removed from the wound.
- Wounds often have scattered slough at the start of therapy.
- Removing foam from the wound may be painful.
- Progress slows over time.

Adding simultaneous irrigation to an NPWT dressing means a wound is cleansed of slough and debris, bioburden is reduced, foam is cleansed, moisture is balanced in the wound bed, and the patient experiences less pain at dressing changes and during treatment.

Cardinal's NPWT PRO is affordable and easy to use for clinicians, patients and their families, making it an efficient NPWT treatment. Negative pressure can help clinicians achieve healing goals, but sometimes suction isn't as good as it could be, leaving a film over the wound and slowing the healing process. To augment this treatment, Cardinal Health offers a new advancement that allows clinicians to irrigate the wound at the same time negative pressure therapy is applied to the wound. This allows for uniform hydration of the wound and the use of advanced wound care products, which are often applied under the dressing. Clinicians using simultaneous irrigation never compromise the negative pressure treatment to the wound. In addition, a constant river of clean saline or another agent can be delivered to the wound. Ideal rates of irrigation are still being investigated, but the current recommendation is somewhere between 10 and 40 cc/hour.

### Possible Irrigation Solutions

- **Hypochlorite-based solutions**
- **Silver nitrate (0.5%)**
- **Sulphur-based solutions**
- **Biguanides**
- **Cationic solutions**
- **Isotonic saline**
- **Antibiotic solutions**
- **Acetic acid (0.25%)**

## Case Study

A 30-year-old police officer in Detroit was chasing an assailant when he cut his leg on a fence. He arrived in the clinic with necrotizing fasciitis. After debridement and source control, it was noted that large amounts of soft tissue were missing, there were large areas of exposed surfaces, and pain levels were extreme. First, the wound was cleaned with debridement, cleansing and dressing changes. After the wound was controlled, it was treated with negative pressure and irrigated with acetic acid. This incited granular tissue formation, and there was no clinical evidence of a prohibited bioburden formation. Through dressing changes, a uniform granulation bed was seen and was amenable to skin grafts. Following the skin grafts, the wound was covered with white foam and a layer of black foam on top, and continuous irrigation was applied to the fresh skin graft.

About one month later, the skin graft was well matured, and healthy granulation tissue was present—an excellent skin graft response with no maceration. Skin around the graft area remained pliable, and the patient did not have flexion issues.

These kinds of result are highly reproduceable: they are seen every day when using NPWT in combination with simultaneous irrigation.

Challenges with using continuous irrigation with NPWT include educating colleagues about its uses and, when a decision has been made to use it, deciding on the most suitable irrigation solution. To determine this, clinicians should consider what their goals are: To decrease bioburden? To increase hydration? Something else?

## The Evidence Behind the Treatment

A research project was conducted to demonstrate the fluid dynamics of continuous irrigation. Using a three-dimensional wound model made of clear ballistics gel, the study found that irrigation fluid doesn't simply take the path of least resistance back to the source of the suction (the vacuum). Instead, the study suggested the entire surface of the wound is exposed to the irrigation fluid before the fluid exits (stochastic displacement).[1] This is why simultaneous, continuous irrigation is effective. The most common solution used is normal saline, followed by variants of acetic acid (maximum 3% concentration).

Applying continuous irrigation is an easy process that can be done by community-care workers, caregivers, family members and, at times, patients themselves. While it has been suggested through animal models that negative pressure with continuous irrigation does not improve the rate of wound healing more than NPWT does on its own, it does decrease the bioburden of wounds when compared to standard NPWT treatment.[2] In my practice, I use NPWT with simultaneous irrigation because, despite a lack of clinical evidence at this time, my patients report dramatically less pain during this therapy than with other forms of treatment, including NPWT on its own.

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Presentation Digest is a production of Wounds Canada. (www.woundscanada.ca).

# Healing with Hydration

By Ellen Mackay, MSc, RD, CDE

## Wounds Are Thirsty

Adequate hydration can help set the stage for proper wound healing and good skin integrity. Often, however, when we need our patients to drink more fluid, they are unable to consume the amount they require. Water can become a forgotten nutrient. Helping clients stay hydrated is a challenge.

Our bodies are estimated to be 60% water.[1] To stay hydrated, a healthy person needs to consume a minimum of 2 litres of fluid from food and beverages throughout the day.[2] This amount varies by age, sex and medical condition. Adequate hydration helps ensure good blood volume and delivery of oxygen and nutrients to the wound bed, and removal of waste products.[3]

## Complications from Dehydration

Dehydration can have serious complications, including poor wound healing and increased risk of skin breakdown. It can also negatively affect mood, cognitive functioning and balance.

Many of the patients in our care may be at risk for dehydration. What puts our clients at risk? It may be increased needs from excessive fluid loss, a low overall fluid intake or a combination of both.

### Increased Needs

Wounds may increase the body's need for fluid, and heavily draining, large or multiple wounds can increase fluid requirements significantly. As well, fever, diaphoresis, vomiting and diarrhea increase fluid losses, as do some medications, such as diuretics or laxatives. High blood glucose increases urinary output, eventually leading to dehydration. And hot, humid weather may increase fluid needs, especially in the elderly.

### Low Fluid Intake

Many patients do not or cannot drink enough, for one or more of the following reasons. Patients may:

- Have an impaired thirst mechanism, especially with age
- Wish to restrict their fluid intake to minimize trips to the washroom
- Experience pain, which can be a potent appetite and thirst suppressor
- Rely on help to open beverage containers or bring fluids to the bedside
- Be unable to communicate their needs
- Experience difficulty swallowing (dysphagia), including coughing or choking, even with thin liquids

## How much is enough?

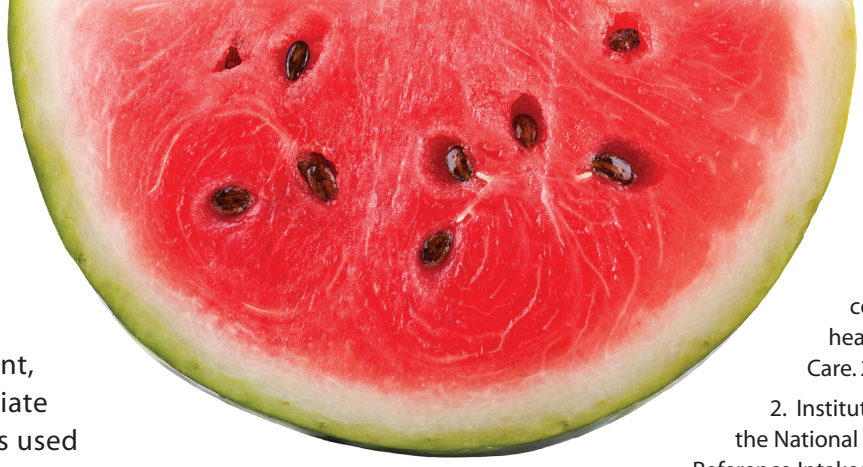
Fluid needs vary from person to person, though specific ways to determine fluid requirements have been proposed. Provision of 30 to 35 mL per kg of body weight may be sufficient.[4] Other advisory groups suggest fluid needs be based on calorie intake, with 1 mL per kcal consumed.[5] Patients with wounds requiring high protein intake will need more fluid. Monitor such patients for signs of dehydration (see sidebar below) and adjust as required. Fluids may need to be tapered down for patients with congestive heart failure or chronic kidney disease. For individualized assessment, consult a Registered Dietitian or the nutrition care team.

## Helping Hydration

Offering a variety of fluids frequently through the day will help improve a patient's hydration status. Water is best, but also include a variety of hot or cold beverages such as 100% fruit or vegetable juice, milk or fortified milk alternatives, shakes, tea or coffee. See the sidebar on the next page for hydration tips.

### Signs of Dehydration[3]

- Decreased skin turgor
- Weight loss
- Fatigue, confusion
- Dry mucous membranes
- Blood values (elevated serum sodium or calculated serum osmolality)
- Concentrated urine output



Patients with impaired gag reflex may find swallowing anxiety-provoking. If dysphagia is present, ensure an appropriate thickening agent is used with thin fluids. Consider a swallowing assessment as part of your nutrition care plan.

Food can provide up to 30% of fluid needs, especially fruits and vegetables. Soups, puddings and flavoured jelly have a high fluid content and may be easier than solid foods for some patients to eat. Any food that is liquid at room temperature, such as frozen juice bars or ice cream, is considered a fluid in this context.

## Every Sip Counts

A wound patient's need for good hydration is ongoing and is the responsibility of an integrated team. Gentle, frequent reminders to increase fluid intake will support wound healing. Help patients or their caregivers to learn the importance of fluids for the health of their skin and for their overall health.

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## Hydration Tips

- ✓ Set up a hydration station on your unit or in your clinic. (Provide water, milk or fortified soy beverage, 100% fruit or vegetable juice, coffee or tea.)
- ✓ Keep a drink of water within arm's reach. Equip wheelchairs with drink-holders.
- ✓ Offer fluids with and between meals.
- ✓ Provide fluids with each patient contact (vitals, turns, check-ins).
- ✓ Offer extra water when providing medications.

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## Wounds Canada Fall Conference:

# Exploring Integrated Wound Management


**November 8–11, 2018, London Convention Centre, London, ON**

# Session Summaries

## ADVANCED TOPICS: PILONIDAL SINUS (PS), HIDRADENITIS SUPPURATIVA (HS) AND EPIDERMOLYSIS BULLOSA (EB)

### Session 25

*Presenters: Connie Harris, John Hwang, Afsaneh Alavi, Michelle Lee*

This session outlined how PS, HS and EB are being treated today, how treatment can be optimized, and how proper wound care is integral in the resolution of these skin lesions.

**John Hwang** discussed a surgical approach to PS and asked attendees to consider the question: "Why do these patients not heal?" Those affected by PS are often young and relatively healthy and *should* heal, but do not. He emphasized that the priority is preventing a primary lesion as well as preventing recurring disease.

**Practice pearls for PS:**

- Laser ablation and endoscopic pilonidal sinus treatment (EPSiT) can be used in first presentations of PS disease and in simple cases.
- Surgical flap repairs provide a tensionless repair of the PS.
- Sitz baths are great for comfort but are not effective for wound hygiene.
- Perineal wipes are most effective for proper hygiene.
- Involving the patient in proper hygiene and wound care practices is key to improving PS healing.

**Connie Harris** provided a community nurse perspective and re-emphasized Dr. Hwang's remark that the patient must be involved in their wound care.

**Practice pearl for PS:**

- The modified jackknife position provides better wound exposure and resolution of the issue of clenching during wound care.

Dermatologist **Afsaneh Alavi** discussed the use of laser hair removal as an effective means of preventing irritation and inflammation due to body hair. She also said that 0.5% chlorhexidine can be used for decontamination of PS, including those containing pseudomonas bacteria. Among wound dressing options, it was found that the best are dry, simple, clean and changed frequently.

For effective management of HS, the first step is early diagnosis. She explained that, unfortunately,

those affected are often young females who average 17 visits with physicians before getting an HS diagnosis. She discussed the psychosocial implications of HS on patients, as they experience painful, draining boils that can severely impact their quality of life. As a result, about 40% of HS patients suffer from depression.

**Practice pearls for HS:**

- Psychological counselling is important for patients with HS.
- Better results are achieved if the patient is optimized medically before undergoing surgical treatment.

Due to the rarity of EB, there is no protocol for treating EB patients, and practitioners are usually intimidated by the disease. The most successful treatment of EB begins with genetic testing to identify the subtype causing EB, which can then lead to a more individualized treatment plan. As **Michelle Lee** explained, EB causes constant pain and physical limitations, so psychosocial care is essential to ensure EB patients can live a relatively normal and happy life.

**Practice pearl for EB:**

- During wound care in EB patients, consider using silicone medical adhesive removers (SMARs) to prevent skin stripping.

## VENOUS LEG

### Session 26

*Presenters: Barbie Murray, David Keast, Adam Power*

This session outlined venous leg ulcer risk assessment tools, leg edema and its management, and indications for and effectiveness of surgical interventions for venous disease.

**Barbie Murray** began by providing an overview of three types of assessment tools and two new validated risk assessment tools used for patients with venous leg ulcers.

#### Validated Risk Assessment Tools for VLU

Using a validated assessment tool to identify a patient's risk of not healing or of having a recurring ulcer can help better determine realistic care goals and encourage earlier decision making about specific interventions that can address barriers to healing. There are two new validated risk assessment tools for venous leg ulcers, the VLUR and the RECUR.

