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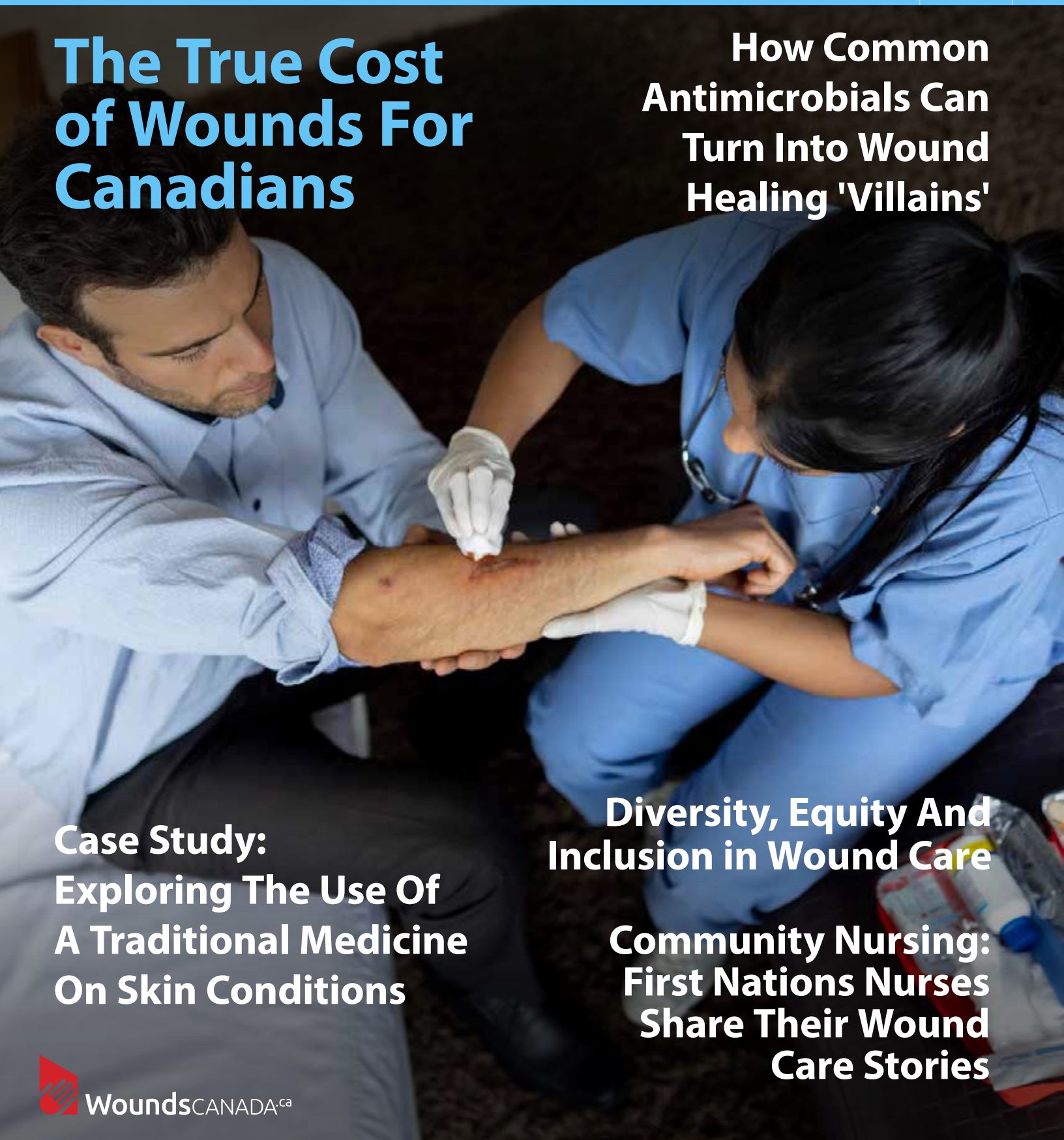
Wound Care CANADA

THE OFFICIAL PUBLICATION OF WOUNDS CANADA



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Wound Care CANADA
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Wound Care Canada is published by Wounds Canada. Canada's first publication devoted entirely to wound care, *Wound Care Canada* addresses the needs of clinicians, patients, care partners and industry.

Wounds Canada (www.woundscanada.ca) is a non-profit organization of health-care professionals, industry participants, patients and care partners 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.

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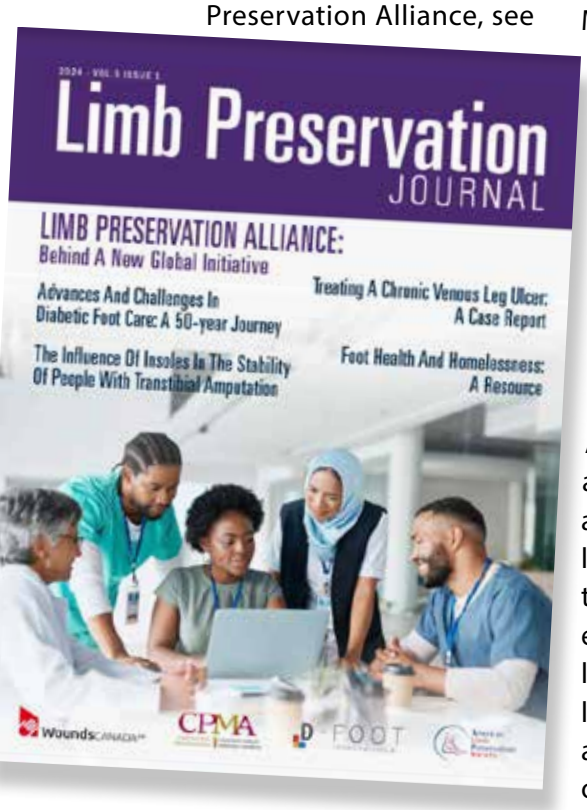
News In Wound Care

Resources

Limb Preservation Alliance Aims To Increase Awareness

Wounds Canada continued its work on awareness campaigns through the Limb Preservation Alliance (in partnership with the American Limb Preservation Society, the Canadian Podiatric Medical Association and D-Foot International), established in 2023).

For background on the Limb Preservation Alliance, see the article in the current edition of *Limb Preservation Journal.*



February 2024 was Heart Month and the Alliance took this opportunity to encourage self care in order to reduce the risk of heart disease.

April 2024 was Limb Loss and Limb Difference Awareness Month and the Alliance raised awareness about the challenges faced by those who have experienced limb loss and limb difference and focused on addressing, promoting and advocating for limb preservation. A campaign webpage was created to provide information, resources and key messages

Finally, **May 2024** was Foot Health Awareness Month and the Alliance advocated for the importance of healthy feet, particularly for those who are already dealing with pre-diabetes and diabetes, in order to avoid problematic ulcers and infections. Considering that 80% of lower limb amputations are preceded by a diabetes foot ulcer, this message was more timely than ever. Again, a dedicated webpage was developed for the campaign.

Campaigns Target Black History Month And International Women's Day

For *Black History Month* in **February 2024**, Wounds Canada featured a riveting and inspirational interview with the current Chair of Wounds Canada, Andrew Springer BSc DCh DE WCC(c) FRSH, a celebrated practicing chiropodist since 1983 who has vast expertise in diabetes and other related foot conditions. The interview focused on black excellence and thriving in an often difficult industry, topics Andrew is very well versed in. Read the article here.

For *International Women's Day* on **March 8, 2024**, Wounds Canada shared several messages from our female employees and collaborators highlighting the power and resilience of women in the health-care industry and the transformational impact they have in their respective fields. A dedicated webpage was created.

Skin Health Program Announced

In **February 2024**, Wounds Canada and the Registered Nurses' Association of Ontario (RNAO) launched the *Skin Health Program for Personal Care Providers*. This new program, offered through the Wounds Canada Institute, is an innovation in best practices in skin care education, specifically designed for personal care providers to enhance their knowledge in skin health and the prevention of common forms of skin damage, within their role as unregulated care providers supervised by nurses. For more information click here.

New Expertise Enhances Organizational Excellence

Former Wounds Canada board member Irmajean Bajnok RN BScN MScN PhD has joined the organization as an Education and Policy Specialist. Irmajean is an international health-care consultant specializing in change management, leadership and implementation science and was previously the Director of RNAO's International Affairs and Best Practice Guidelines Centre.

Meanwhile, the Wounds Canada Institute welcomed new Program Directors for the Wound Care Champion Program - Nova Scotia (Barbie Murray and Greg Archibald) and for the Wound Care Champion Program - Ontario and SHARP Program (Robyn Evans and Pamela Houghton). For more information and to view the new directors' many credentials visit the dedicated webpage.

Developing Provincial Nutrition Guidelines For Wound Prevention And Management: A Guideline For British Columbia's Registered Dietitians

By Ellen Mackay RD MSc CDE, Esther Huang RD, Mignon Radhakrishnan MEd RD and Shannon Handfield RN BSN NSWOC WOCC(C)

How to cite: Mackay E, Huang E, Radhakrishnan M, Handfield S. Developing provincial nutrition guidelines for wound prevention and management: a guideline for British Columbia's registered dietitians. Wound Care Canada. 2024;22(1): 6-8. DOI: 10.56885/HYFD6379.

In late 2021, the British Columbia Provincial Interprofessional Skin & Wound Committee, led by Shannon Handfield, saw the need for a nutrition-focused dietitian sub-committee to develop provincial resources for health-care team members caring for clients with, and at-risk for, wounds.

Registered dietitians (RD) from across British Columbia (BC) and the Yukon, with a focus on wound care and prevention in their practice, were invited to join this volunteer committee. RDs were recruited through word of mouth and a provincial listserv. Fifteen RDs answered the call with representation from each Health Authority across BC and including the Yukon. The result was the formation of the British Columbia Provincial

Registered Dietitian Wound Sub-Committee (RDWSC).

The initial intent for this sub-committee was to develop a stand-alone nutrition guideline for nurses working in wound care. Previously, each wound guideline developed by the Interprofessional Skin & Wound Committee had its own nutrition section. However, when the RDWSC recognized that there were no current, up-to-date, evidence-based nutrition guidelines for RDs, this became the new priority. After the development of the nutrition guidelines for RDs, the subcommittee pivoted to working on a stand-alone guideline that provided nutrition recommendations that are within the scope of nursing when caring for patients with wounds.

Guide For Dietitians

In 2022, the sub-committee met virtually each month to review the most up-to-date nutrition evidence, best practice guidelines and available client education materials, and to share direct clinical experience. Over the course of 18 months, they created the document *Nutrition for Wound Prevention & Management: Guideline for Dietitians* (available at https://www.clwk.ca/get-resource/nutrition-for-wound-prevention-management-guideline-for-dietitians/).

This decision support tool (DST) supports RDs in providing key nutrition interventions for wound prevention and management for all wound etiologies for adult clients. The intended audiences for the document are entry level RDs and RDs new to the area of wound care.

The DST was put forward for provincial partner review in July 2023 and has now been endorsed by all health authorities in BC and the Yukon. (Note: at time of publication, endorsement was pending for the Northern Health Authority.) Following endorsement, the DST was presented in November 2023 at the Vancouver Coastal Health/ Providence Health's annual Dietetics in Action education event.