The VLUR measures the risk that a venous leg ulcer (VLU) will not heal in a 24-week period by categorizing this risk as low, moderate or high. This involves using an online app to calculate a risk score. This tool considers the patient's age, how long the ulcer has been present, whether the patient lives alone, calf and ankle circumference (cm), slough on the wound, wound size ($cm^2$) and type of compression being used. Questions about these factors are asked at an initial assessment and two weeks later in a follow-up appointment. The tool gives a score related to risk, with low indicating the wound is likely to close (90%), moderate indicating a 20 to 25% chance of closure, and high indicating an 80% chance the wound will not close (at which point clinicians should consider adjunctive therapies and referral to a specialist). This tool also enables good follow-up, as it can be used at regular intervals and subsequent scores compared with the initial, baseline score.

The RECUR is a predictive tool that measures the risk that a VLU will recur within 12 months by categorizing this risk as low, moderate or high. Using this tool, clinicians consider the patient's history of leg ulcers, the type of compression being used, and whether the patient is living


alone, is moving around for at least three hours per day, is elevating their legs for at least 30 minutes per day and is using compression at least five days per week. Clinicians enter the patients' answers to these questions into an app that calculates a score related to risk, with low indicating a 10% risk of re-ulceration, moderate indicating a 30% risk of re-ulceration, and high indicating a 75% risk of reformation (the latter indicating the need for specialist referral).

**Practice pearl:**

- Choose validated risk assessment tools, such as the VLUR or RECUR, to aid in clinical decision making.

### Understanding Leg Edema and Its Management

**David Keast** explained that edema is an excess of fluid in the extracellular matrix, seen in the extremities. There are two types of edema: acute, such as that presenting with a sprained ankle, and chronic, which lasts more than three months, often as the result of systemic factors.

A failure of any component of the body's venous system (valvular insufficiency, obstruction or calf-muscle pump failure) can result in venous hypertension.

The lymphatic system is an open system that transports fluids and supports immune function. The circulatory system is a closed system. These two systems work closely together, so if there is an issue in either system, both can be affected.

Failure of the lymphatic system can be primary or secondary, the latter caused by trauma, malignant disease, venous disease, infection or inflammation.

### Managing Edema

Basic principles of management for leg edema include compression therapy, meticulous skin care, patient education, manual lymphatic drainage for lymphedema, and exercise to stimulate the calf-muscle pump.

### Compression Basics

A Cochrane review found that individuals treated with compression bandages experience better healing rates than those who do not use compression, and that multi-layer compression systems are more effective than single-layer systems. Compression stockings work because the compartments act like a closed system; the compression stimulates calf muscle activity and increases movement of blood flow and lymphatics, enhances muscle activity and increases hydrostatic pressure by helping movement into the capillary bed.

## DIABETIC FOOT

### Sessions 24 and 32

*Presenters: Charles de Mestral, Zaina Albalawi, Amanda Mayo, Ann-Marie McLaren, Jeremy Caul, Ahmed Kayssi, Yoko Schreiber, Bill Thompson, Sébastien Hains, Kyle Goettl*

These sessions discussed the burden of diabetic foot ulcers, addressing pins-and-needles foot sensations, tips and tricks for offloading, managing diabetic foot in Indigenous populations, treating diabetic foot infections, advances in diabetic foot management and rehabilitation after amputation.

### The Burden of Diabetic Foot Ulcers (DFUs)

**Charles de Mestral** discussed the importance of understanding the phases of the burden of a DFU. Many individuals with diabetes require treatment for foot ulcers, which can necessitate amputation, post-amputation treatment and end-of-life

care, each of which has a detrimental effect on patient quality of life. In addition, there are large financial costs associated with care. For example, amputation costs approximately $600,000 per patient, which translates to about $547 million dollars nation-wide each year. Using preventative services, it is possible to drastically reduce amputation rates. Annual foot checks are critical, but many patients aren't getting their feet properly checked, especially if their primary care provider does not have the knowledge required to perform the check. It is also critical for interdisciplinary teams to co-ordinate their efforts by communicating effectively and jointly deciding on and carrying out a comprehensive plan of care. Lack of preventative measures in large urban centres where the greatest concentration of specialists is located is seen to an even higher extent in northern Canadian communities, where patients generally do not have access to specialist care.

**Practice pearl:**

- The most successful health-care teams communicate effectively and use joint decision-making while carrying out the plan of care.

## Addressing Pins and Needles

**Zaina Albalawi** emphasized the importance of understanding the spectrum of diabetic peripheral neuropathy implications, identifications and management. The pins-and-needles sensation can be caused by diabetes, alcohol consumption, HIV, certain medication and several other factors, but 46% of the time it is idiopathic. It is not usually the result of neuropathy. Red flags include acute onset, asymmetric pain, motor predominance and progressive symptoms. Nerve fibre damage can be a combination of inflammation, ischemia or metabolic pain. Treatment is difficult because symptoms can occur for months or years, and hard work with the patient often does not create relief. It is critical to differentiate the types of pain and the symptoms to ensure the patient's sensation is not a presentation of a separate phenomenon. Unfortunately, very few medications provide substantial relief for patients.

## Tips and Tricks for Offloading

**Amanda Mayo** and **Ann-Marie McLaren** presented various case studies illustrating different methods of offloading. The Wounds Canada Offloading Product Plantar Pressures in Diabetes Picker provides more information about the devices they discussed.

**Practice pearl:**

- Selection of an offloading device depends on where pressure lies; therefore, pressure mapping of the foot can be beneficial for determining where you should be moving the pressure.

## Managing Diabetic Foot in Indigenous Populations

**Jeremy Caul**, **Ahmed Kayssi** and **Yoko Schreiber** relayed that many patients based in the Sioux Lookout area need to be flown into Thunder Bay to receive care. Unfortunately, this patient demographic sees a lot of "band-aid" care due to the lack of financial resources, education resources and health-care providers. As a result, Indigenous populations have amputation rates seven times higher than those in the rest of Ontario.

**Practice pearl:**

- While providing care, clinicians must take into consideration the patient's spiritual traditions and the social health determinants that are playing a role in care.



## Treatment of Infection in the Diabetic Foot: A Case-based Approach

**Bill Thompson** urged attendees to assess whether there is an infection present before prescribing antibiotics to patients. Characteristics that indicate infection include redness, edema, purulence, sepsis, discoloured granulation tissue, undermining and foul odour.

**Practice pearls:**

- Don't forget to conduct a vascular assessment, and to rule out bone involvement.
- The 2012 Infectious Diseases Society of America Clinical Practice Guideline for the Diagnosis and Treatment of Diabetic Foot Infections is a great resource for information on this topic.

## Advances in Diabetic Foot Management

**Sébastien Hains** used an extensive case study to illustrate the importance of offloading. The case, which involved a large, multidisciplinary team conducting many complex, experimental interventions over a year and a half, saw barely any improvement. The ulcer was deemed non healing. Two weeks later, the patient broke a hip and couldn't walk. Now, the ulcer is almost entirely healed. This illustrates that offloading is paramount to ulcer healing.

**Practice pearl:**

- The most common reason for delayed healing is inadequate offloading.

**Ahmed Kayssi** discussed why offloading is not always used effectively to care for ulcers. Two main reasons for this are a lack of hospital funding for devices and a greater pull for procedures that are reimbursed by insurance companies. He discussed switching to community-based care as a potential solution for this problem. Another reason is a lack of education among health-care providers in wound care. A fourth barrier is data gathering and sharing. Without consistent numbers to present to policy makers, it is difficult to implement change. Ideally, there would be a wound registry with a data-gathering platform easily accessible to health-care teams and their patients, but this is a long way off. To help, clinicians are encouraged to reach out to their colleagues, and to connect with and participate in the wound care community.

## Rehabilitation after Amputation

**Kyle Goettl** discussed the importance of ensuring patients are good candidates for prosthetics before making a referral: consider their readiness, financial stability, current level of independence, ability to perform activities of daily living and care support. Obtaining a prosthetic is hard work and involves several "mini victories" that lead to the bigger goal over a larger span of time. It is important to consider all elements within the large spectrum of available devices, including cost of the device, direct/indirect medication costs, cost of home/environmental modifications and cost of a driving assessment and training (if necessary). It is also critical to consider the patient's cognitive state: Is there someone there to assist if needed?

**Practice pearl:**

- Once your patient has a new prosthetic, ensure they are stepping and not hopping. The latter can create new ulcers and discourage healing.

**Amanda Mayo** noted that only 33% of amputation patients will be walking two years post-op. Below-knee amputations are easier to manage with transfers and prosthetics; above-knee amputations are a lot of work. Clinicians should keep in mind that there is a high five-year mortality

rate for patients who have had an amputation. Connecting your patients with support groups is key to ensuring their well-being following an amputation. Remember: Exercise is medicine. If your patients weren't healthy before the amputations, are they going to be healthy after it? This is something to consider before proceeding with any plan of care.

## ADVANCED TOPICS: ACUTE BURN WOUND MANAGEMENT

### Session 33

*Presenters: Marc Jeschke, Alan Rogers, Anne Hayward*

This session examined the pathophysiological response to burn injuries in adults, recent advancements in wound coverage technologies in burn surgery, and social work following traumatic burn injuries.

**Marc Jeschke** began the session by introducing the pathophysiology and the severity of burn injuries. He emphasized that those affected by burns can be any age, and burns can happen anywhere. He explained how wound care is lacking in developing countries and how sharing burn-care knowledge is integral in improving burn care worldwide. He explained that burns have been a neglected injury, and that with 300,000 burn-related deaths globally each year, this area needs more attention and research. An important new issue is the rise in prevalence of antibiotic-resistant pathogens and the resulting increase in sepsis mortality. He stated that topical and systemic antibiotic therapies must be developed to address this. Another issue clinicians need to consider is the erosion of body mass by the increased metabolic needs created by burn wounds.

**Practice pearls:**

- The priorities in clinical management of burns are:
  - Assessing the airway, breathing and circulation
  - Basing treatment on burn size
  - Transfer to burn unit

- Implementation of the Parkland burn protocol
- Time to IV

**Alan Rogers** outlined the current treatments for burns: debridement, tissue allografting and other grafting methods. He explored some of the dressings that can be used in the treatment of burns and explained how there is no one ideal dressing. He also elaborated on the many benefits of negative pressure wound therapy (NPWT) and how it can result in successful wound healing. He went on to discuss some of the barriers facing clinicians who specialize in the treatment of burns, including lack of leadership in burn research, lack of innovation in the field and how the treatment of burns is seen as being less-glorified work.

**Practice pearl:**

- The treatment of burns must be addressed using a team-based approach to ensure the best patient care.

**Anne Hayward** presented the often-overlooked aspect of patient care: the social and psychological effects of surviving a severe burn. She explained how survivors are often faced with new identities, intimacy issues, family dynamic issues, and the guilt and psychological trauma caused by surviving such a horrific event.

**Practice pearl:**

- The key to long-term successful patient care is a plan that provides patients with the proper social care when they return to the community.

## PRESSURE INJURIES

### Session 34

*Presenters: Jolene Heil, Morty Eisenberg, Karen Campbell, Ellen Mackay*

This session discussed the impact and management of pressure injuries (PIs) on people living with neuromuscular disorders, recent advancements in microclimate and PIs, and recent advancements in nutrition and PI care.

**Jolene Heil** and **Morty Eisenberg** discussed the impact and management of pressure injuries in people with neuromuscular disorders. These diseases impair muscle function due to pathology affecting spinal cord motor cells, peripheral nerves, neuromuscular junctions or muscles. Examples include muscular dystrophies, multiple sclerosis, ALS, myasthenia gravis, Charcot-Marie-Tooth disease (CMT), Friedreich's ataxia and Parkinson's disease. Spinal cord injuries (SCI) are not neuromuscular disorders, but the physiological changes seen in patients are similar, especially if denervation is present, and can include the following symptoms: muscle weakness, numbness, paresthesia and muscle atrophy. Each of these symptoms also puts patients at an increased risk of developing pressure injuries. Neuromuscular disorders negatively impact patient quality of life by increasing fear and/or anxiety, necessitating changes in daily activities and potentially leading to complications such as infection, pain, fatigue and loss of appetite.

Patients with SCIs experience physiological changes and skin denervation, which lead to increased risk of skin breakdown and impaired healing caused by decreased fibroblast activity, abnormal vascular reactions and decreased blood flow. (See article on page 10 for an extensive overview of SCIs.)

#### Treatment of Pressure Injuries

Goals of care for patients with pressure injuries should include reducing pressure, friction and shear, maintaining skin health, managing

incontinence and modifying skin risk factors such as nutrition, mobility and activity level.

Clinicians can provide pressure redistribution using devices that manage tissue load and microclimate. These include specialized mattresses, integrated bed systems and seat cushions or overlays. Low-air-loss mattresses help keep patients' skin dry, but clinicians need to ensure that individuals whose skin is already quite dry are not placed on these surfaces. To minimize friction and shear, clinicians should make use of trapeze bars and transfer and lift sheets. When offloading pressure from patients' feet, heels must often be offloaded separately when a patient is on a low-air-loss mattress. Most important, all surfaces the patient is encountering must be assessed, including wheelchairs, vehicles and commodes or shower chairs. Transfer procedures must be assessed as well.

**Practice pearls:**

- Turn the patient based on patient health, internal and external risk factors, and the surfaces being used. Consider using foam wedges, pillows and tilting wheelchairs for assistance.
- Watch out for wrinkled sheets or clothing, and catheters and tubing, as these can apply pressure to at-risk skin.

Additional considerations when treating patients with neuromuscular disorders are pain management, quality of life (often associated with dressing changes) and the psychological effects of medications.

**Practice pearl:**

- Clinicians need to provide information to the patient and their caregivers, empowering them to take control of their own care, which leads to better adherence to the plan of care.

Local wound care for patients with neuromuscular disorders includes tissue debridement, as necrotic tissue inhibits healing and is a medium for infection. Clinicians can consider autolytic, mechanical, sharp or enzymatic debridement depending on the specifics of the case and their level of expertise. Health-care providers must also consider a clinical diagnosis of infection, as this will affect the plan of care.

Clinicians should use dressings that promote moisture balance in patients who have neuromuscular disorders and are being treated for pressure injuries. Semi-occlusive dressings maintain moisture balance and provide a bacterial barrier to wounds. It is important to look at the peri-wound skin when choosing a dressing: maceration indicates too much moisture and the need for an absorbent dressing. Clinicians should remember not to over-pack pressure wounds, but rather to loosely fill the wound cavity. Finally, clinicians are reminded not to irrigate the wound bed if they can't see it—use wet gauze to gently clean the wound in these cases.

## Microclimate and Pressure Injuries

**Karen Campbell** discussed new developments related to microclimate and pressure injuries. High humidity decreases the stratum corneum's stiffness and plasticizes keratinocytes. Lower humidity results in drier skin, increasing the skin's susceptibility to mechanical damage such as cracks and fissures. We know that drastically increased or decreased skin temperature increases the severity of pressure injuries. Airflow also affects skin temperature, because increased moisture increases heat accumulation. This effect is seen when there are plastic sheets over mattresses or non-breathable bed pads. While microclimates don't directly cause pressure injuries, they indirectly affect their development as one of several factors that can increase risk of development and prevent timely healing.

**Practice pearl:**

- Clinicians should consider using breathable fabrics developed specifically for health care; the more skin adheres to the contact layer, the

greater the extent of deformation and shear and the higher the risk for developing a pressure injury.

As individuals with diabetes age, skin becomes stiffer and doesn't respond as well to pressure. It is good practice to keep skin cool and dry; increased stratum hydration concentration increases the coefficient of friction between skin and the support surface.

### A Note About Obesity

Obese patients store heat longer than leaner ones. These patients are at a potentially higher risk of developing pressure injuries, since producing sweat over long periods of time increases humidity and alkaline pH, increasing risk for fungal infections in skin folds.

### What's New in Nutrition and PI Care?

**Ellen Mackay** noted that malnutrition, or the inadequate intake of energy, protein and nutrients, is linked to pressure injuries, poor wound healing and increased risk of infection. About 45% of patients admitted to hospitals are malnourished. Dehydration, weight loss, low body mass index, decreased food intake, gastrointestinal disorders, depression, pain, undernutrition and inability to self-feed all increase risk of acquiring a pressure injury. As muscle and fat mass decrease, so does protection over bony areas of the body. In a malnourished person, wounds take longer to heal, because the body has less energy to allocate

to the healing process. Nutritional interventions enhance PI healing and can also reduce the direct medical cost of wounds by decreasing dressing material, health-care professional time, medications and "bed days."

There are many validated nutrition screening tools, including the Canadian Nutrition Screening Tool (CNST), Mini Nutritional Assessment (MNA®), Malnutrition Screening Tool (MST), Malnutrition Universal Screening Tool (MUST), Short Nutritional Assessment Questionnaire (SNAQ), and Nutri-eSCREEN.

In 2014, the National Pressure Ulcer Advisory Panel (NPUAP), European Pressure Ulcer Advisory Panel (EPUAP) and Pan Pacific Pressure Injury Alliance (PPPIA) released a white paper looking at the role of nutrition in pressure injury management. This paper extended guidelines to those deemed at risk for pressure injuries, emphasized the importance of collaborating with a dietitian to develop an individualized nutrition care plan, and noted the role of protein, arginine and micronutrient supplements in stage 3 or 4 PIs, or for individuals with multiple PIs.

The first thing clinicians should look at when dealing with nutrition and wound care is energy: wounds are hungry and require calories and protein to heal.

**Practice pearl:**

- Consider adding lots of cream to coffee, offering favourite foods, increasing snacks and drinks and encouraging multiple helpings at meal times. Patients should be offered food before considering nutritional supplements.

Arginine is an amino acid essential for stress or trauma recovery, including wound healing. Arginine, which can be found in soy, seeds, nuts, beans and chicken skin, promotes production of nitric oxide and collagen and protein synthesis, increases the tensile strength of a wound, and regulates insulin secretion and immune function. Some early work has been done on specialized oral nutritional supplements (ONS) that include protein, arginine, zinc and vitamin C. Results suggest that ONS might accelerate PI healing (based on PUSH scores and wound area), especially for stage 3 and 4 pressure injuries.

Topical and oral probiotics have been correlated with improved wound healing. These probiotics accelerate granulation tissue and collagen deposition, which can result in a compressed wound repair cascade, more rapid progression of inflammatory events during wound healing and reduced infection risk.

At this time there is no specific dose, strain or duration of probiotics recommended for wound healing. It is generally safe to consider consuming fermented foods, probiotics and prebiotics. A clinical guide to probiotic products is available online at www.probioticchart.ca.

## INFECTION

### Session 47

*Presenters: Ranjani Somayaji, Gregory Schultz, Bill Thompson*

This session covered the basics of identifying wound infection, the significance of micro biomes and biofilms in wound care, and infection and antibiotic stewardship.

#### Identifying Wound Infection: Now and in the Future

**Ranjani Somayaji** noted that the biggest challenge in wound care is that a lot of patients don't present like a textbook. They generally fall somewhere between a paper cut and a severe necrotic wound, and every plan of care will differ depending on the patient, the wound and the environment. The big players in infection are

bacteria (gram positive, gram negative, anerobic), fungi and viruses. For diagnosis, clinicians should consider the clinical signs and symptoms of infection observed, followed by wound cultures and other diagnostic tests (such as blood work and imaging) as indicated. An accurate diagnosis is important to determine the most appropriate plan of care. Critical criteria for infection include local and systemic signs and symptoms, and subjective and objective findings. Health-care providers can consider using radiology and microbiology for testing CBC, inflammation, imaging modalities, cultures (qualitative and quantitative) and number of bacteria in the wound. Understanding what is there is critical for deciding how to proceed with care.

### The Significance of Micro Biomes and Biofilms in Wound Care

**Gregory Shultz** discussed biofilms, a major player in infection, which cause chronic inflammation infection. Biofilms are identified in > 80% of chronic wounds but only 6% of acute wounds. Antibiotics kill only proliferating bacteria so, when biofilm is present, clinicians need to use antimicrobials as well. Biofilms are very difficult to kill, because oxygen diffusion to the centre of a biofilm is limited. This promotes the growth of anerobic bacteria, which in turn promotes synergy between the bacteria and continued growth.

**Practice pearls:**

- Extensive debridement is key when caring for a patient with biofilm present.
- Clinicians should consider changing the cycles of antibiotic use every two weeks to target different bacteria.

### Infection and Antibiotic Stewardship

**Bill Thompson** discussed the difficulty of using antibiotics properly; clinicians must choose the right antibiotic for the right bug via the correct route in the correct dose for the right amount of time—a lot of variables to consider. To choose the right antibiotic a clinician must take into account the patient and their comorbidities and other medications, and potential bacterial resistance. Basic principles for identifying the bug include epidemiology, susceptibilities, location/origin, inflammation, colonization and comorbidities. There is a lack of research looking into optimal length of time for antibiotics, so follow the culture. While using antibiotics, it is critical to continue with local management and debridement to support the wound environment. Barriers to the effective use of antibiotics include a lack of guidelines for use, autonomy of doctors in care planning, and a lack of feedback for antimicrobial susceptibility.

**Practice pearl:**

- Consult an infectious disease specialist for patients with diabetic foot ulcers: with these patients, look back over the past year and consider antibiotic history. For patients with osteomyelitis, consider a longer program of antibiotics.

## ADVANCED TOPICS: PYRODERMA GANGRENOSUM (PG) AND OTHER VASCULITIC WOUNDS

### Session 48

*Presenters: Afsaneh Alavi, Gary Sibbald*

This session looked at how to treat patients who have PG, and discussed other vasculitic wound types.

PG is difficult to treat. It is not an infection, but rather a neutrophilic disorder resulting in an inflammatory disease. PG has a genetic component and often overlaps with inflammatory bowel disease. PG also has common associations with polyarthritis and hematological disease.

There are four morphologies of PG: ulcerative,

pustular, vegetative/granulomatous and bullous, the latter of which is more common in non-solid neoplasia such as leukemia. PG has pathergy, which means it occurs when minor trauma causes flare-ups in the disease. This often occurs in surgical sites and piercings, where the disease may first be observed.

Diagnosis of PG is key: look for a characteristic grey-coloured border and abnormal and traumatic scarring. A biopsy of active, grey border material is useful for excluding other diagnoses. Keep in mind that pseudoepitheliomatous hyperplasia can mimic PG. The best treatment for PG is administration of immunosuppressants and local wound care. Corticosteroids and biologics can be considered. Clinicians must also keep in mind that PG is extremely painful; social and psychological impacts must be kept in mind during treatment.

## MOISTURE-ASSOCIATED SKIN DAMAGE (MASD)

### Session 49

*Presenters: Kevin Woo, Rosemary Kohr, Lina Martins*

This session discussed assessment and categorization of MASD, recent advances in the prevention and management of MASD, and prevention and treatment strategies for peristomal skin damage.

#### Assessment and Categorization of MASD

**Kevin Woo** outlined the six key causes of skin damage, which can be remembered using the mnemonic MINDS:

- **M**echanical trauma from friction, skin tears and skin stripping
- **M**oisture
- **I**ntrinsic factors: Skin aging is associated with anatomical and physiological changes that increase susceptibility to skin disease and functional disorders
- **N**oxious chemicals and irritants including strongly alkaline feces or urine
- **D**rugs, such as steroids (long-term use), and diseases of the skin, such as psoriasis
- **S**kin allergens

#### Pathophysiology of MASD

Moisture that comes into contact with the skin in the form of urine, feces or cleansing materials can cause physical irritation, increase permeability of the skin and decrease barrier function, which leads to bacterial overgrowth, cutaneous infection and weakened skin. MASD often results in pain, burning, itching, tingling and/or inflammation. When weakened skin is combined with friction, a pressure injury likely will result. The Ghent Global IAD categorization tool (GLOBIAD) has divided MASD into four categories to help clinicians determine the type of treatment needed to manage the problem.

#### Advances in Prevention and Management of MASD

**Rosemary Kohr** noted that excess moisture and bacteria results in a higher skin pH (alkaline). When feces are present, digestive enzymes become active on the skin itself, and the barrier function of the skin does not work properly. When this occurs, it is essential for clinicians to determine and treat the underlying cause. Consider what is causing the moisture build-up: incontinence, skin folds, diaphoresis, wound drainage?

To prevent complications, prepare and protect the skin. Clean the skin, but remember that bar soap is alkaline, reducing the normal acid mantle, and that almost all soaps leave residue that is difficult to get rid of. Consider using a perineal cleanser; the goal is to remove feces and maintain

normal pH. Ensure moisture level is appropriate; skin that is too wet is five times more likely than dry skin to develop MASD, and skin that is too dry is two and a half times more likely to ulcerate than normal skin.

When cleansing skin, avoid perfumed soaps and rough washcloths that can result in new friction injuries.

**Practice pearl:**

- Avoid using sensitizers such as lanolin and perfumes and look for products with a pH between 4 and 7.