Sub-Committee Health Authorities Representatives		
First Nations Health Authority • Tessie Harris RD **Fraser Health Authority** • Hannah Mazure RD • Alison Schmidbauer RD **Island Health** • Erica Messing RD • Christy Remington RD	**Interior Health Authority** • Liam Pierce RD, CDSC **Northern Health Authority** • Judy April MAdEd, RD • Tanis Mihalynuk PhD, RD **Vancouver Coastal Health** • Esther Huang RD • Ellen Mackay MSc RD CDE - Chair • Mignon Radhakrishnan MEd, RD • Swati Scott RD, IBCLC, CDE • Anna Slivinski RD	**Providence Health Care** • Yoon Heo RD, CNSC **Yukon** • Cynthia Chubbs RD, BScN With support from: Shannon Handfield, RN BSN NSWOC Provincial Professional Practice Stream Lead – Wound Ostomy Continence

Guide For Nurses

Guided by the RD DST, the sub-committee has now drafted a document for nurses: *Nutrition for Wound Prevention & Healing: Nursing Guidelines.* This draft DST guides nurses in supporting nutritional intake for clients with a wound or who are at-risk for developing a wound, performing malnutrition screening and understanding when to refer to an RD for an individualized nutrition care plan for the prevention and management of wounds. This DST is currently out for review, with a target of endorsement in the summer of 2024.

First Nations: Remote And Rural Support

The sub-committee is fortunate to have volunteers from the First Nations Health Authority (FNHA) who have supported the committee's efforts to create culturally safe and inclusive resources. RDs from the RDWSC have volunteered to provide consultation to clinicians working in rural and remote areas of BC and the Yukon who are new to, or need support with, caring for clients with wounds.

Next Steps: Updating Nutrition And The Wounds Learning Module

Currently, the RD sub-committee is drafting an interactive learning module for nursing and allied health providers. This module will review the key nutrition requirements and interventions to support skin integrity, wound prevention and healing. Targeted launch for the learning module is fall 2024. The RDWSC is also looking to expand the guidelines to support the pediatric population.

Ellen Mackay RD MSc CDE is a diabetes educator at Vancouver Coastal Health's North Shore Chronic Disease Services, in West Vancouver BC, Canada.
Esther Huang RD is a community dietitian at Vancouver Coastal Health's Three Bridges Community Health Centre, in Vancouver BC, Canada.
Mignon Radhakrishnan MEd RD is a critical care dietitian at Vancouver General Hospital, Vancouver BC, Canada.
Shannon Handfield RN BSN NSWOC WOCC(C) is the British Columbia Provincial Professional Practice Stream Lead for Wound Ostomy Continence.

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CASE REPORT

An Alternative Approach: Decellularized Dermal Matrices For Pilonidal Sinus When Standard Care Falls Short

By Idevania G Costa RN NSWOC PhD*, Robert Strachan and Erin Everett RPN

How to cite: Costa IG, Strachan R, Everett E. An alternative approach: decellularized dermal matrices for pilonidal sinus when standard care falls short. Wound Care Canada. 2024;22(1): 10-14. DOI: 10.56885/LKQU7921.

Introduction

A young female patient, referred to by the pseudonym Daisy, presented to a wound care clinic in Northwest Ontario on March 30, 2023, with a wound to her intergluteal cleft. Daisy had a history of pilonidal cysts and, despite undergoing two previous surgeries for pilonidal cyst removal in 2021 and 2022, experienced a recurrence of the sinus after a failed closure. Eventually, the wound did close, but then dehisced, leaving Daisy to depend on ongoing wound care in her remote hometown. Daisy stated that she was tired of dealing with this issue for over two years, which impacted her life a, "great deal," causing discomfort, embarrassment and absence from work. She also stated her local clinic had tried multiple different wound dressings, such as Gentian Violet, Methylene Blue Antibacterial (GV/MBA) foams and collagen and oxidized regenerated cellulose dressing with silver, but nonetheless, the wound remained open. It seemed that despite using the most advanced standard care dressings, Daisy was not able to achieve the desired outcome.

Desperate for a solution, she chose to travel more than 485 kilometers from her home seeking advanced wound care from an 'expert' in wound healing. This included advanced techniques and therapies (e.g., dermal matrix, or DDM), which were not readily available in her local area. The term 'expert' used here refers to a health-care provider who has undergone specialized training and possesses in-depth knowledge, skills and judgment to make decisions about therapies tailored to specific wound types and characteristics, ensuring the highest level of care and treatment to achieve the desired outcome — wound healing.

What Is Pilonidal Sinus?

Pilonidal sinus wounds (PSW) are characterized by the formation of a sinus tract or small tunnel in the skin, usually around the intergluteal cleft. Each year, numerous young individuals, predominantly young adults (21 years for male and 19 years for female) with predisposing factors such as obesity, family history, excess hair and prolonged sitting, experience discomfort, embarrassment, and workplace absenteeism as a result.[1,2] Hair follicles play a crucial role in the development of PSWs.[1-4] Initially, follicles in the gluteal cleft become blocked due to friction and moisture,[4] leading to an environment prone to inflammation and infection.[3,4] This blockage results in folliculitis, contributing to abscess formation.[4] As the infection progresses, it can develop into an acute abscess, often characterized by a painful, pus-filled swelling in the subcutaneous tissue near the follicles.[3,4] If untreated, the acute abscess can evolve into a chronic abscess, leading to the development of sinus tracts that connect the abscess cavity to the skin surface.[3-5] Hair accumulation within the chronic abscess is considered a secondary phenomenon that perpetuates inflammation and hinders healing.[4,5] Indeed, in many cases, the wound may fail to heal completely, leading to recurrent infections, drainage and discomfort, and subsequent attempts at wound care may involve various dressings, wound debridement and other interventions—yet the sinus tracts persist, prolonging the healing process[1] and the suffering.

Despite being a relatively common condition, PSWs can be challenging for both the patient and clinicians to manage, with treatment often involving surgical excision of the sinus tracts and ongoing wound care to prevent recurrence.[2] The non-healing PSW, and prolonged need for wound care, greatly impact patients' quality of life. Individuals may endure a cycle of healing and recurrence for an extended period, significantly affecting their lifestyle.[5] Therefore, effective management strategies and ongoing research are needed.

Physical Examination

Upon examination, Daisy appeared otherwise healthy, with no chronic medical conditions. On March 30, 2023, the wound in the intergluteal cleft exhibited moderate serous drainage and keloid scarring at the edges. Despite clean granulation tissue, excoriation of surrounding skin indicated irritation (likely from previous dressings). Unsurprisingly, Daisy reported tenderness during wound care and stated it usually drains and impacts her social life. The wound measured 1.0 x 0.5 x 1.0 cm (l x w x d). At this time, the wound was cleansed with saline and a hypochlorous acid compress was applied for five minutes, followed by GV/MBA foam as the primary dressing, which was then covered with an absorbent wound pad with border.

Key Questions

As the wound care provider:

- What would you do if standard care wasn't effective?
- Are you open to trying different options to help patients with challenging wounds?

An Innovative Approach: Treatment With DDM

Decellularized dermal matrix (DDM) grafts are relatively new to wound care.[6,7] Although there is emerging evidence of DDM efficacy in diabetic foot ulcers,[6,7] there is comparatively little research on their applicability to PSWs in clinical practice.

Yet, in Daisy's case, it was clear that an innovative treatment modality was necessary, and DDM grafts offer a biologically active scaffold that supports tissue regeneration and wound closure by providing a framework for cell ingrowth and deposition of the extracellular matrix. It was thought that by applying a DDM, we could enhance the wound healing process and promote tissue repair in the recurrent PSW. Thus, after receiving patient consent, on March 31, 2023, a trained specialist applied a DDM graft to facilitate wound healing (See Figure 1). Health teaching points included offloading and using a cushion with a hole in the middle to prevent shearing on the wound location and dislocating the DDM from the place. While using a cushion to offload pressure on the gluteus area is not considered best practice, in this particular case, it served the sole purpose of mitigating direct contact between a seating surface and the affected area, thus preventing displacement of the DDM. This was especially important during a five-hour journey, undertaken one week after the application of DDM, between her remote hometown and the clinic for follow-up appointments. The patient was aware that she could gently move her gluteus while using the cushion. At home, she was advised to minimize pressure on her gluteus and to only use the cushion when necessary.

Follow-Up And Management Timeline

April 5, 2023 (five days post application): The DDM remained intact, and the edges were well attached within week one. Once the bandage was removed, minimal serosanguinous drainage was noted, and Daisy denied experiencing pain since the DDM application, stating that she had been offloading the area as much as she could. For treatment, the DDM was left intact and covered with a secondary dressing, and all were held in place with medical tape.

April 12, 2023: Daisy returned for a dressing change, stating the area had been itchy, and was advised to take an oral antihistamine. The right edge of the DDM had started to lift but remained intact (See Figure 2). The area around the DDM was cleansed with saline, and skin prep was applied to the surrounding area. The wound was covered with a new secondary dressing and secured with medical tape.

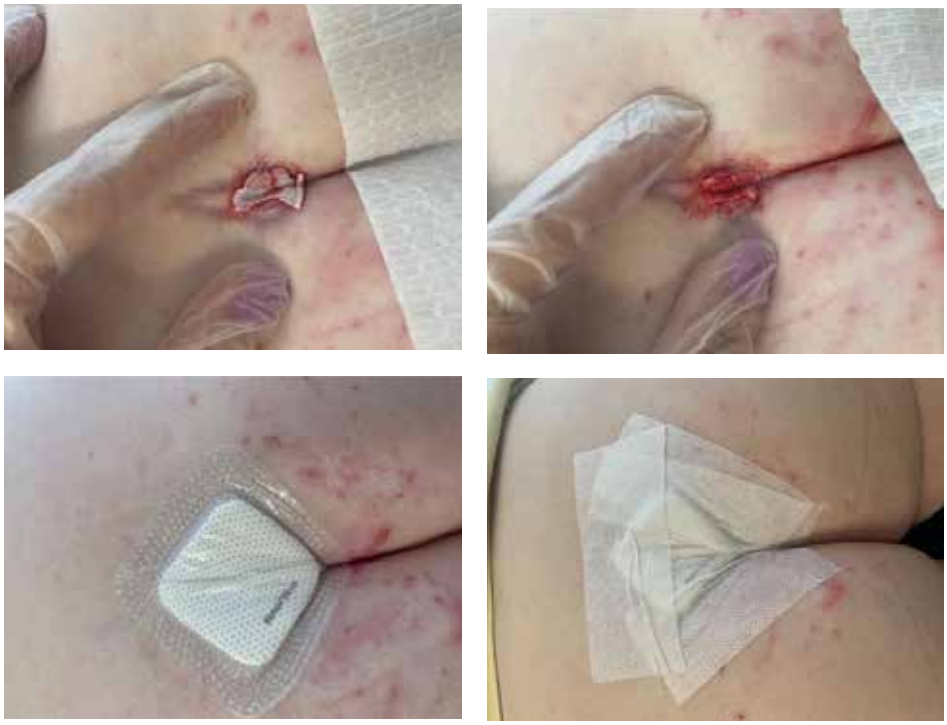

Figure 1. Treatment day; secondary dressing to hold DDM in place

April 15, 2023: Daisy had returned home and was being treated through virtual care when she sent a picture stating that she noticed a "tiny hole" with moderate amounts of serosanguineous exudate (See Figure 3). Daisy was instructed to remove the dressing carefully, but when she did, the DDM came off with the bandage. She was advised to cleanse the wound and apply a secondary dressing until her next appointment in two

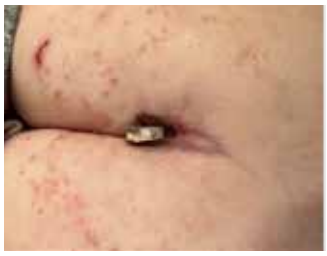

Figure 2. Week 1

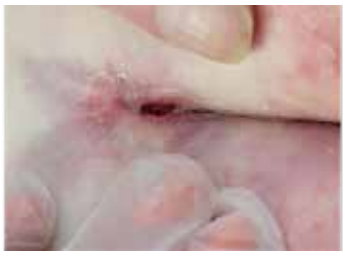

Figure 3. Week 2

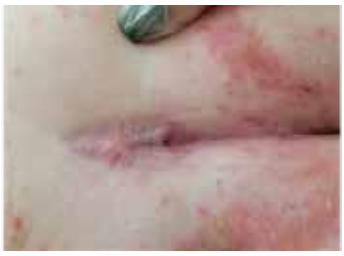

Figure 4. Week 3

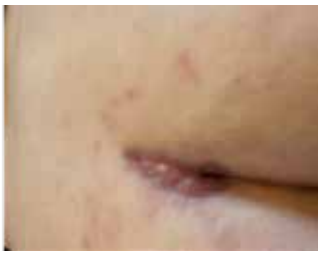

Figure 5. Closure

days.