## Barrier Products

Barrier products provide protection to skin in the form of ointments, creams, pastes or films. Petrolatum and zinc can be used, but be sure to find the ones that are clinically indicated. Dimethicone provides a neutral base, as it has no sensitizers. Liquid films are a new formulation composed of polymer with cyanoacrylate. They are durable up to seven days, are flexible and can stretch while in place, can be applied to wet, macerated skin and don't require removal.

## Our Reality Today

Assessment and treatment are more complex and require more attention than ever before. Clinicians need to consider ways to cut down on busy work by using products and technologies available to help. Patients and care providers may feel that less frequent protection applications demonstrate bad care, so it is critical to provide education and demonstrations on how new products work better than older ones requiring more frequent applications. While there is a perception that these newer practices and products are costlier, they focus more heavily on prevention, reducing care costs and improving patient quality of life.

## Peristomal Skin Damage: Prevention and Treatment Strategies

**Lina Martins** discussed prevention and treatment strategies for individuals with peristomal skin damage. Approximately one million people in North America are living with an ostomy, and an additional 100,000 will undergo ostomy surgery in the next year. Seventy percent of these patients will experience stomal or peristomal complications.

Peristomal dermatitis is inflammation and erosion of skin adjacent to a stoma, related to exposure to urine or stool. Risk of developing peristomal MASD is higher in individuals who perspire heavily, those with a body mass index greater than 30, those with exposure to external moisture sources and older adults.

Peristomal skin should be assessed using visual inspection and focused patient history (especially related to pouching method and management), and treatment should consider economic and lifestyle factors. To aid in assessment, clinicians can use the ostomy skin tool (OST), the Canadian Ostomy Assessment Guide (COAG) or the Peristomal Skin Assessment Guide (PSAG).

When treating peristomal skin damage, enlist a nurse specialized in wound ostomy and continence (NSWOC) or a wound-ostomy-continence nurse (WOCN). Treatment should always be directed at alleviating skin damage while maintaining an effective seal. It is crucial that clinicians select appropriate skin barriers based on the stoma and abdominal contours and that patients adhere to optimal pouch wear times and use of appropriate accessories.

**Practice pearls:**

- Maintain an effective and predictable seal between the skin and the skin barrier, and reapply *before* leaks happen—about every three days.

- Demonstrate to patients the correct use of products and provide instruction on avoiding or limiting behaviours that may interfere with the seal between the pouch and the peristomal skin.
- Ensure patients recognize the characteristics of healthy versus unhealthy peristomal skin, and the importance of seeking treatment when things go wrong.

When managing peristomal skin damage, always try to determine and treat the cause by identifying and addressing any contributing factors. Consider whether consultations with or referrals to other health-care providers are needed.

## ARTERIAL LEG

### Session 53

*Presenters: Robyn Evans, Ahmed Kayssi, Christine Murphy, Sudhir Nagpal*

This session discussed medical and surgical management of peripheral arterial disease (PAD), and presented attendees with an interdisciplinary team model, demonstrated by a limb-salvage program at The Ottawa Hospital.

#### Medical Management of Peripheral Arterial Disease (PAD)

**Robyn Evans** noted that PAD is the leading cause of limb amputation. Remember: a single artery can cause a problem. No one vascular test is perfect, so refer to a vascular surgeon when in doubt.

#### Surgical Management of PAD

**Ahmed Kayssi** discussed the importance of understanding the anatomy of veins and arteries, and how they connect. Goals of treatment of PAD might include reserve viability of veins, improved function and prevention of deterioration.

#### Limb Salvage at The Ottawa Hospital: An Interdisciplinary Team Model

**Christine Murphy** and **Sudhir Nagpal** presented an overview of a clinic in Ottawa where three vascular surgeons, nurses, one plastic surgeon and a wound care nurse work together as a team. The model features customized charting for the clinic so that all members of the team have access to patients' complete information, including photos, care summaries, previous closures and dressing information. Clinic activities include vascular examinations and interventions, clinic debridement, skin graft closures and patient education. The goals of this care centre are the use of fewer antibiotics, fewer hospital admissions, fewer community care and emergency room visits, higher clinician competency, increased resources and research, and an overall better patient outcome through specialized care close to home. The main challenge of implementing this type of program large-scale is convincing stakeholders to fund the project. This requires extensive data collection and research at the clinic that will show concrete cost benefits.

## ADVANCED TOPICS: SCLERODERMA ULCERS

### Session 54

*Presenters: Zareen Ahmad, Afsaneh Alavi, Deirdre O'Sullivan-Drombolis*

This session described the pathophysiology and management of scleroderma ulcers, specific challenges of these ulcers, and the benefits of physical therapy for patients with scleroderma.

**Zareen Ahmad** outlined risk factors for developing scleroderma ulcers, including genetics, environment and exposure to toxins. Prevalence estimates vary widely and may be increasing over time; however, there was no standard classification for these ulcers before 1980. Patients with scleroderma ulcers have poor quality of life, with most suffering from depression, anxiety and intimacy issues.

Classification factors include:

- Skin thickening on the fingers
- Fingertip lesions
- Telengiectasia
- Abnormal nailfold capillaries
- Pulmonary arterial hypertension and/or interstitial lung disease
- Raynaud's phenomenon
- Systemic sclerosis-related antibodies

There are two classifications of scleroderma ulcers: localized or systemic (either limited or diffuse).

Clinicians should monitor patients for changes such as change in bowel continence and sexual dysfunction and provide a multidisciplinary approach to patient care. In some cases, a hematopoietic stem cell transplant can help manage the disease.

It is important to control symptoms of Raynaud's disease in the distal phalanges and to monitor for sclerodermal renal crisis, which is marked by a sudden increase in blood pressure and acute increase of creatinine. Monitor, too, for GI involvement such as GERD, bacterial overgrowth and constipation. Hand manifestations can result in neuropathy so, with these patients, consider stretching and massage as preventative measures.

**Afsaneh Alavi** described different classifications of digital ulcers, including those on bony prominences, those with calcinosis (chalky discharge), those on lower limbs and those with gangrene. Remember that pitting scars cause fissures known as pseudo-ulcers that mimic the clinical presentation of scleroderma ulcers.

Clinicians should follow regular wound care principles with a special emphasis on pain management. Treatment generally includes a combination of vasodilators, prostanoids, PDE-5 inhibitors, endothelin receptor antagonists, low-dose acetylsalicylic acid and cycles of immunosuppressants or immunomodulators. Digital ulcers often prove difficult to dress, so clinicians are encouraged to use whatever works for each individual patient.

**Deirdre O'Sullivan-Drombolis** described the ways physical therapy (PT) is important in the long-term treatment of scleroderma. PT can prevent and slow complications of the disease and can improve overall health and endurance. When creating a PT plan of care, always set patient-appropriate goals and involve the patient in their care and progress. Always consider psychosocial aspects when determining the best plan of care for your patients.

## SURGICAL WOUNDS

### Session 55

*Presenters: John Hwang, Valerie Winberg, Johnny Lau, Gregory Schultz*

This session covered what to do when things go wrong with surgical wounds and looked at specialized care for surgical site infections in orthopedics.

## Preventing Surgical Site Infections

Clinicians should pre-wash surgical sites to aid in micro-organism management. Patients should have blood glucose levels of less than 11 mmol/L pre-operation. Transfusion of blood products should not be withheld from surgical patients, and an increased fraction of inspired oxygen should be administered both during and after the surgical procedure.

Risk factors for developing a surgical site infection include age, sex, body weight, smoking habits, hypertension and the presence of diabetes. While dressings may provide protection and absorb exudate, a Cochrane review found that there is no single dressing recommendation for all surgical wounds.

Be aware of patient-specific risk factors, and minimize or eliminate these risks when possible (e.g., through smoking cessation and/or diet change). Local risk factors for surgical wound complications include impaired surgical site healing, infection, edema or elevated tissue perfusion, ischemia and the presence of foreign objects. Systemic failures such as inflammatory disorders, malnourishment or vascular disease also increase patient risk.

## Specialized Care: Surgical Site Infections in Orthopedics

**Gregory Schultz** noted that infections are a major complication of implant surgeries and can occur years after the surgery is conducted. *Staphylococcus aureus*, *S. epidermidis* and *P. aeruginosa* are the major strains of bacteria that have been isolated in these infections.

Biofilms are communities of bacteria encased in a self-producing matrix of polysaccharides, protein and DNA that provide high levels of tolerance to neutrophils, antibodies, antibiotics and antiseptics. Biofilms are present in a high percentage of chronic wounds and implanted medical devices, where they can impair healing by stimulating chronic inflammation, leading to elevated levels of proteases and reactive oxygen species (ROS) that degrade proteins essential for healing. Biofilms are extremely inflammatory.

**Practice pearl:**

- Bacteria in biofilms are difficult to kill, but negative pressure wound therapy can be effective in treating biofilm infections in orthopedic patients.

### Preventing Post-surgical Wound Complications

**Johnny Lau** noted that surgical wound complications are associated with higher risk of ICU stay, hospital readmission, depression and death. To optimize surgical outcomes, clinicians should work to control blood glucose, improve immune function, address malnutrition, improve vascular status and optimize skin condition. Furthermore, patients should be encouraged to stop smoking, and the use of immunosuppressive drugs should be suspended.

Post-surgical wound complications put an enormous strain on health-care systems, but there are numerous modifiable risk factors that can be addressed to lower risk of complications.

## PATIENTS' AND CLINICIANS' EXPERIENCES OF WOUND CARE IN CANADA

### Session 60

*Presenters: Ken McLellan, Linda O'Rourke, Kevin Woo*

This session gave attendees an overview of the patient and clinician experience across the wound care continuum in Canada.

**Ken McLellan** did not have a family doctor and had what he thought was a bunion on his foot that he was self-treating. This "bunion" turned out to be a diabetic foot ulcer that required immediate amputation. He moved to Parkwood, where he received excellent care. He participated in Wounds Canada's Diabetes, Healthy Feet and You program (formerly known as the Diabetes Peer Education Program) to avoid losing his independence and is still active in the support community. He advised that everyone have a general practitioner and go for regular check-ups. Don't just go when something is wrong, he said, as it is important to be proactive with one's health.

**Practice pearl:**

- Care should be a collaborative effort between a general practitioner and the patient.

**Linda O'Rourke** is a caregiver for her mother, who for most of her life has had a wound on her ankle that's moved between healing and re-ulceration. The wound had been healed for 20 years until a skin tear resurfaced the problem, and her mother was sent down a "rabbit hole" of treatments, eventually leading to amputation. She explained that her mother bounced back, but notes it is critical we understand the complexities of caring for the elderly and making sure they understand the expectations of their self-care. As a caregiver, she now knows she should have asked more questions about her mother's care, but at the time she didn't have the knowledge to do so. She should have ensured that a detailed health history be taken, and then asked what type of wound it was, what the treatment plan was and why the ulcer wasn't healing. She also noted that she should have asked for education and training about providing care, and for information about addressing pain. She urged attendees to do as much as possible as caregivers: ask questions and be a part of the plan of care.

**Practice pearl:**

- Practitioners should create a guide for patients and caregivers to use to ensure they know the right questions to ask.

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## WHO'S WHO IN WOUND CARE

### Session 61

*Presenters: Jason Altenberg, Susie Jin, Ellen Mackay, Deirdre O'Sullivan-Drombolis, Surkhad Peerzada*

This session brought together wound care experts of varying disciplines and specialities to discuss members of the typical wound management team, and the role each team member plays.

**Deirdre O'Sullivan**, a physiotherapist, emphasized the importance of learning what your colleagues do and how they can support a team approach to wound healing. Physiotherapy can have a great impact in wound prevention and care by improving strength and mobility and addressing nerve pain. When wounds aren't healing, physiotherapists can assist in treating underlying causes; wound care is within their scope of practice. Exercise is a critical component of health and wellness.

Dietitian **Ellen Mackay** reminded attendees that wounds are hungry! When a patient has a wound, nutrition must shift. If you are caring for a patient with diabetes, blood glucose targets can be met through a planned diet. The wound must be nourished through food, but sometimes there are impediments to nutritional support such as tooth structure, swallowing difficulties or financial constraints preventing the patient from eating a balanced diet. Meeting nutritional goals must focus on the patient: their likes and dislikes, their support system and their socio-economic situation. Menu planning and supplements can assist patients in ensuring they receive adequate nutrition while their bodies work to heal a wound.

**Susie Jin**, a community pharmacist, encouraged attendees to communicate with their colleagues: pharmacists should ask their patients' permission to call their health-care provider and have a conversation with them. Each time a patient comes into the pharmacy, pharmacists should do a medication check, and consider why the patient is still taking each medication and whether it is still needed. Pharmacists can also help clients find supplies such as compression stockings or socks. In this community role, pharmacists can provide information and support for patient self-management and increase patient awareness of what their medications do.

**Jason Altenberg** and **Surkhad Peerzada** represented administrators in this panel, emphasizing the importance of creating interprofessional teams and providing these teams with constant, active support. Administrators can also consider developing partnerships with other facilities to foster a team approach to healing. They noted that creating equitable services is what will help reduce barriers to care. To do this, systems need to invest in research to determine who is affected by the greatest number of barriers, and then target these populations specifically. Furthermore, the pair suggested the use of peer support and facilitator programs to encourage empathy and share lived experiences. This serves to humanize the disease or condition and improve social support for patients. Administrators need to ensure patients are receiving information about how to make a complaint; this allows growth in the system. Finally, administrators can encourage the creation of interdisciplinary teams, which not only save money but also provide better care for patients living with or at risk of developing wounds.

# Wound Sleuth

By Erin Tegeldi, RN, Hon. BA, Hon. BScN

## Optimizing Foot Health in a Homeless Individual

### Presentation

D is a 33-year-old Indigenous man who arrives at the Moss Park Overdose Prevention Site (OPS) reporting feeling unwell. He states that he feels his blood sugar is low, and he's experiencing tingling, shooting pain to both feet. He quickly drinks some juice and then lies on the ground, elevating his feet on a chair to relieve the pain. He is agreeable to showing me his feet, which on inspection are macerated, and there is blistering to the plantar and calcaneal aspects bilaterally (see Figure 1). Otherwise, the skin is generally intact.

D reports that he is currently homeless (having arrived in Toronto from Thunder Bay a month and a half previously) and that he walks for several hours a day and sleeps outdoors with his boots on. He reports that he often doesn't take off his boots for several days at a time (as he is almost always outside). His boots became wet during a recent rainstorm and have not fully dried. D reports that he has diabetes. He knows that a normal blood sugar reading is between 4 and 7. He reports frequent episodes of low blood sugar, but is not sure if he has episodes of high blood sugar (he does not have a glucometer), and he is unsure if he has had a recent HgbA1c. Since moving to Toronto, D has not had contact with primary care; however, he does have a methadone prescriber, and when feeling unwell, he has sought help at the emergency department.

**Figures 1a and b:** Initial presentation

**Q** What are considerations for managing D's feet?

**A** D requires regular monitoring of his feet and skin. This is especially true if his blood sugars have been labile. At the Moss Park OPS, a service

where people can inject pre-obtained drugs with monitoring and harm reduction support, we have been able to provide him with footbaths, clean socks, and regular application of povidone-iodine when his feet become macerated. As we provide a safe space for people who use drugs, he is also able to take advantage of our full hours of operation to offload his feet and give his shoes time to dry. Povidone-iodine was chosen for the management of D's feet, as it helps to dry his macerated skin and provides broad-spectrum antiseptic action. Povidone-iodine is also an economical choice, ideal from a resource-management perspective, because OPS funding remains limited and precarious.


**Figures 2a, b, c and d:** Taken approximately one month after initial visit and with intermittent visits for monitoring and and management at Moss Park OPS; ongoing issues with maceration because patient remains unhoused, plus wet late summer weather

**Q** What kind of care coordination is required to optimize D's diabetes management?

**A** Required along with regular monitoring and care of his feet are capillary blood glucose monitoring and ongoing education about management of diabetes. At the Moss Park OPS we are able to provide regular capillary blood glucose checks and glucagon and snacks in the event of low blood sugar events. To manage high blood sugar readings, D would have to seek intervention at an emergency department. Ideally, he would have a primary care provider to manage monitoring and prescriptions for anti-hyperglycemics. The Moss Park OPS is able to make referrals to primary care (often via nurse practitioner clinics at South Riverdale Community Health Centre [CHC] and Street Health); however, accessing services outside of the Moss Park OPS can be a barrier to D, who on a daily basis already juggles the priorities of shelter, food, and drug acquisition for his opioid dependence, as well as pain management, which is not optimally addressed by his methadone prescription.

D would also benefit greatly from referral to a chiropodist and optimization of his footwear. As this service is not available on-site at the Moss Park OPS, there are significant barriers to D accessing DCh care. We continue to work towards finding a time when D is available and when the DCh and nurse practitioner drop-in services are running at South Riverdale CHC.

Ultimately, the health of D's feet rests on optimizing social determinants of health. D has often slept outside during the summer months. Sleeping outside leaves people vulnerable to theft of belongings. For this reason, D may be reticent to sleep without his shoes on, even if they are wet. Housing and income security would help D to co-ordinate his diabetic and skin

self-management, and other primary health care.

## The Outcome

Following our initial interaction, D returned to the Moss Park OPS for three days for foot washing, application of povidone-iodine, fresh socks, and an opportunity to offload his feet and allow his shoes time to dry. This resulted in remarkable improvement to his skin: his feet were noticeably less macerated, and he reported a decrease in foot pain. D subsequently returned to the Moss Park OPS at least a couple of days a week for ongoing care and monitoring, as well to access the supervised consumption service. As D became more familiar and comfortable with the service, during one of his visits he allowed me to check his CBG (capillary blood glucose) level—it was 6.3.

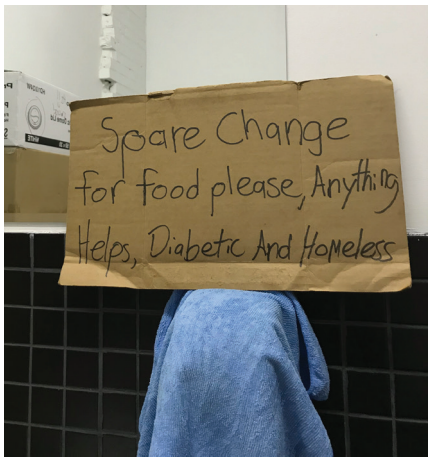


**Figure 3:** A sign the patient made to use when panhandling

We continue to work on connections to primary care and chiropody. As the weather gets colder, finding housing will become a priority to provide D and his feet with relief from the weather.

D was excited at the prospect of having the story of his treatment shared with others. He is passionate, as am I, about improving access to compassionate and client-centred health care for people who use drugs and people who are homeless or experiencing poverty. We both believe strongly in treating the cause—which in the case of someone like D means not only managing blood sugar, but also making changes to improve the services available to people who use drugs and addressing the systemic barriers that lead to ongoing poverty and marginalization.



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# Using PICO™ 7 for Patients with Complicated Diabetic Foot Ulcers: An Economic Perspective

*This is a brief summary of a presentation at the annual fall conference of Wounds Canada, in London, Ontario, on November 10, 2018. It has been produced with the financial support of Smith & Nephew. The presenter was Andrew Sharpe, BSc (Hons), MSc, MCPod, HCPC, a podiatrist and lecturer at the University of Huddersfield, England.*

## Introduction

In the United Kingdom, an estimated 4.5 million individuals live with diabetes, whether diagnosed or undiagnosed—meaning approximately one in 15 people is affected by this disease. Current projections estimate that the number of people with diabetes will surpass 5 million by 2025, increasing the burden on the healthcare system. Unfortunately available personnel trained to care for these patients will not increase at the same rate. Researchers and clinicians are now asking: "How can we do more with less?"

## Impact on Health Care

In 2012–13, some 169,000 diabetic foot ulcers (DFUs) were recorded, which translates to 5% of adult diabetic patients.[1] The lifetime risk of developing a DFU was calculated at 15 to 25%.[2] Furthermore, in England, 60,000 to 75,000 people have an active DFU any given week.[3]

## The Role of Negative Pressure Wound Therapy

- Creates an active (not passive) dressing
- Results in fewer dressing changes
- Improves microcirculation
- Stimulates blood flow and oxygenation
- Provides effective mechanical wound cleansing
- Forms a bacterial barrier
- Biochemically reduces fluid concentration of proteases that impair wound healing
- Removes excess fluid
- Reduces area with edge of wound retraction
- Reduces interstitial edema

The NHS England, an executive non-departmental public body of the Department of Health and Social Care, spends $1.66 to $1.93 billion on foot ulceration and amputation per year: a cost of $4.52 to $5.27 million per day. Cost per diabetic foot ulcer can range from $3,650 for a healed wound to $15,000 for an unhealed wound. The cost of amputation for one diabetes-related wound is $28,500. The economic cost of wound care is expected to rise by 39% over the next four years.

In the UK between 2013 and 2016, there were 8,500 amputations per year. This translates to 160 amputations per week, or 23 amputations per day. The costs of social care for DFUs and amputations have been estimated at $23.71 billion.[4]

## Cost-effective Management

Cost-effective management of DFUs should aim to promote rapid and complete wound closure and should return the patient to their pre-ulcerative state. Standards of care for DFUs include offloading to manage pressure, control of ischemia to manage arterial disease, and control of foot infection, wound debridement and dressings to manage infection. While no one dressing is a fix-all solution, the key components of a wound dressing include:

- Supporting progression toward wound healing
- Maintaining a balanced wound environment that is not too moist or too dry

## PICO™ 7 Wound Dressing: Unique by Design

The innovation of the PICO™ 7 is within the dressing, and a key part of this is the patented AIRLOCK™ technology layer, which stabilizes the healing process by:

*continued . . .*

- Ensuring pressure is distributed in a uniform way across the wound bed
- Ensuring consistent delivery of negative pressure wound therapy (NPWT) over the seven-day duration of therapy
- Managing fluid from the wound through absorption and transpiration, thereby reducing the risk of maceration

Furthermore, the AIRLOCK™ layer, in combination with the Superabsorber layer, prevents up to 99.9% of bacteria movement to the wound contact layer.

The PICO™ 7 empowers patients with its new dressing-full indicator, which is designed to detect when the dressing filter has become blocked and visually indicate to the user within two hours of occlusion that a dressing change may be required. This is designed to ensure dressings are only changed when necessary, not because of a routine.

The PICO™ 7 is also designed with clinician confidence in mind; the pump is more than twice as effective at dealing with air leaks. This means improved performance on hard-to-seal wounds, allowing the clinician to address a wider range of wounds, and reducing dressing checks done "just in case."

## PICO™ 7 Clinical Evaluation

The PICO™ 7 device was tested for its potential to do more with less. Researchers were interested in whether the PICO™ 7 could reduce the resource burden of complicated DFUs, and at the same time improve wound outcomes. The pump was tested using case studies of four complicated DFUs cases. Investigators measured the number of weekly contacts and the healing trajectory (percentage of reduction in wound area). Table 1 provides a summary of the patient demographics for these four case studies.

**Table 1:** Case Study Demographics

| Details | Case 1<br>86 y.o. male | Case 2<br>81 y.o. male | Case 3<br>51 y.o. male | Case 4<br>65 y.o. male |
|---|---|---|---|---|
| DFU location | Right forefoot amputation | Left 5th toe amputation | Right posterior heel | Left posterior heel |
| Dimension (area) | 2.5 x 0.4 cm (1 $cm^2$) | 1.2 x 0.6 cm (0.72 $cm^2$) | 6 x 10.5 cm (63.5 $cm^2$) | 2.5 x 4.5 cm (11.25 $cm^2$) |
| SINBAD (0–6) | 3 (I, N & A) | 3 (I, N & D) | 3 (S, N & A) | 4 (S, N, B & A) |
| Length of PICO™ 7 treatment | 4 weeks | 12 weeks (4 weeks PICO™ 7, 2 weeks break, 8 weeks PICO™ 7) | 5 weeks | 6 weeks |
| Dimension post-PICO | 2.3 x 0.3 cm (0.69 $cm^2$) | 0.4 x 0.8 cm (0.32 $cm^2$) | 5 x 6 cm (30 $cm^2$) | 2 x 2.5 cm (5 $cm^2$) |
| Percentage reduction | 31% | 56% | 53% | 56% |

Table 2 shows the decrease in contacts per week and clinician time per week recorded during the case studies.

**Table 2:** Clinician Contacts and Time per Week

| Case | Clinician Contacts Per Week | | Clinician Time (minutes per week) | |
|---|---|---|---|---|
| | Pre-Pico° 7 Treatment | During Pico° 7 Treatment | Pre-Pico° 7 Treatment | During Pico° 7 Treatment |
| 1 | 3 | 1 | 93 | 62 |
| 2 | 2 | 1 | 62 | 31 |
| 3 | 7 | 2 | 217 | 155 |
| 4 | 3 | 2 | 93 | 31 |

## Results of Clinical Evaluation

Using PICO™ 7, the number of contacts decreased from an average of 3.75 to an average of 1.5 per week. Furthermore, a total of 279 minutes (4 hours, 39 minutes) was saved in clinician time per week of treatment. Patients in this study saw a mean wound area reduction of 49% following treatment with the PICO™ 7 (range 31–56%).