April 17, 2023: Daisy was seen in the clinic for follow-up, post-DDM accidental removal. The wound appeared to be closed with minimal drainage noted. However, when Daisy left the appointment, she stated that she sat down and noticed the wound began to bleed. The wound was reassessed that same day and a very superficial opening measuring 0.5 x 0.1 x 0.1 was noticed (See Figure 4). The area was cleansed, and a barrier cream was applied to the peri-wound area. Daisy returned home and her mother assisted with dressing changes as per virtual care from a specialized clinician at the clinic.

April 18, 2023: Daisy sent a picture taken by her mother (Figure 5). Both Daisy and her mom were happy to report that the wound appeared to be closed.

April 22, 2023: Daisy had a home care nurse at her side changing her dressing who confirmed that her wound was completely healed.

Then, Daisy sent the following message to the wound specialist through virtual care: *"Hey just letting you know that am fully healed now. Thank you very much for helping me heal this wound."*

Outcome

Despite a temporary setback during treatment with DDM, the wound healed and was completely closed 24 days post-treatment on April 22, 2023, as confirmed by Daisy's report, which is faster than standard care for open healing.[1] Importantly, home care and support from family members helped lead to Daisy's full recovery.

Conclusion

Daisy's case highlights the challenges associated with recurrent pilonidal wounds and the importance of accessing advanced wound care experts and interventions. Additionally, it is important to stress that through a person-centred approach, successful wound management and healing can be achieved. We firmly believe that the utilization of DDMs holds promise in addressing not only diabetic foot ulcers but also other 'off-label' wounds, such as PSWs, where conventional treatments may fall short to the point of prolonging patient suffering and impacting their quality of life. The integral role played by virtual care in supporting healing in remote areas, home care and Daisy's informal caregiver (her mother) cannot be overstated. All in all, by integrating novel approaches into practice, we can facilitate successful wound healing, thereby mitigating the risk of experiencing negative outcomes and ultimately enhancing patient quality of life.

Editor's Note: The dermal matrix (DDM) used in this case report, DermGEN™, is approved by both Health Canada and the FDA for all cutaneous wounds. While it was initially targeted for diabetic foot ulcers (DFUs) due to the abundance of data supporting its efficacy in this indication, efforts are underway to explore its use for other wound types. The first author has been collaborating as a clinical expert for the use of DermGEN and has received trial products to provide for free to patients that meet the criteria, with the goal of developing best-use protocols for different wounds. At present, the product in Canada is provided for DFUs through hospitals in their

wound care clinics. For other clinics, there would be a cost to the patient for the product.

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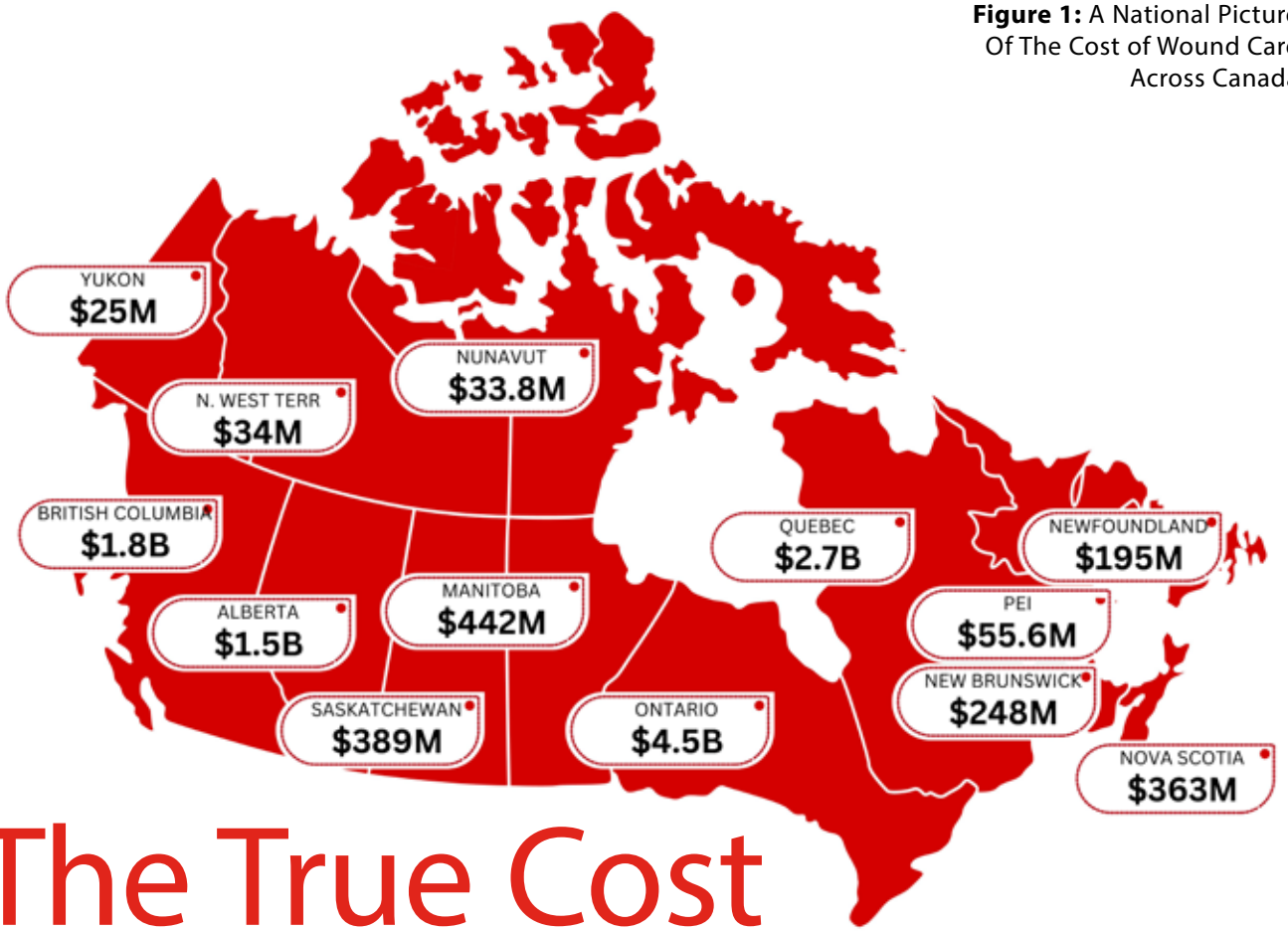

Figure 1: A National Picture Of The Cost of Wound Care Across Canada

The True Cost Of Wounds For Canadians

By Douglas Queen BSc PhD MBA and Mariam Botros DCh DE IIWCC MEd

How to cite: Queen D, Botros M. The true cost of wounds for Canadians. Wound Care Canada. 2024;22(1): 16-20. DOI: 10.56885/NXMW2913.

Introduction

For many wound care providers within Canada getting a handle on the costs associated with their management of chronic wounds is difficult, if not impossible. There are some published figures looking at costs geographically, both national and provincial/territorial, but most of these are not 'standardised', which doesn't permit comparison easily or directly. Many researchers and clinicians focussed on wound care have for years recognised this difficulty. They have also recognised the constant 'undervaluing' of the real

costs of managing patients with wounds.

One consistent theme from several international research studies, however, is that they relate the costs of wounds, extrapolated or otherwise, to the total geographic health-care costs of that region.[1-12] This provides a percentage figure as a benchmark, an approach which Canada has used previously.[13] While this is likely an underestimate, it is at least a starting point for most wound care providers.

A basic literature search shows the paucity of data generally across Canada, and in some provinces/territories, as well as the outdatedness of the data, with most of it being published over a decade ago. Due to the difficulties of capturing such cost data, most of these studies caution that their results may be an underestimate of the costs involved. In this situation, Canada is no different to the other nations.

A recent editorial in the *International Wound Journal* introduced an approach to estimate the possible costs of wound care using freely available governmental health data, population statistics and the research findings of many international groups.[14] Using these statistics and a simple formula provides an estimate of the likely costs of wound care within both Canada and the provinces and territories of which it is comprised. This will provide a more detailed vision of the likely cost of wounds for Canadians.

Methods

Governments, including both Canada's federal and provincial/territorial legislative bodies, capture annual population[15] and health-care costs.[16] These statistics are a valuable starting point for the estimation of the cost of wounds.

Many researchers have studied and estimated the costs of wounds in many locations around the world.[1-12] Such studies have demonstrated relative commonalities regarding wound care costs, ranging from 2-5% of total regional health-care costs upwards.[1-12] Understanding that research bias and GDP spending differences between geographies

Types Of Costs[22]

Direct Costs - those costs that are incurred by the health-care system and/or the patient as a direct result of the disease and its associated treatment.
Indirect Costs - less obvious and include the losses to society caused by the disease and its treatment.

Examples of Direct Costs	Examples of Indirect Costs
• diagnostic tests • costs of dressings, tape, cleansers, bandages, adjunctive therapies, medications and other materials • staff time costs • site of care overheads (e.g. administration, building costs, heating, lighting) • Transportation costs (e.g. ambulance)	• loss of income by patients and/or their carers due to reduced time at or ability to work • out of pocket expenses related to inability to undertake domestic responsibilities • welfare or disability payments by government or insurance company

When analysing cost studies look for the perspective or viewpoint of the analysis to understand the true value of any study.

In the case of this analysis the perspective is that of the health system, therefore only the costs incurred by the health system in the treatment of wounds was included, i.e. mainly direct costs.