## Summary

Facilities working with patients with diabetic foot ulcers can realize significant potential cost savings through the use of the innovative PICO™ 7 dressing in conjunction with standard of care treatment.

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# Developing a Wound Care Program in Long-term Care:

## Changing the Focus from Products to Prevention

By Bernadette Mitchell McDonald, RN, BComm, IIWCC, Clinical Resource Manager

Wound care in long-term care (LTC) presents challenges that are unique to this sector of health care. Many LTC residents are frail elderly who have multifactorial co-morbidities, which place them at a higher risk of pressure injury. As well, there are challenges with staff awareness, education and limited access to products that are available in other health-care sectors.

The purpose of this article is to share the changes that were put in place at Northwood, a continuing care organization, to develop a wound care program that would educate staff, implement best practices, decrease the prevalence of pressure injury and decrease the cost of care delivery, resulting in better efficacy and improved outcomes.


Northwood provides care to 641 residents—485 at Halifax Campus and 156 at Bedford Campus. Prior to 2012, Northwood did not have a formal wound program, and treatment modalities were physician-driven using a provincial wound product formulary comprising 337 wound products. In 2012, it was decided by a team of clinicians, who became part of a wound care community of practice, that the delivery of care needed to be restructured by updating resources, educating all levels of clinical staff and implementing current wound care evidence-based best practices.

Fostering a culture shift meant administration supporting an environment for staff that would focus on interprofessional strategies to prevent pressure injuries.

## Assessment of Current Situation

In April 2012, a full assessment of the current wound care program and products was completed, and the findings were as follows:

- The formulary had numerous products from different suppliers with similar properties (337 products).
- Physicians were ordering traditional treatments based on preference, leading to confusion and inappropriate use by registered staff.
- The few staff had minimal training in wound care and required physicians to make the decisions.
- There were no set protocols followed by all registered staff or physicians.
- The wound care resource role was an addition to regular charge nurse duties, resulting in inconsistent delivery of care.
- Physicians' prescribing habits and limited wound care knowledge led to unsuitable

treatment regimens, prolonging healing or impairing outcomes.
- Examination of product costs revealed Northwood was paying more through their current supplier than they would through a group purchasing contract.
- Occupational therapists and dietitians had little involvement in wound management.
- Many supplies were wasted as a result of inappropriate treatment regimens.
- Indicator monitoring was unreliable due to inconsistencies.
- Pressure injury prevalence rates in 2013 fluctuated from 5 to 8%.

## Proposed Project Outcomes

In 2012, a project was proposed with a focus on three core areas.
- The first focus was on *resident care*, with goals being to a) reduce healing time, b) reduce the prevalence and incidence of pressure injuries and c) reduce the number of referrals to specialty clinics, thus reducing transportation costs for our residents.
- The second focus was on the *facility*, the goals being implementation and compliance of current best practice guidelines for wound prevention and management, improved resident care and improved use of registered staff resources by expanding their scope of practice through training and education.
- The third focus was to improve our *health-care system* in order to reduce costs of wound care

products used in long-term care through product standardization and implementation of evidence-based best practices.

In April–May 2012, an action plan was formulated to accomplish the following:

- Review evidence-based guidelines currently available.
- Develop a formulary based on the provincial group purchasing contract.
- Run a trial of an electronic software program to track outcomes.
- Meet with the Department of Health and Wellness (DHW) to review potential cost-saving initiatives, which resulted in a joint project.
- Hold discussions with wound care product suppliers to determine appropriate product use and ability, to improve consistency.
- Identify a company that could provide consistency in products on formulary available through current supplier and GPO contract. Monthly education sessions were offered to staff.

## Implementation

Over the course of summer 2012, the wound resource team implemented, with DHW, a project charter. With the support of IT, Financial Services and Materials Management, the team also implemented a software program. Initially the software program was put in place on two medical units, and 140 professional staff were trained. The team developed a wound resource binder, using resources from the Registered Nurses' Association Ontario (RNAO)[1–4] and Wounds Canada's Best Practice Recommendations,[5] then placed these on all 15 units. Education modules were presented to the Wound Resource Champions. Going forward, routine medical directives would be vetted through the pharmacy and therapeutics committee to assist staff in selecting treatments based on evidence-based best practices. The team entered wound data for all residents into the software program to monitor care, supplies, outcomes and costs. By fall 2012, the wound care formulary was aligned with the provincial formulary, and a new product list was developed from the current provincial list, resulting in the number of products being reduced from 337 to 39.

Over the next few years, the team went on to evaluate the initial project, and its success led to the program being implemented at a second campus.

From 2012 to 2017, the team held several one-hour and full-day education sessions on various wound care topics for all staff. In 2016 and 2017, it went on to host two one-day wound education programs for other long-term care facilities. Presenters included long-term care clinicians with wound care expertise, an occupational therapist, a pharmacist and a dietitian; there were also presentations by a clinician who had developed a multidisciplinary leg ulcer clinic in acute care. Attendees included nurse managers, registered nurses (RN), licensed practical nurses (LPN), nursing educators, a nurse practitioner (NP), an occupational therapist and dietitians.

## Results

The wound resource team evolved and remains an interprofessional team (including RN, LPN, OT, DT, NP and nursing educators), all with a common interest in wound care. Unit staff offer case presentations to share success stories about com-

plex residents and the positive outcomes they have seen. An interdisciplinary wound referral form was developed for the interprofessional team for more effective use of resources.

The team was given autonomy from DHW to modify their wound product list and use products available on the GPO contract. The new list comprised two parts:

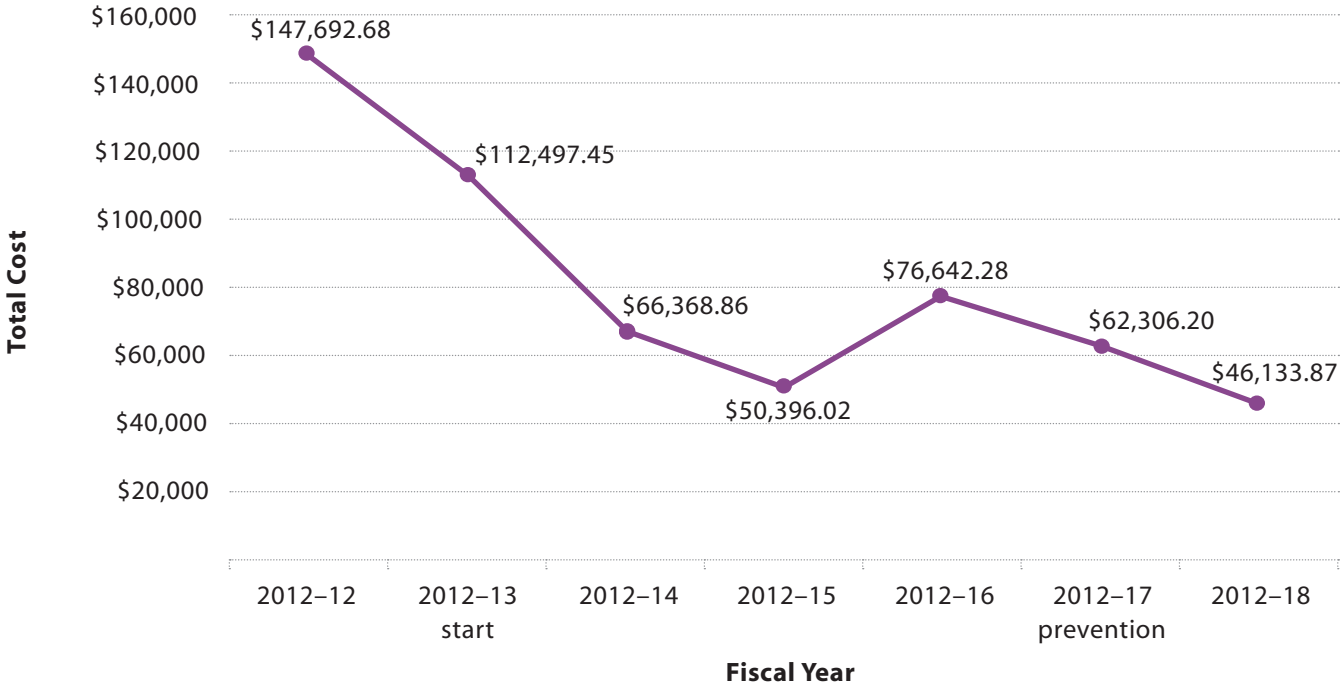
1. 58 products wound care staff can select from in treating residents
2. 37 products for which staff require special authorization for use in treating residents

In 2017 modifications were made to our wound resource binders, using current resources such as Wounds Canada's Best Practice Recommendations,[5] the British Columbia Provincial Nursing Skin and Wound Committee's Guideline: Braden Scale for Predicting Pressure Ulcer Risk in Adults and Children, CLWK product cheat sheets,[6] assessment and documentation tools, copies of education sessions held, SCALE[4] and the Registered Nurses' Association of Ontario's (RNAO) Health Care providers' turning and position techniques document.[7] Version 2 of this binder is currently being revised and updated.

## Preventative Team Approach

Prevention is now the focus of care. Skin assessments are done within two hours for a new admission and for any resident that has spent a minimum of 12 hours in the emergency department. The Braden Scale[8] is completed within the first 72 hours of admission and within 24 hours for readmissions. Follow-up Braden Scale assessments are then completed every two to four weeks based on the resident's risk for pressure injury. The nurse practitioner for the facility performs ABPIs and sharp debridement when required. This has tremendously improved healing outcomes and reduced the frequency of sending residents out of the facility for these specialty services. Wound rounds continue to be completed virtually on a monthly basis, and then quarterly on each unit by a wound resource nurse. Prevalence and incidence are also reported to administration and DHW within the same time frames. As part of a quality indicator, each unit now reports

**Figure 1:** Wound Care Product Total Costs: 2011–12 to 2017–18



the number of facility-acquired pressure injuries (FAPI) on their unit for families and residents.

## Results

In June 2018, the wound resource team completed a prevalence and incidence (PI) study at both campuses. The results:

**Campus 1:** prevalence 1.9%; incidence 1%

**Campus 2:** prevalence 2.58%; incidence 2%

Before the project began, the cost of all wound products purchased for our facility in the 2011–12 fiscal year was calculated to be $147,692. In 2014–15, the cost had been reduced to $50,396. Currently, the cost for the 2017–18 fiscal year is $46,133. This represents a 59% reduction compared to when the project started in 2012 (see Figure 1).

Mandatory education modules have been developed for our online learning program, covering new procedures on prevention, selection of wound products, ABPI and turning and positioning techniques for Continuing Care Assistants (CCA). A skin tear prevention program is in development and will soon be rolled out, followed by a lower limb assessment program. The formulary has been separated into two parts. One that registered staff can order internally and the second requiring special authorization by a wound care clinician. In June 2018, the DHW approved and adopted the concept idea for this program for all long-term care facilities in the province of Nova Scotia.

## Conclusion

This project has been successful from a care delivery perspective, but also it has demonstrated a culture shift in staff that embodies a sense of pride, camaraderie and an interprofessional approach to wound management and prevention.

## Acknowledgements

Thank you to the Halifax and Bedford campuses wound resource teams, Cathy Burrows, RN, BScN, MScCH (Wound Prevention & Care), and the management and administration of Northwood, whose support made this project possible.