Table 1: Formula To Estimate Wound Care Costs Geographically:

$$EWCE = [PCHCS \times TP] \times AWCCP$$
EWCE - Estimated Wound Care Expenditure (PPP International $) – our estimate of the likely wound care costs.
PCHCS - Per Capita Health Care Spend (PPP International $) [16] – current published per capita health-care cost.
TP - Total Population [15]
AWCCP – Average Wound Care Cost Percentage [14] – several published studies have indicated that the percentage of total health-care costs that is represented by the cost of wounds, ranges from 2% on the low end to 5% on the high end. For the purposes of our calculations, remembering different geographies can be at differing evolutionary stages regarding wound care, we chose the median of 3.5% as the AWCCP.

Table 2: Estimated Costs Of Wound Care Within Canada:

Province or Territory	Population (2023)[15]	Per Capita Health Spend 2023 (CAD$)[16]	Estimated Total Health-care Spend 2023 (CAD$)	Estimated Spend On Wounds 2023 (CAD$)
Yukon	45,148	$15,696	$708,643,008	$24,802,505
Prince Edward Island	175,853	$9,036	$1,589,007,708	$55,615,270
British Columbia	5,581,127	$9,182	$51,245,908,114	$1,793,606,784
Ontario	15,801,768	$8,245	$130,285,577,160	$4,559,995,201
Manitoba	1,465,440	$8,616	$12,626,231,040	$441,918,086
Nova Scotia	1,066,416	$9,737	$10,383,692,592	$363,429,241
Alberta	4,756,408	$9,041	$43,002,684,728	$1,505,093,965
Quebec	8,948,540	$8,785	$78,612,923,900	$2,751,452,337
New Brunswick	842,725	$8,413	$7,089,845,425	$248,144,590
Saskatchewan	1,218,976	$9,112	$11,107,309,312	$388,755,826
Nunavut	40,817	$23,652	$965,403,684	$33,789,129
Northwest Territories	44,760	$21,750	$973,530,000	$34,073,550
Newfoundland and Labrabor	540,418	$10,333	$5,584,139,194	$195,444,872
Canada	**40,528,396**	**$8,563**	**$347,044,654,948**	**$12,146,562,923**

may influence this figure,[14] the authors decided to take the median point of 3.5% as an international average. Similar to the other statistics used in their analysis, this will be revised annually. Or if a particular geography has a good handle on their own percentage, this can be modified in the formula to have a more local estimate.

Using the methodology of Queen & Harding,[14] the indicated formula (See Table 1) was used to estimate the costs of wounds both in Canada and within its provinces and territories.

Results

Table 2 provides a snapshot of the possible costs of wound care within Canada in the year 2023.

Discussion

From a previously published editorial in the *International Wound Journal*,[14] it was estimated that the costs of wound care in Canada in 2019, were 6.9 billion PPP International Dollars* (or 8.28 billion CAD -using the IMF Conversion Rate[17]). Recently, the authors of this manuscript published an editorial in the *International Wound Journal* that updated these figures to 2022.[18] This put the estimate for Canada at just over $11 billion, which was a significant increase. The three years between estimates were highly influenced by COVID which drove up per capita cost significantly during that period. This may or may not have artificially inflated the estimate for the cost of wounds. However, several studies showed that wound care was less than optimally delivered during this period and, as such, the costs of wound care would be higher.[20] It may, therefore, be a reflection of the true costs during the pandemic timeframe.[20]

In this article we have updated the figures to 2023, as new governmental figures for population and cost were available. Once again, these figures have risen as the population of Canada increases and, for the most part so does the cost of our individual health care. The 2023 estimate for Canada as a nation has now surpassed $12 billion. The data presented in Table 2 and Figure 1 provides a crucial estimate of the likely costs of wounds across Canada's provinces and territories. This comprehensive national perspective on wound costs significantly surpasses prior estimates from 2012.[13] It acts as a vital benchmark at both provincial/territorial and national levels, serving as a tool for evaluating the effectiveness of standardizing wound care, advancing education and training initiatives and measuring the return on investment for government-funded research and educational grants in this clinical field.[21]

Conclusions

Identifying realistic estimates of the cost of wounds enables health-care organizations to optimize resource allocation, facilitating the efficient allocation of budgets and personnel to address the unique needs of patients. Secondly, this understanding acts as a catalyst for elevating the quality of care provided to individuals with wounds. Organizations are incentivized to invest in training, acquire necessary technology and adopt best practices, all of which contribute to cost reduction while simultaneously enhancing patient outcomes.

Furthermore, comprehending the economic impact of wound care offers valuable insights to policymakers and health-care leaders, shedding light on the broader economic implications of wound management. This knowledge serves as a foundation for informed decision-making and the development of policies and research direction that support effective wound prevention and care practices.

Wounds Canada has committed to provide the regional updates regularly to keep researchers up to date with the most recent estimates based on updated government statistics and any research findings.

**An international dollar is defined as being able to buy in the cited country a comparable amount of goods and services a U.S. dollar would buy in the United States.[19]*

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Enoch Cree Nation Health Services in Alberta, where Holly & Susan work.

Community Nurses In Canada: A Focus On Skin And The Prevention And Management Of Wounds

By Janet L Kuhnke RN BA BScN MSc NSWOC DrPsychology, Holly Calliou RN and Susan McGillis RN

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In Canada, community health nursing includes unique practice settings, such as public health, home health and nurses in primary and family practice settings (Community Health Nurses of Canada).[1] Being a community nurse can be incredibly rewarding and challenging.[2-4] Nurses in the community play a key role in supporting preventative initiatives and the promoting and preserving of health of individuals, families and communities.[1] Specifically, home health nurses focus on the care of persons and their care partners living with long-term conditions (prevention, maintenance and end-of-life/palliation), including a focus on skin and wound care.[1]

For First Nation nurses living and working in Alberta communities, serving the people means ensuring the people's voices are heard. We wanted to share the journey of two community nurses, Holly Calliou and Susan McGillis, to understand the complexity of their roles and responsibilities in relation to skin and wound care services. We co-created the interview questions and used a web-based platform to create the following interview. Questions were posed by Janet L Kuhnke on behalf of *Wound Care Canada*.

Wound Care Canada: Can you briefly describe the scope of your nursing services, the area you provide them in and the population you service?

Holly: I am a registered nurse working in home care for the Enoch Cree Nation, a First Nation in Alberta. I am the Home Care Coordinator. We service everyone who lives or works on the Nation. As the Home Care Coordinator, I am also the case manager and I provide home care services.

Susan: I work in a First Nation community in Alberta with a population of approximately 2,000 members. I manage the community diabetes program and coordinate clients' appointments with the variety of health professionals that deliver

The Enoch Cree Nation is indicated by the dotted red line. Source: Google Maps 2024

services in the community. I also provide education and support to individuals and their families living with diabetes.

Wound Care Canada: How would you describe a typical week at work?

Holly: As the coordinator I arrange the schedule of home visits for the licensed practical nurses (LPNs) and health-care aides (HCAs) as well as myself. During the day, I review faxes, emails and phone messages for any new clients, discharges or physician orders. The HCAs report to me if they have any concerns which I assign for follow-up or do myself. I am the case manager for all the home care clients, so I assess and reassess them on a regular basis to ensure that the client's are receiving the care they need. I do home visits as needed to assess and reassess the wounds and dressing protocols being used. I refer to other health professionals and link clients to services and support.

Susan: My work week varies. It can include direct client care, committee meetings, coverage for another nursing program, case management and health prevention programming.

Wound Care Canada: How frequently does the prevention and management of wounds play a critical role in the care provided?

Holly: Wound prevention and management are our main functions. The majority of our clients come to home care for acute or chronic wound care. We also do home wellness checks where we determine a client's risk of developing wounds.

Susan: Wound prevention is so critical in our diabetes program —we schedule monthly podiatry and orthotist clinics to catch potential problem areas early and delay or prevent wounds from developing. Additionally, we are fortunate that one of our clinic nurses has expertise in wound care and is a great resource to consult with for product selection and protocols.

Wound Care Canada: Can you give an example of a typical or particularly challenging case?

Holly: I can think of a client, an elderly person with type 2 diabetes mellitus, that was not well controlled. The individual had gotten a cut on the fourth toe of their left foot at a swimming pool which developed into a wound. Home care assessed and referred them to the Wound Clinic in Stony Plain which ended up referring the client to the surgeon. The client received revascularization surgery and their affected toe was amputated. Prior to discharge the client was to receive home intravenous therapy which our home care was unable to support, so the client ended up being transferred to a subacute unit.

When the client was discharged, home care monitored them, doing daily dressings, arranging transportation for medical appointments and providing equipment. Because we saw them often, we were able to follow the wound's progress, and when it stalled or got worse, could send referrals to the surgeon or send the client to the ER.

The initial wound protocol was done using a product as per surgeon's orders. After five months, the wound was steadily getting worse with tunneling to the third and fifth toes. The surgeon was aware of the deterioration and determined that an amputation was necessary. The client refused the below the knee amputation, so the surgeon opted to remove part of the foot knowing that if the infection continued, they may need to amputate more. The client was agreeable to this revised plan.

During this time, home care staff escorted the client to doctor appointments as the client was overwhelmed and wanted home care staff there to support and explain things.

Six months after the initial infection the client had surgery to amputate their left foot. After discharge, dressing orders were given to home care which consisted of an antiseptic to the incision. Four months later the incision again started to deteriorate; there was no change to the dressing orders made by the surgeon.

Home care sent a referral to the surgeon suggesting trying a new product that I had heard

Holly Calliou

Susan McGillis

about at the Wounds Canada Conference (Niagara Falls, 2023). The surgeon agreed to try it and two months later, at the follow-up, the surgeon determined no more follow-up was needed. The post-operative incision was closed, there were no more issues.

This case, like many others we see, involved a lot of, not only wound care, but booking transportation, accompanying clients and being a support for the client. I also utilized my new knowledge from attending the conference and meeting other experts in skin and wound care.

Susan: I remember a client from when I was a fairly new nurse in home care. I was caring for a middle-aged lady with a large wound on her leg that would not heal. The client and her husband were becoming increasingly frustrated with this non-healing wound that had been ongoing for two plus years. The family felt they were not getting any answers or solutions for healing this wound. The client was making frequent trips to her doctor and was occasionally visiting home care for supplies. I spoke to our wound consultant and subsequently wrote a letter to the family physician requesting that the client be referred to dermatology. Eventually the client was referred to dermatology and plastic surgery and ended up getting a skin graft to close the wound. The client has since had another two surgeries and has had significant periods of time that she has been wound free. This case taught me the importance of advocacy and pursuing expert opinions when conventional treatments are not working.

Wound Care Canada: What are some of the biggest challenges you face?

Holly: The federal and provincial jurisdictions. Even though we are located on the border of a major city we are unable to access provincial services on the nation. Provincial services will not/are not able to come onto the Nation to provide services, with some exceptions. This makes it very difficult for some clients as transportation is always an issue.

I find it very frustrating because we still live in the province, therefore, we should still have access to the services. One of the services which we get asked a lot about is palliative care.

Sometimes families want to bring clients home when they are deemed to need palliative, or need end-of-life -care, so they can die at home. If you lived in the city, then the Palliative Care Team would assist and support you, but they do not provide services to the Nation.

Another frustrating example is that we happen to have an apartment building on the Nation that is not owned by the Nation. This apartment building rents out to a number of people who are not from the community, or even First Nations. This is important because if they require health services, the provincial teams will not venture onto the Nation so it is expected that our home

care team assist them. We have no problem doing home visits, wound care, etc., for others but we do not receive funding for them. The only way we can access supplies is through the Non-Insured Health Benefit Program, which is exclusively for First Nations people, therefore it is difficult to get these clients what they need.

Susan: Transportation is a significant issue as we are a rural community, so if the client does not have a car it is sometimes difficult to get them transportation to appointments. Medical transportation is provided through Non-Insured Health Benefits but there are restrictions with its use. If the client has children, the children are not able to go, so the client would need a babysitter. They can not be driven to a pharmacy to pick up prescriptions and certain services are not covered, such as physiotherapy, unless it is at a hospital. To help a little we try to provide as many services as we can at the health centre. For the diabetes program we have an internist, podiatrist, orthotist and psychologist who all come to the health centre at least monthly to provide services.

Wound Care Canada: What steps do you feel are needed to improve the wound care knowledge of nurses in your area?

Holly: More educational opportunities, especially hands on learning. Even doing the same education more than once helps, as it helps to reinforce what was already learned. 'Hands on' training is great because it helps you to remember what you may have read or heard at a lecture.

Susan: Online education sessions that are relevant and practical, that can be viewed while at work would be an asset.

Wound Care Canada: How important are learning and educational opportunities like the Wounds Canada National Conference?

Holly: I was able to attend the 2023 Conference. Opportunities like this are very important. I have used what I have seen in my practice. The sessions are interesting, informative and relative. There is always something to learn or update in your practice. It would be wonderful if we could start doing the regional ones again. It was sometimes easier to go to ones closer to me and my colleagues.

Wound Care Canada: Did you learn anything particularly useful at the Conference that stands out?

Holly: I always try to look for things that I feel I need to learn more about according to the needs of my practice. The exhibitors are also always really good. I enjoy talking to them about their products and they give me ideas on how to work with particular wounds.

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The Alberta Atlas Of Healthcare Variation (A-Atlas): A New Clinical Tool

By Michael Sidra MBA, Dr. Adian Wagg BS FRCP, Erin Thompson BComm, Ryan Sommer MScOT, Alice Chiu MPH MSc, Karen Williams BScN, Charlene Brosinsky RN BScN and Marlene Varga MSc BScN

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Introduction

A pressure injury is defined as localized damage to the skin and/or underlying tissue, because of pressure or pressure in combination with shear stress. Pressure injuries usually occur over areas of bone that are close to the skin's surface but may also be related to pressure from a medical device or object.[1] Pressure injuries can occur in any setting - at home, in hospital or in Long Term Care (LTC) facilities. Pressure injuries result in significant physical and psychological challenges for individuals adversely affecting all domains of a person's life, with pain and suffering as one of the most common outcomes.[2,3] In addition to the human burden, pressure injuries are an economic burden on health-care resources as treating pressure injuries can be expensive and cost the health-care system billions of dollars annually, in addition to taking up clinician time and resources, increasing length of stay in the hospital and increasing admissions to LTC facilities.[4-6]

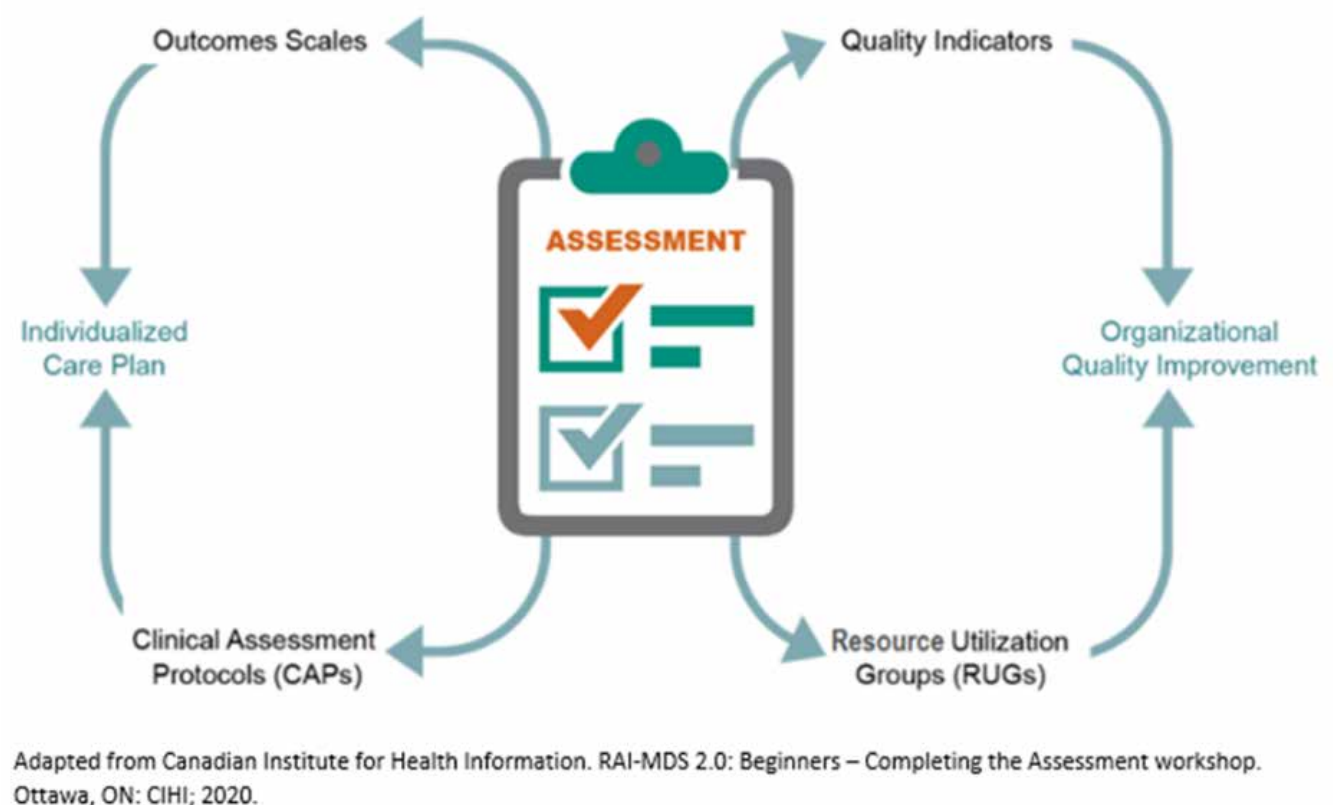
Pressure injuries are a frequently occurring health problem worldwide in all health-care settings. Globally, in LTC, prevalence varies from 3.4%-32.4%.[7] In 2004, the pressure injury prevalence in Canada was estimated at 26% in all health-care settings (29.9% in non-acute care settings, 22.1% in mixed health settings, and 15.1% in community care).[8] In Ontario, the overall prevalence of pressure injuries across the spectrum of health-care settings was 13% and was highest in complex continuing care.[9] An analysis of Ontario databases revealed a low proportion of people with pressure injuries in Ontario LTC facilities (8.4%) and found that skin tears and pressure injuries were the most common causes of skin breakdown affecting 14.7% and 15.5% of participants.[10] In 2022, 22 LTC units/facilities in Alberta completed a standardized Pressure Injury Point Prevalence and Process audit on a sampling of residents (minimum sample number of five). Prevalence results ranged from 0 to 50% and facility acquired pressure injury results ranged from 0 to 42%. Approximately 70% of pressure injuries are considered preventable, but despite best efforts on prevention, and pressure injury prevention being recognized as a measure of quality by Accreditation Canada, pressure injury rates have not decreased when compared to other countries.[11]

Older people in continuing care homes are vulnerable to the development of pressure injuries as the aging process is associated with skin integrity changes that increase risk.[1,12] Immobility, incontinence, malnutrition, multiple co-morbidities and polypharmacy further increase the risk, especially when a combination of factors exist.[1] While research and interest in promoting and implementing best practice has grown to help prevent pressure injuries in all populations, there is a gap in getting the evidence into practice and compliance rates to pressure injury prevention strategies vary.[1,11] Implementation of pressure injury prevention clinical practice guidelines in continuing care homes is challenging.[13] Prevention requires active involvement of leadership and multidisciplinary teams, current knowledge of best practices, on-going education, standardization of pressure injury specific interventions, accurate documentation, resident and family partnership and the use of validated metrics to monitor outcomes and drive culture and practice.[1,5,11,14,15]

Atlas Of Variation

Clinicians strive to provide consistent and evidence-based health care for their patients; however, safety and quality of health care can vary across geographic and clinical areas. Understanding this variation is critical to improving the safety, quality, value and appropriateness of health care.[16] While some variation may be warranted, the persistent existence of unwarranted variation in health care, defined as variation unexplainable by variation in patient illness or preference, signals an opportunity for improvement in care.[17]

The Alberta Atlas of Healthcare Variation (A-Atlas), developed and maintained by Alberta Health Services (AHS), is a tool that highlights variation through topic-specific themes and easy-to-understand maps and graphs for clinical and administrative leaders within the organization. The goal of the A-Atlas is to raise awareness of



Adapted from Canadian Institute for Health Information. RAI-MDS 2.0: Beginners – Completing the Assessment workshop. Ottawa. ON: CIHI: 2020.

Figure 1: RAI-MDS 2.0 Assessment

clinical variation and prompt further investigation about why variation is present and whether the variation is warranted or unwarranted. The A-Atlas is not intended to judge performance or suggest ideal levels, instead it offers a data driven analysis to enable continuous quality improvement and stimulate action to improve patient outcomes. The first edition of the Atlas contains five topics, including Pressure Injuries in LTC.

Quality Indicators And Risk Assessment

The Resident Assessment Instrument- Minimum Data Set 2.0 (RAI-MDS 2.0) is a validated clinical assessment developed by interRAI, an international research network. A modified version has been developed with permission by the Canadian Institute for Health Informatics (CIHI) for Canadian use. In Alberta, use is required under the Continuing Care Health Service Standards (CCHSS). CCHSS dictates completion by a regulated health-care provider (HCP) trained in the assessment, upon admission to a continuing care and quarterly thereafter, or in the case of a meaningful change in clinical status. The assessment encompasses over 400 data elements evaluating the needs, strengths and preferences of individuals in continuing care homes. Covering various domains, it assesses physical and mental health, social, support and psychological aspects, including skin integrity, number and stage of pressure ulcers and typical risk factors for pressure injury development.[18,19] The RAI-MDS 2.0 assessment tool has received extensive reliability and validity testing.[19,20] Data quality with respect to reliability, validity, completeness and freedom from logical coding errors was consistently high.[21]

Within the assessment, Section M2a. Pressure Ulcer captures the highest stage of pressure ulcer in the last seven days using the following scale:

Stage 1: A persistent area of skin redness (without a break in the skin) that does not disappear when pressure is relieved
Stage 2: A partial thickness loss of skin layers that presents clinically as an abrasion, blister, or shallow crater

Stage 3: A full thickness of skin is lost, exposing the subcutaneous tissues- presents as a deep crater with or without undermining adjacent tissue
Stage 4: A full thickness of skin and subcutneous tissue is lost, exposing muscle or bone.