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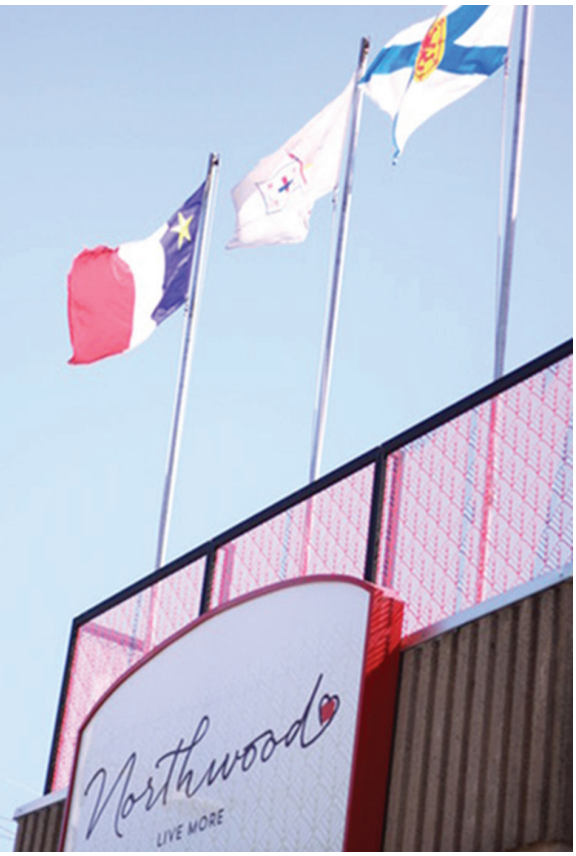


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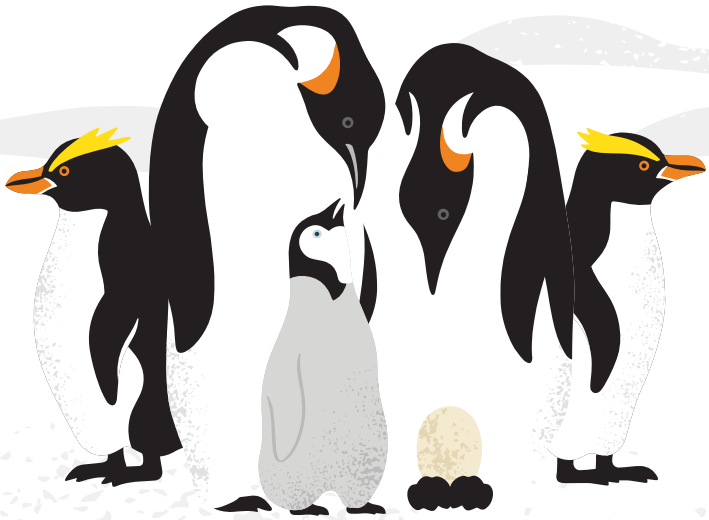

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# How We Decreased the Costs of Wound Care Supplies

## at a Hospital and Long-term-care Home

By Carol L. B. Ott, MD FRCPC, Lilibeth Jones-Lim, RN(EC) MN GNC (C), Aysha Bandali, RN(EC) MN GNC (C), and Sue Calabrese, RN(EC) MN

In institutional health care, we are now working in an environment of restricted financial resources. Wound management is one area where attempts are being made to understand true costs. Costs may include:

- Dressings
- Interprofessional care time (including physicians, nurses and other allied professionals)
- Inpatient days[1]

At Baycrest, we decided to look into the costs of our dressings over the period 2010 to 2014, as this seemed a logical place to start. The plan is to assess other areas later on.

### Background

Baycrest is a geriatric teaching hospital, long-term-care facility and research facility associated with the University of Toronto in Toronto, Ontario. The hospital has about 250 beds, which include high-intensity and slow-stream rehabilitation, behavioural neurology, mental health, and complex continuing care, along with palliative and transitional care wards. The long-term-care section, Apotex Jewish Home for the Aged, has 472 beds. Our patients have a variety of wounds including pressure injuries, venous stasis wounds, arterial ulcers, diabetic foot ulcers, iatrogenic wounds, skin tears and others.

In 2010, we calculated the costs of our dressings and found we spent $147,859 in both the hospital and long-term care home for that year. We realized that we had a large variety of dressings available on our wards, and our nurses were often asking for help determining which dressings to use. We wondered what would happen to our yearly costs if we were able to streamline our inventory of dressing supplies and build on the knowledge and abilities of our ward nurses.

Over the next four years, treatment plans were

developed by advanced practice nurses, bedside nurses, physicians, families and patients, as well as other team members as needed.

## Treatment and Product Selection

Our education and treatment planning corresponded to many of the guidelines for healing healing wounds. Plan of care goals should include healing the wound when the patient has the physical capacity to heal.[2] For non-healing wounds, where the patient has the physical capacity to heal but is either making choices that are inconsistent with optimal wound healing and/or the health-care system cannot support optimal healing at this time, goals of care must reflect this.[2] For non-healable wounds, where the wounds cannot heal due to co-morbidities, medications or other circumstances, supportive goals must put be in place.[2]

Once healability is determined, especially by the assessment of blood supply to the wound, we consider the etiology and factors leading to the wound and make necessary corrections. For example, many of our wounds are pressure injuries, and in those cases, we consider offloading with the appropriate mattresses/chair surfaces and positioning. This is similar for the venous- and lymphedema-related leg ulcers, where we treat the underlying edema issues. Diabetic and arterial wound-related issues must be considered and treated. We also identify quality-of-life issues such as pain control, functional status and well-being.[2] Only once all these issues are addressed do we determine the appropriate dressings.

Products were chosen and made available in supply closets on wards for regular use. Other products were still easily available by special request to one of the advanced practice nurses, though not kept on the ward. Wound care supplies on wards were chosen based on cost, access-

## Prevalence

Prevalence measures the proportion of a defined set of people with a pressure injury at a moment in time.

$$\text{Prevalence} = \frac{\text{Number of patients in the population studied with a pressure injury at a particular moment in time}}{\text{Total number of patients in the same population studied at the same moment in time}} \times 100$$

ibility, ease of use and their wound management properties. Review articles, best practice guidelines and our own experience guided these decisions.[3,4] We set a goal to increase the knowledge of wound care by all involved rather than restrict the availability of products. We wanted the ward nurses to be able to determine the dressings needed in a given situation. Discussions about the treatment of wounds aimed to expand the knowledge and abilities of the ward nurses occurred both in classrooms and on wards.

### Measuring and Documenting

To determine the costs of the supplies, we quantified our wound care supplies purchased for use in the long-term-care home and hospital for that year. The quantities were multiplied by the cost for each product that year based on our contracts. Items included in the cost analysis were limited to products that were on that year's wound care dressing formulary. Cost analysis did not include basic wound care products such as gauze for cleaning, saline, or dressing trays, as these came out of a different budget.

Unfortunately, even though we treat a variety of wounds in both our hospital and long-term-care home, and our wound care supplies are used on all types of wounds, the only prevalence studies that are regularly performed are for pressure injuries. This is standard at most facilities.

To determine the prevalence of our pressure injuries, we conducted a full review of all patients over 24 hours. Only pressure injuries were recorded.

### What We Discovered

The costs of the wound care supplies in our hospital and long-term care were calculated for each year of the study (Table 1).

Using 2010 as our baseline costs of wound care supplies, we determined that we had been able to achieve yearly savings of $65,818 (–44.5%) in 2013. Our yearly savings increased in 2014 to $82,538 (–55.8%) (Table 2).

The only wound care quality marker we assessed from 2011 to 2014 was prevalence of pressure injuries. We used the prevalence of pressure injuries stages 2 to 4, as these require the use of bandages, to estimate our number of wounds yearly.

Our prevalence too was calculated yearly. Yearly results were similar (range of 2.5%). Our numbers fell within the range of what is considered to be acceptable prevalence in Canada.[5]

## Implications of These Studies

The retrospective look at our costs of wound care supplies shows that we reduced the costs of wound care supplies at our institution by up to 56%, freeing money that could be used in other areas of health care or pressure injury prevention.

We do not know if our reduction in wound care supply costs affected the care of the patients. The only marker we currently have is our prevalence rate of pressure injuries, which has remained similar over the four years it has been evaluated. We hypothesize, based on using pressure injuries as the marker, that this means we are treating the same number of wounds with evidence-based practice and by using less costly dressings. However, we also treat venous stasis, arterial, diabetic foot ulcers, skin tears, surgical wounds and others. These were not evaluated or tracked. Only pressure injuries are traditionally monitored, being considered a quality-of-care indicator.

**Table 1:** Costs of Wound Care Supplies in 2010, 2013 and 2014 (Canadian dollars)

| Area | 2010 | 2013 | 2014 |
|---|---|---|---|
| Long-term Care | $43,423 | $27,067 | $26,508 |
| Hospital | $104,434 | $54,972 | $38,811 |
| Summary | $147,857 | $82,039 | $65,319 |

**Table 2:** Cost Savings Achieved (2010 as baseline)

| Year | Total Costs of Wound Care Supplies | Difference from Baseline | % Difference from Baseline |
|---|---|---|---|
| 2010 | $147,857 | N/A | N/A |
| 2013 | $82,039 | $65,818 | –44.5% |
| 2014 | $65,319 | $82,538 | –55.8% |

## What Now?

This is only the beginning of our study into wound care issues at Baycrest. Evaluating this endeavour created more questions than answers. It also identified the need to create a Wound Care Stewardship Committee to organize and promote leadership in the responsible use of wound care products and wound treatments. If we can show that our quality of care improves or remains the same, other institutions may be inspired to look at the costs of their own wound care supplies. We realized the need to look for quality of care markers beyond the prevalence of pressure injuries, and we are working toward this. Our 2017 prevalence study was expanded to investigate the numbers of other wounds we treat as well.

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# Embrace Social Media to Build Online Recognition and Brand Authority

By John Gregory, IIWCC, and Mariam Botros, DCh, DE, IIWCC

## Introduction

We live in a very social, interconnected world. Twitter has become the quill of our time, and Facebook connects individuals and supports communities. There is evidence everywhere of how channels such as these have encouraged new conversations that might not have occurred otherwise. Within health care, such exchanges have been prompted by social advocates like Dr. Perry Mayer, medical director of The Mayer Institute, a centre for the treatment of diabetic foot, and Dr. Doris Grinspun, CEO of the Registered Nurses' Association of Ontario (RNAO).

As a result, more and more organizations and individuals are recognizing the importance of raising their online presence. Wound care practitioners in Canada are no exception, yet some may not be sure how to embrace these new communication media.

Through images, quick facts and quotations, this article explores how social media channels have had an impact on wound care, how Wounds Canada has engaged with them and how you can apply them yourself.

## What Wounds Canada Is Accomplishing with Social Media

For an organization or individual using social media, the most important goal is to post often,

### Quick Facts about Social Media Channels

- Social media channels are increasingly being used as search engines.
- YouTube is the second largest search engine in the world next to Google.
- Facebook remains the most widely used social media platform.
- Among users, there is high reciprocity between social channels: those using LinkedIn are more likely to be using Twitter, and 90% of those using Instagram or LinkedIn are likely to be most active on Facebook.

providing information of interest to followers. If successful, the result will be one of continued growth in reach over time. A social media presence generally won't grow if it is not fed with frequent, meaningful posts. The presence of Wounds Canada on social media channels has grown in recent years, with spikes of activity that coincide with the conferences. Building the authority of a brand online takes an investment of time and patience.

*"Social media channels like Twitter have become powerful vehicles to connect communities of people, source real-time, categorized information and resources, as well as offer a global avenue to express and share knowledge, opinions and conversations. Twitter is about following, not friending," says Catherine Finlayson, medical communication manager, IDB, at Takeda Canada Inc. and a pioneer in social media marketing in health care in Canada (@Catherinefin).*

Figure 1 demonstrates Wounds Canada's steady growth in activity over seven years. Note both the general increase in the past two years and the spikes during major events.

Figure 2 demonstrates the reach, based on impressions, of the top-performing tweet at the Wounds Canada Fall Conference in London, Ontario, on November 9, 2018.

Figure 3 shows Wounds Canada's reach via Twitter, based on impressions, over the period of the 2018 Fall Conference.

Wounds Canada's increased use of social media has established improved connections with physicians, researchers and policy-makers, groups

## Useful Social Media Definitions

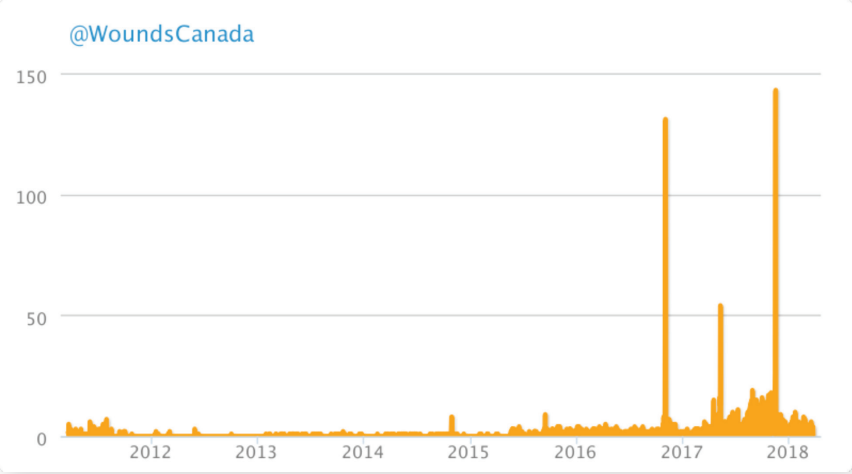
**Online presence:**
This is how and where you can be found on the Internet, across your website(s) and social media channels. Increasing your online presence makes you easier to find and might increase your online authority.