The RAI- MDS 2.0 incorporates embedded decision-support algorithms providing clinical outcome scales, quality indicators (QIs) and Resource Utilization Groups (RUGs) which correlate to case mix methods (See Figure 1). An outcome scale derived from the MDS data is the interRAI Pressure Ulcer Risk Score (PURS) aimed at supporting interventions for those at risk of pressure injuries. QIs derived from RAI-MDS 2.0 aid in monitoring and improving care quality. They fall into prevalence and incidence categories, with adjusted QIs allowing fair comparisons among organizations or regions. Three relevant QIs related to pressure injuries are highlighted here. These QIs identify newly occurring pressure injuries and track severity changes over time.

1. *Percentage of residents who had a newly occurring pressure injury at stages 2 to 4 (PRU09):* Describes the number of residents with a pressure injury at stages 2 to 4 in their target assessment, but not in their prior assessment, out of all residents with valid assessments and an assessment in the previous quarter.
2. *Percentage of residents who had a pressure injury at stages 2 to 4 (PRU05):* Describes the number of residents with a pressure injury at stages 2 to 4 in their target assessment, out of all residents with a valid assessment.
3. *Percentage of residents who had a worsened pressure injury at stages 2 to 4 (PRU06):* Describes the number of residents with a pressure injury at stages 2 to 4 in their target assessment and a less-severe pressure injury (i.e., at a previous stage) in their prior assessment, out of all residents with valid assessments and an assessment in the previous quarter.

Pressure injuries emerge as the mostpractice-sensitive QI, followed by worsening pain, physical restraint use, antipsychotic medication use without psychosis diagnosis and indwelling catheters.[22] Examining and addressing these QIs promotes ongoing quality improvement in the realm of continuing care.

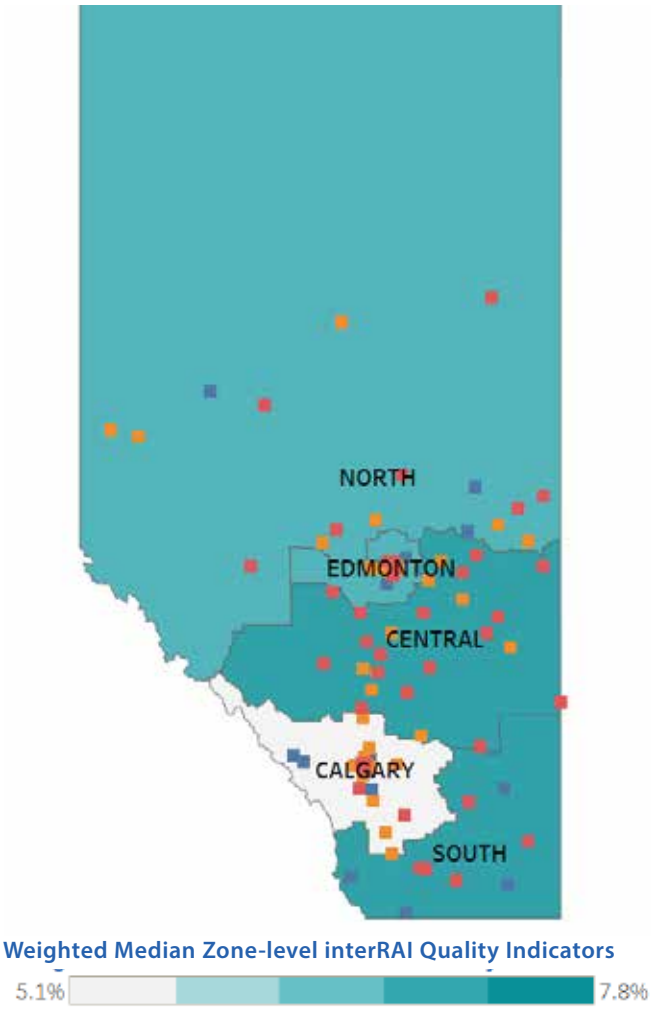


Figure 2: Facility and Zone level weighted median of adjusted Stage 2 to 4 pressure injury rates in 2021/22 Q4.

Methods

The Atlas examined variation in pressure injury rates across 182 LTC facilities during 2017/18 to 2021/22 using the RAI-MDS 2.0. The number of facilities in operation fluctuates from quarter to quarter. This study used a time series design

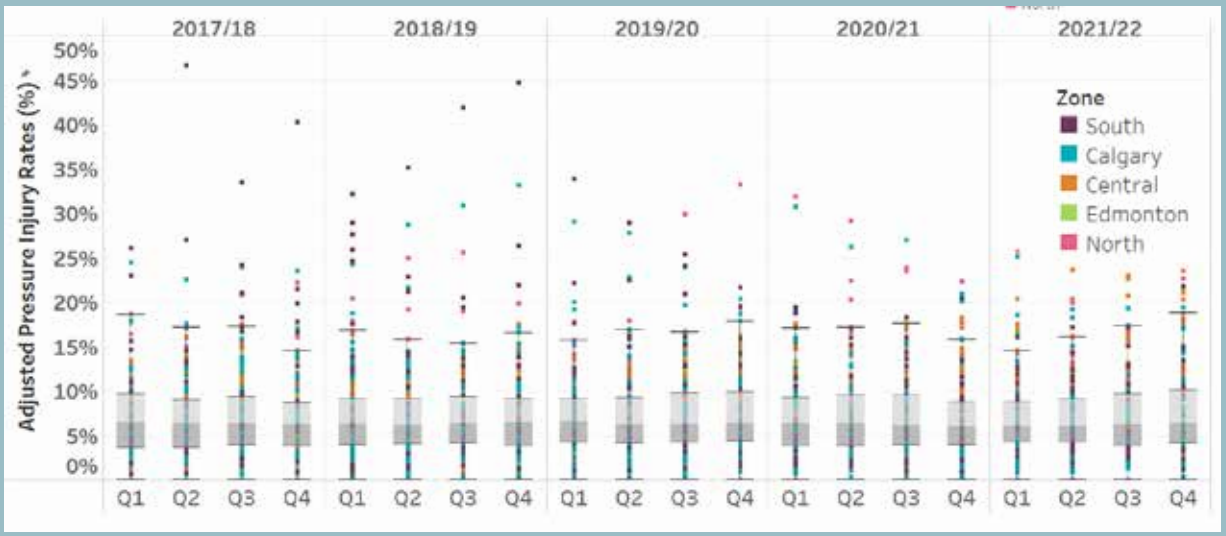


Figure 3: Adjusted Stage 2 to 4 Pressure injury rates by bed capacity in Long Term Care Facilities in 2021/22 Q4.

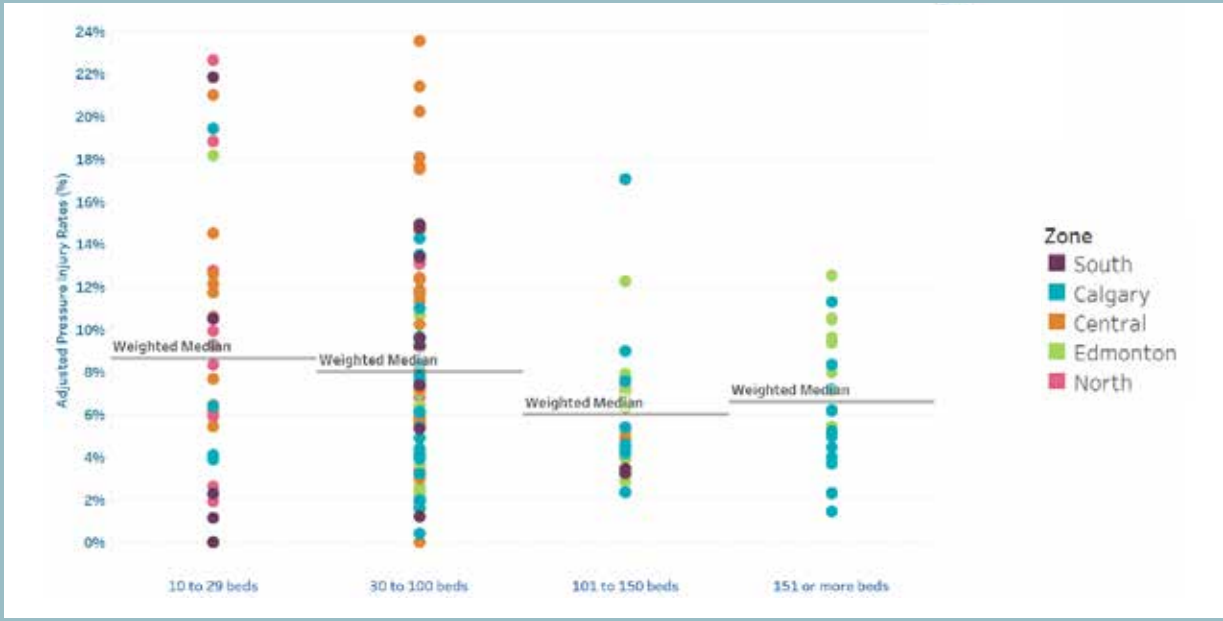


Figure 4: Adjusted Stage 2 to 4 Pressure injury rates by bed capacity in Long Term Care Facilities 2021/22 Q4

and explored pressure injury rates quarterly. All residents from LTC facilities with a bed capacity of 10 or more in Alberta were included in the analysis. The three-pressure injury QIs were assessed for variation. For each of the pressure injury quality QIs, both crude and adjusted pressure injury rates were computed. Adjusted rates considered were individual covariates including Personal Severity Index (PSI) Subset 1: Diagnoses; higher level of dependence in toileting; Resource Utilization Group (RUG); cognitive impairment and ages under 65. Facility-level stratification using Case Mix Index (CMI) was also applied. Pressure injury assessments were classified into first assessment and subsequent assessment. Assessments conducted within 90 to 92 days of

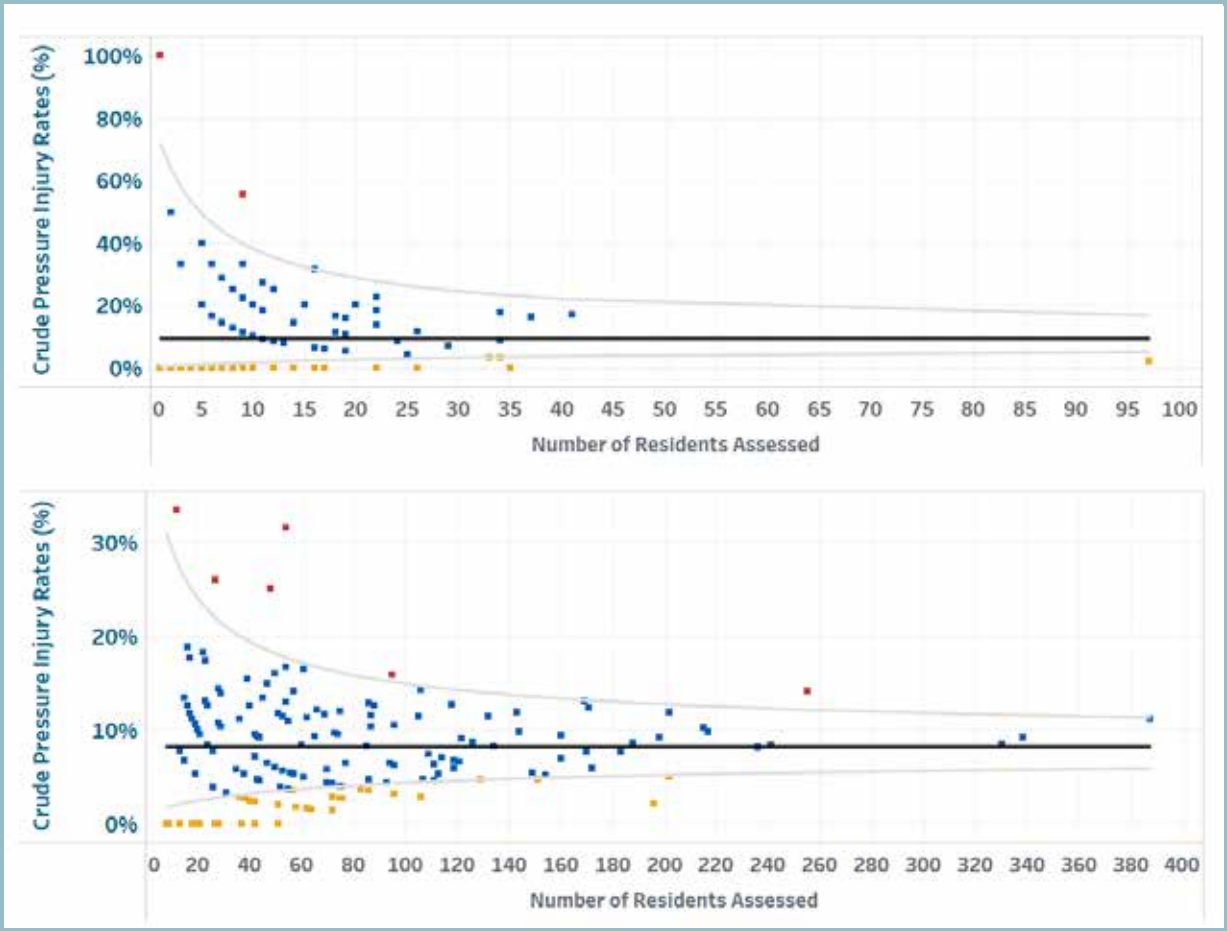


Figure 5: Crude pressure injury rates at first assessment (top) and subsequent assessment (bottom) at Long Term Care Facilities in 2021/22 Q4

admission are considered as first assessments; any following assessments are considered subsequent assessments. Whenever there is more than one assessment completed per resident per quarter, only the last assessment will be analyzed. Descriptive statistics and exploratory statistical methods were used. Weighted median pressure injury rates were computed at the provincial level and zone levels and weighted according to the bed capacity of individual facilities. Funnel plots were used to investigate the relationship between number of assessments completed and crude pressure injury rates as pressure injury rates have binomial distribution. The Wilson score interval was used to determine the 95% confidence limits of funnel plots.

Results

Our study sample comprised 182 LTC facilities, which included 356,278 assessments from 2017/18 to 2021/22. The mean standard deviation age of residents at assessment was 81.8 (12.6) years. Age at assessment ranged from 16 to 112. 62.9% were females. In Figure 2, the weighted median pressure injury rate at the provincial level was 6.4% (first to third quartile: 4.4% to 9.3%) in 2021/22 Q4. Weighted median pressure injury rates displayed some variations at zone level. The highest variance was in the South zone (weighted median, first to third quartile: 7.8% [3.3% to

10.2%]), the lowest was in Calgary zone (5.1% [3.9% to 7.4%]). The Central zone (7.5% [5.6% to 12.1%]), Edmonton zone (7.1% [5.4% to 9.4%]) and North zone (6.9% [4.8% to 10.1%]) were in between. Figure 3 shows the boxplot of adjusted pressure injury rates varies between 6.0% and 6.6%. Maximum rates display substantial variation over time. It is between 22.3% and 46.7%. Figure 4 shows the variation weighted median pressure injury rate that facilities are grouped by bed capacity ranges. In Q4 2021/22, adjusted pressure injury rates display the highest weighted median of 8.7% for 10 to 29 bed capacity ranges. The largest variation of 0.0% to 23.5% was found in the 30 to 100 bed capacity ranges. Figure 5 compares the crude pressure injury rates between first assessment and subsequent assessment. More substantial variations were found in subsequent assessments as represented by the dots outside the confidence limits.

> "Clinicians strive to provide consistent and evidence-based health care for their patients; however, safety and quality of health care can vary across geographic and clinical areas. Understanding this variation is critical to improving the safety, quality, value and appropriateness of health care. The persistent existence of unwarranted variation in health care, defined as variation unexplainable by variation in patient illness or preference, signals an opportunity for improvement. The A-Atlas described here offers a data driven analysis to enable continuous quality improvement and stimulate action to improve patient outcomes. Production of the A-Atlas is only the first step in improving the quality of care and this alone may be insufficient to secure meaningful change."

Discussion

The A-Atlas topic highlights accessible and interpretable data on pressure injuries in Alberta to encourage and advocate for routine monitoring, reporting and improvement activities to reduce pressure injuries in LTC. The A-Atlas, using validated assessment methods and systematic reporting, allows monitoring of trends in pressure injuries over time, comparison between regions and sites (adjusted for case mix) and ideally should be used to form the basis for quality improvement plans designed to address pressure injuries in LTC. Using the A-Atlas, health-care providers and policy makers can allocate health-care resources more effectively, implement changes where necessary and monitor the impact of these changes over time. Atlases of variation have been produced in many other jurisdictions, for example, the Office for Health Improvement and Disparities, part of the Department of Health and Social Care in England and Wales (https://fingertips.phe.org.uk/profile/atlas-of-variation) and New Zealand (https://www.hqsc.govt.nz/our-data/atlas-of-healthcare-variation/).

These atlases cover a wide range of health conditions and have been used as a monitoring tool in evaluation of quality improvement efforts such as activities designed to reduce the incidence of surgical site infections. Clearly, atlases raise the profile of health conditions under study; this, in itself, may prove sufficient to precipitate action to improve care along the lines of an audit and feedback cycle, a proven mechanism of quality improvement.[23,24] Atlases may also serve as the foundation for system-wide quality improvement initiatives, allowing a coordinated approach to the design of high value programs of care. However, the evidence that atlases do lead to a reduction in clinical variation is limited. [25,26]

Production of the A-Atlas is only the first step in improving the quality of care and alone may be insufficient to secure meaningful change. Data need to be produced in a timely fashion and accessible and available in a form understandable to the intended audience. In Spain, where atlases have been used for over two decades, a multifaceted dissemination program accompanies the publication of each, to ensure maximum expos-

ure.[27] This has been replicated in many other areas where atlases are used.[28]

This may not be enough. In a UK study of primary care organization managers, only half had used the atlas. There was a lack of awareness, staff capacity for analysis, or the content was thought inapplicable to local decision-making.[29] Data on medical practice variations create the additional conundrum that, as opposed to a guideline, they rarely tell the user what to do, thus considerable evidence informed practice support is required for meaningful improvement. There is also considerable difficulty in identifying unwarranted variation; the assumption that all variation is unwarranted has been erroneously made by some authorities. Such identification is an essential prerequisite to meaningful action and research has identified factors which might be considered when making these judgments.[30,31] There have been calls to refine atlases allowing for interpretation of any differences found, support for the selection and application of levers for change that align with local context and provision of evidence-based options for implementation.[32] Likewise, the organizational infrastructure that addresses training and education, optimal health services delivery for prevention and system-wide communication, clinical champions and processes for risk assessment need to be in place in order to successfully address the underlying problem.

The A-Atlas does have some strengths and limitations that must be considered. An important strength of the A-Atlas is that it provides a visual overview of the current state of pressure injuries in LTC across the province. These visual representations and interpretations are useful for providers and decision makers as they clearly identify areas for quality improvement work. The A-Atlas also allows the user to drill down to specific areas while longitudinal data allow for the identification of trends. A limitation of the A-Atlas is that variation may exist not only between sites, but also within each site. This type of variation within the clinical microsystem in which care is provided, may be 'hidden' and not easily assessed by the reader without further analysis of the data. Finally, the current A-Atlas is a 'static' product and the ability to routinely update the A-Atlas with new, up-to-date information is currently unavailable due to data handling issues. However, work is underway to explore how this could be possible in the future.

Conclusion

Newly occurring and worsening pressure injuries are a challenge across LTC facilities in Alberta. Despite multiple risk reduction/prevention strategies and early identification and treatment approaches, there is inconsistency with how best practices are utilized across sites. The newly created Alberta Atlas of Healthcare Variation (A-Atlas) reveals the degree of variation by showing weighted median pressure injury rates across provincial zones, adjusted pressure injury rates over time, weighted median pressure injury rates between facilities grouped into different bed capacity ranges and crude pressure injury rates between first and subsequent assessments across sites. Through use of the A-Atlas as a catalyst for change, we hope that operational and medical leaders can be better informed regarding the opportunity to improve pressure injury care and where best to target efforts.

Acknowledgements

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Conflicts Of Interest

The authors declare there are no conflicts of interest.

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A Love Letter To My Wound Care Friends: Collaborating To Care For The 'Ton' Of People With Type 2 Diabetes

By Susie Jin RPh CDE CRE

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Dearest Gentle Reader,

It's no secret that we're in the middle of a health-care crisis and that, despite our individual efforts, the number of people being diagnosed with diabetes every day continues to grow, putting more Canadians at risk of diabetes complications.[1-3] I'm writing to you because although the idea of stopping this exponential growth seems overwhelming, it is my hope that our collaborative efforts will be stronger together; and that we can make a difference by impacting the seeming ton of people affected by diabetes, one individual at a time.

The good news is that, in my opinion, in comparison to 25 years ago when I first became a diabetes educator, the management of type 2 diabetes is generally easier. People with type 2 diabetes now have more management options, including:

• **Remission of type 2 diabetes**,[4,5] which is possible for some individuals when they are not taking blood glucose-lowering medications for at least three months and their A1C is either:

- ✓ A1C between 6.0 - 6.4 % →remission to prediabetes
- ✓ A1C <6.0 %→remission to normoglycemia.

• **Optimizing incretin mimetics**,[6] i.e., GLP-1 receptor agonists and dual GIP/GLP-1 receptor agonists, and/or SGLT2 inhibitors which are not, on their own, affiliated with hypoglycemia and which:

- ✓ Have robust glucose-lowering efficacy (often supporting A1C goals within non diabetes ranges)
- ✓ Support weight management.

• **When insulin is needed**, using insulin regimens with less risk of hypoglycemia[7]
• **Using 2nd generation basal analogue insulins**, e.g., insulin degludec or insulin glargine U-300, over 1st generation basal analogue insulins, e.g., insulin detemir, insulin glargine U-100.
• **Using continuous glucose monitoring** (CGM) to support personalized glycemic goals.[6,8]

In this letter, I am limiting my comments to discussing the use of CGM in people with diabetes.

What Is Continuous Glucose Monitoring (CGM)?

With continuous glucose monitoring (CGM), a sensor, inserted into the interstitial space under the skin, measures the body's glucose at regular intervals. These measurements are translated into a blood glucose value and displayed on a compatible smart phone, or on a stand-alone device, where the user learns their current glucose value and the direction and speed the glucose is changing. Most commonly, the sensor is changed once every 10 or 14 days, depending on the system used.