**Search Engine Optimization (SEO):**
The principal search engine, Google, ranks your online presence based on algorithms. The art and science of increasing your online authority is called Search Engine Optimization (SEO). Although the exact algorithms are not widely known, the principles that apply and can improve SEO are well understood. They help people to find you online.

**Impressions:**
The number of people who saw your tweet.

**Total engagements:**
The number of interactions (e.g., commenting and sharing) with your post(s).

**Figure 1:** Growth of the Wounds Canada Twitter Account: 2012 to 2018



that traditionally have lower rates of interaction with the organization through conferences or email. By using multiple methods of communication, including social media, Wounds Canada is extending its sphere of influence and reinforcing its online authority.

**Figure 2:** Wounds Canada Fall Conference 2018 Top Tweet, Welcoming Speaker Doris Grinspun, CEO of RNAO


Catherine Finlayson notes that "Wounds Canada is successfully utilizing this effective communication and marketing platform to gain followers who seek to connect with a reliable and trusted community dedicated to providing sound and

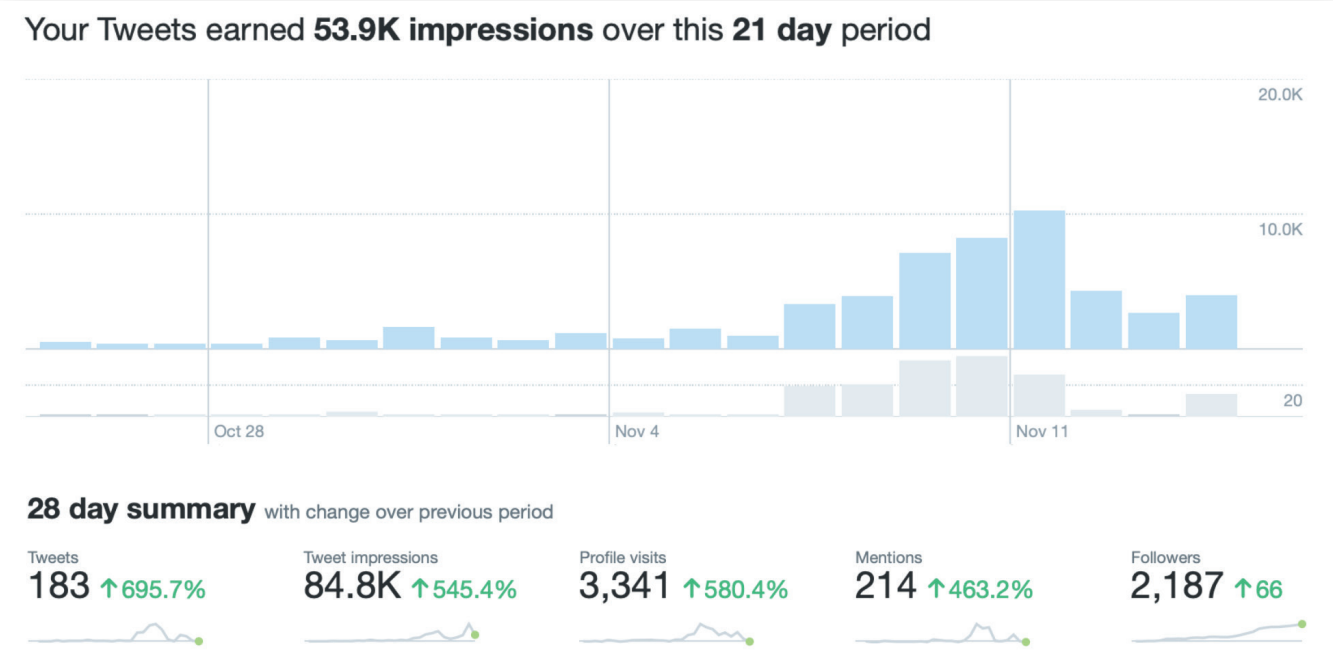
## Wounds Canada's Community on Social Media

| Social Channel | Wounds Canada | Diabetic Foot Canada |
|---|---|---|
| Facebook followers | 3351 | 3704 |
| Twitter followers | 2187 | 2007 |
| YouTube subscribers | 61 | |
| LinkedIn followers | 188 | |

## Physicians and Social Media

Dr. Perry Mayer represents a growing number of wound care physicians who have recognized the power of social media. He co-led the social media hands-on workshop at the Wounds Canada 2018 Fall Conference and had this to say: "Diabetic foot wounds are the most prevalent complication of diabetes, and yet it is the least recognized and [most] poorly treated complication, frequently leading to unnecessary lower limb amputation. Part of our problem in changing this narrative involves awareness amongst those with diabetes and the medical community itself. Organizations such as Diabetes Canada, Diabetic Foot Canada and Wounds Canada have attempted to disseminate messages through their forums, but, unfortunately, that message is only heard by the few, and we need it to be heard by many. The only way that this can be done in a scalable way is to use social media. Social media is geared towards scalability when delivering messages of importance and allows us to reach a huge population base, with relative ease. It is only when we can have the public think about a diabetic foot wound in the same way that they think about being on dialysis because of kidney failure or blindness as a result of diabetic end-organ damage that we will have uptake and action to tackle this prevalent and debilitating diabetic complication effectively."

**Figure 3:** Number of Impressions on Twitter during Wounds Canada's 2018 Fall Conference



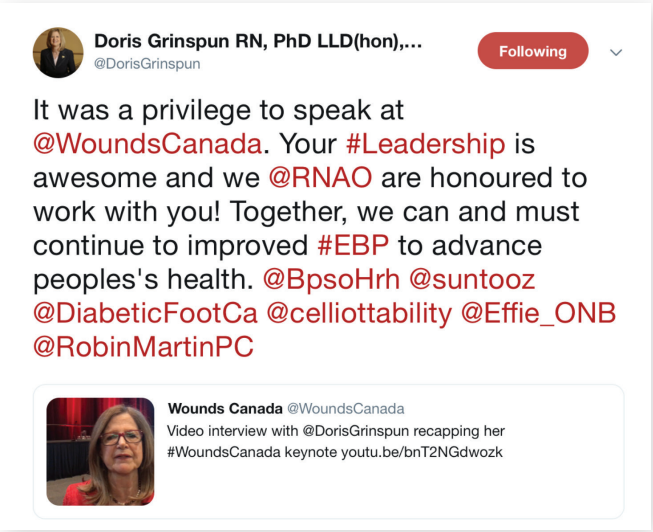

relevant medical education opportunities, clinical resources and evidence-based research. The followers of @WoundsCanada on Twitter receive not only valuable information but also a connection into a strong and growing network of cohorts, professionals, health institutes, support groups and stakeholders driven to disseminate credible information, collaborate on sound projects, share events and conferences and elevate the importance of wound care knowledge and practice."

Twitter allows Wounds Canada to amplify its message when those with a large sphere of influence share their stories. Doris Grinspun has more than 8,700 followers on Twitter (see example, Figure 4).

The value of social media for individual professionals is well described by Marlene Varga, Pressure Injury Prevention lead at Covenant Health Canada, in Edmonton, who commented to *Wound Care Canada,* "Social media is important to help communicate messages about wound care. It keeps me updated as to what is currently going on with others. A snippet of information here and there from Twitter, for example, is a source of information that I could follow up on if that is of interest to me. It's all about sharing, connections, learning from others, getting inspired and motivated. This is important for my work well-being to have those connections with others."

Social media allows you to listen and interact in a very human-to-human way. "There is no more B2B or B2C. There is only Human-to-Human (H2H)," writes author Bryan Kramer in his book of the same name.

**Figure 4:** Tweet by Doris Grinspun during Wounds Canada's 2018 Fall Conference



## Case Study: Stop Pressure Injury Day

The Stop Pressure Injury Day annual event is an example of an international movement built by social media. In 2012, working with the European Pressure Ulcer Advisory Panel (EPUAP), co-author John Gregory helped establish the Twitter accounts and the #STOPPressureInjuries hashtags. Social media has helped build this annual November event to eliminate avoidable pressure injuries. Figure 5 is an example of a tweet containing event hashtags.

**Figure 5:** Example of a Stop Pressure Injury Day tweet


## How to Use Social Media Successfully for Your Wound Care Initiatives

Health-care professionals can use social media channels to seek answers to questions and help guide other health-care practitioners as well as patients to credible sources. Both the Registered Nurses' Association of Ontario (RNAO) and College of Nurses of Ontario offer guidance to their members on how to use social media effectively. Indeed, they advocate the use of social media in influencing government. As an example, check out the RNAO guidance on social media at https://rnao.ca/news/socialmediaguideline.

By following a few simple tips, you too can successfully incorporate social media into your overall communication strategy to enhance your reach with patients, connect to colleagues and support virtual communities.

- Create a profile on each of the major social media platforms (Twitter, Facebook, LinkedIn, YouTube and Instagram) so that those searching

## Wounds Canada's Most Influential Supporters on Twitter

Consider following these individuals and groups:

1. David Armstrong @dgarmstrong – Diabetic foot physician from California
2. Rob Fraser @rdjfraser – Nurse and writer from Toronto
3. Doris Grinspun @DorisGrinspun – CEO of RNAO and speaker at Wounds Canada's 2018 fall conference
4. James Hinchcliffe @Hinchtown – Keynote speaker from Wounds Canada's 2017 fall conference
5. Health Quality Ontario @HQOntario
6. Ahmed Kayssi @ahmedkayssi – Vascular surgeon and wound care physician at the University of Toronto
7. RNAO @RNAO

for you can find you.
- Ensure your profile is complete, with a legible profile icon and header image, and that it is clear and professional-looking on mobile devices.
- In your profile header or description, include links back to your website.
- Specify and communicate a hashtag for your wound care events or facility initiatives.
- Get creative! Social media posts that contain videos, images, quotes or links are more likely to be shared than those without. Be sure to tag others, to ensure that they're notified about and see the tweet or post. See Figure 6, an example from the Wounds Canada 2017 fall conference that tags keynote speaker James Hinchcliffe (@Hinchtown).
- When retweeting or sharing a post, always state your motivation.

**Figure 6:** A tweet from the Wounds Canada 2017 Fall Conference tagging keynote speaker @Hinchtown


## Further Resources

To make optimal use of social media channels, refer to the following:

- Free Social Media Certification Course (HubSpot Academy): https://academy.hubspot.com/courses/social-media
- "How to Write the Most Effective Social Media Posts" [Infographic] by Laura Forer (MarketingProfs): www.marketingprofs.com/chirp/2017/33189/how-to-write-the-most-effective-social-media-posts-infographic
- Ultimate Cheat Sheet Guide to Social Media Image Dimensions (HubSpot): https://blog.hubspot.com/marketing/ultimate-guide-social-media-image-dimensions-infographic
- Social Media Video Marketing: The Insider's Guide (Wave.video): https://assets.animatron.com/blog/insiders-guide-to-social-video-marketing/insiders-guide-to-social-media-video-marketing.pdf

*"Congratulations to Wounds Canada for not only being a leader online but also a valuable medical community connection to confidently follow."*

*—Catherine Finlayson*

## Your Call to Action

You can connect with Wounds Canada online from your workplace or home.

- Follow @WoundsCanada and @diabeticfootcanada on Twitter and retweet one of their recent posts.
- Join the Wounds Canada community across various social channels. Even if you are not on Twitter, you can find us on Facebook, Instagram, LinkedIn and YouTube.

***John Gregory*** *edits the syllabus for the Wounds Canada conference. You can find him online at @gregiej and @opencityinc.* ***Mariam Botros*** *is the CEO of Wounds Canada.*

# Become a member of Wounds Canada

As the leading wound care organization in Canada we provide you, our member, with the information and tools to help advance your career, your practice and your team. Your membership provides you with:

- Exclusive access to members-only sections (coming soon) and quarterly newsletters
- Discounts on our professional educational programs; for example, save $40 on this year's fall conference registration fee
- Access to our organizational updates that outline how your membership supports our mission
- The opportunity to become involved as a regional representative and/or board member
- Networking opportunities with other regional, national and international health professionals
- Discounts on wound care tools and resources sold in our eBoutique
- Complimentary subscription to *Wound Care Canada*

Find out more about us at www.woundscanada.ca.

WoundsCANADA.ca