Continuous glucose data can help a person proactively manage and prevent glucose highs and lows. Alerts can be personalized to give real-time insights into how the body is responding to factors such as eating patterns, physical activity (intensity and duration), stress and sleep. CGM systems also provide aggregate data such as sensor-derived A1C, Time in Ranges and glycemic variability, which all provide an indication of the person's risk of diabetes complications reflective of the determined timeframe.

At present, the two most commonly used CGM systems in Canada are the Freestyle Libre 2™ system[9] and the Dexcom G6[10]™or Dexcom G7[11]™ systems.

Situation

Can we collectively optimize the use of CGM?

Studies demonstrate that continuous glucose monitoring (CGM) systems are a powerful tool to support improved health outcomes in people living with diabetes.[8] However, my personal observation amongst the ton of people with diabetes that I support in clinical practice is that CGM is both under-accessed and under-utilized/under-actioned upon. In this letter to you, I ask for your help in solving this problem. Can we collectively optimize the use of CGM?

1. Can we ensure that people who can benefit from CGM are recommended CGM according to their needs?
    • Similarly, can we ensure that those people who are using CGM, but who don't need CGM, are gently encouraged to recognize the importance of cost-effective choices in diabetes self-management and not use CGM when there is no indication for CGM, i.e. when CGM is not needed?
2. Can we ensure that people who are using CGM, are actually benefiting from CGM, i.e., using the data from CGM to inform daily decision making and, where applicable, medication adjustments?

Assessment

Who can benefit from CGM? Addressing the 'under-access' of CGM.
How can we assess that the person using CGM is actually benefiting from CGM?

Table 1: Individuals with diabetes who could benefit from using glucose monitoring[12]

Individual characteristics	A1C above target	A1C is at target
Individual* IS at risk of hypoglycemia†	Continuous CGM to prevent / manage hypoglycemia	Continuous CGM to prevent / manage hypoglycemia
Individual* is NOT at risk of hypoglycemia‡	CGM until the person meets their glycemic targets, then→ → →	*Consider/recommend STOP continuous CGM *Consider episodic CGM use, e.g., wear sensor for 10 to 14 days every 3 to 6 months
Individual* is pregnant	Continuous CGM while pregnant	Continuous CGM while pregnant

*Provided the person is willing to learn from and act on CGM data, i.e., adjusting insulin (or other medication) doses and/or supporting daily eating and activity decisions.
† Individuals at risk of hypoglycemia are individuals who use insulin and/or an insulin secretagogue (e.g., gliclazide, glyburide) to manage their diabetes.
‡Individuals NOT at risk of hypoglycemia are individuals who manage their diabetes without the use of insulin and/or an insulin secretagogue (e.g. gliclazide, glyburide).

How can we assess that the person using CGM is actually benefiting from CGM?

1. Ensure appropriate CGM data collection.
   - CGM data collection/sensor usage should be a minimum of 70%[13]
   - When CGM data collection is below 70%: ensure the person is keeping the app open on their smart phone (running in the background) and/or ensure the person is keeping their phone with them. For example, some people leave their phone in the kitchen when they go to sleep in the bedroom which is greater than 6 m away, resulting in a loss of data sensor capture.
   - If the person is using a Freestyle Libre 2 reader, the person must scan the sensor to pull the data to the reader a minimum of every eight hours. (Suggest that they scan on waking, before every meal, at bedtime and, if they happen to be awake during the night, scan at that time).
2. Assess glycemic metrics.
   - Looking at a person's CGM app, i.e., Libre 2, Dexcom G7 and/or Clarity™, will efficiently identify if the person is meeting their glycemic goals and/or whether the individual could benefit from additional glycemic management support.
   - Glycemic metrics and their typical goals are listed in Table 2 with a real-life assessment demonstrated in Appendix A.
3. Have the person explain the actions they take in response to CGM data, i.e., blood glucose results with trend arrow and daily graphs.
   - A conversation with the person using CGM will determine if the person understands what the CGM data is telling them and what kinds of actions they can take to stay in the green zone.

Recommendations

Take Home Messages

1. Solving under-access:
   - Wound care team members can recognize when a person could benefit from access to CGM (as listed in Table 1) and recommend CGM

Table 2: Glycemic Metrics And Typical Goals[13]

Glycemic Metric	Typical Goal
Data sensor capture	Greater than 70%
Time In Ranges: Time In Range (3.9 – 10.0 mmol/L) Time Below Range • low (below 3.9 mmol/L) • very low (below 3.0 mmol/L) Time Above Range • high (above 10.0 mmol/L) • very high (above 13.9 mmol/L)	 Greater than 70 % (greater than ~17 hr/day) Less than 4 % (less than ~1 hour/day) Less than 1 % (less than ~15 min/day) Less than 25 % (less than 6 hours/day) Less than 5 % (less than 72 min/day)
Glucose Management Indicator (GMI), aka sensor-derived A1C	See Diabetes Canada targets table, available at: https://guidelines.diabetes.ca/GuideLines/media/Images/cpg/SA-Fig1-AIC-targets-expanded.png
Glucose Variability	Less than or equal to 36 %

To determine CGM data collection and to assess glycemic metrics:

- If FreeStyle Libre2 monitoring system:
  - ✓ When the person is using a smart phone, use the Libre2 app, dropdown menu
  - ✓ Health-care provider portal: Libreview.com
- If Dexcom monitoring systems, either:
  - ✓ When Dexcom G6, use the Clarity app
  - ✓ When Dexcom G7, when using a smart phone, use the Dexcom G7 app and/or the Clarity app
    Health-care provider portal: https://clarity.dexcom.eu/professional/

appropriately and/or refer the individual with diabetes to other diabetes health-care team members, e.g., primary care providers, pharmacists, diabetes education programs.

2. Solving under-utilization (under-actioning) of CGM:

- When wound care team members identify that a person is using/wearing CGM:
  - ask them about how they use the data from their sensor to support daily health-care decisions, such as what to eat and when/how to exercise.
  - ask them about their glucose metrics (See table 2 for glucose metrics and recommended goals).
- Particularly, if a person is not getting to their individualized glycemic goals (as listed in Table 2):
  - help them to recognize that they may have options in their type 2 diabetes management (a few of which are listed above). Refer the individual to other diabetes health-care team members, e.g., primary care providers, pharmacists and diabetes education programs to optimize the benefits of CGM technology.

Yours in good health,

Lady Susie

P.S. If you have any comments for the author, please reach out via susie.jin@alumni.utoronto.ca. Similarly, if you have an idea which could improve collaboration with diabetes educators, please send to susie.jin@alumni.utoronto.ca. We will put this forward for publication in the *Diabetes Canada Diabetes Communicator* publication to be read by diabetes educators across our nation.

When glucose monitoring is indicated (See populations listed in Table 1), continuous glucose monitoring (CGM) technology, when accessible, is preferred over capillary blood glucose (CBG) monitoring.

• When caring for an individual with diabetes, if they are monitoring their blood sugars using CBG checks (i.e., finger stick pokes), ask them to explain to you how they are actioning on the data that they derive from CBG monitoring. Consider referring them back to their primary care provider and/or diabetes health-care team to see if CGM would be accessible and more appropriate for them

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Applying The Wounds Canada Foot Health Pathway In The Local Context Of Newfoundland And Labrador: The Development Of An Infographic And Custom Button For Health-care Providers

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Introduction

International and national health agencies endorse implementing strategies to strengthen diabetes management to reduce the burden of the disease.[1-4] Despite the call to action, diabetes remains a leading cause of major complications such as lower-limb ischemia, often leading to diabetic foot ulceration (DFU) and amputation.[3,4] The province of Newfoundland and Labrador (NL) has one of the highest incidences of diabetes in Canada, with an estimated prevalence of 34% for diabetes and prediabetes combined.[1,2,5] Currently, NL has one of the highest incidences of lower limb amputations (LLAs) in Canada, with an estimated 37.9 amputations per 100,000 individuals.[6] Given the occurrence and impact of diabetes and DFU in NL, reducing diabetic foot complications and improving patient, provider and health system outcomes must be prioritized.

In this article, a joint organizational and individual-level strategy to address diabetic foot management that was developed as part of a Master of Nursing practicum project is described. The overall goal of this project is to enhance health-care provider (HCP) application of the *Wounds Canada Foot Health Pathway for People Living with Diabetes* and improve outcomes for patients with diabetes in NL. Detailed analysis of the literature, an environmental scan and consultations revealed a need for a resource to assist local HCPs concerning diabetic foot care.

A customized 'button' for HCPs is presented as an individual-level strategy to encourage dialogue between patients and HCPs and improve foot screening (See Figure 1). An infographic to support the application of the Wounds Canada (2022) Clinical Pathway (CPW) is proposed as an organizational-level strategy to support HCPs7 (See Figure 2).

Theoretical Underpinnings

The Donabedian Model of Quality of Care (1966) and Knowles' Theory of Andragogy (1984) provided the theoretical foundation for the project.[8,9] Together, these models offered conceptual direction for the literature review, environmental scan and consultations, and informed the design, content and mode of delivery of the organizational and individual-level strategy that was developed.

According to the Donabedian model, the assessment of the quality of care encompasses three dimensions: structure, process and outcome; where structure refers to the organizational or health system resources and facilities; process refers to the care that is provided and received in the exchange between patient, provider and system, and outcome refers to the effects of the care on the patient, provider and the system. [8,10] Based on this notion, implementing changes at the structure level to address diabetic foot health is thought to produce changes at the process and outcome level to mitigate the impact of DFU (See Figure 3). [8,10]

Knowles' Theory of Andragogy (1984) provided the conceptual direction required to ensure resource development remained consistent with the needs of adult learners. The Theory of Andragogy considers six assumptions related to the adult learner: self-concept, experience, readiness to learn, orientation to learning, motivation to learn and need to know.

Given that the target audience is likely to have previous experience with managing diabetes and diabetes-related foot concerns, it is conceivable that they will be receptive to expanding their knowledge on the topic and improving the level of care their patients receive.[9]

Likewise, Knowles' theory emphasizes that adults are most interested in learning when the information is problem-centred and directly relevant to their careers and day-to-day lives. Given the substantial burden of diabetes and related complications in NL, it is highly likely that the target audience will be motivated to utilize a resource developed to improve diabetes-related outcomes.[11]

While the target audience encompasses primary HCPs such as family physicians, nurse practitioners, registered nurses, nurse educators, endocrinologists and internal medicine specialists from varied backgrounds and experiences, all providers share a common goal of promoting health among their patients. Considering these theories, an infographic and accompanying button were selected

as promising organizational and individual-level strategies to address diabetic foot management among local primary HCPs.

Method

In order to develop a comprehensive resource based on the best evidence and representative of the needs of local HCPs, data were collected using three methods: a literature review, an environmental scan and consultations with key stakeholders. While each method was conducted in sequence, the process was iterative, with multiple drafts completed for each component. Each of these components provided valuable information related to issues to address and content to include that was essential to the development of the resource.

Figure 1: Customized HCP 'Button'

Step 1:

Literature Review: A search of the databases CINAHL, PubMed, Cochrane Library and Google Scholar was conducted to gain insight into the occurrence and impact of DFUs and the contributing factors associated with their onset and management. Key questions to guide the review were:

*What is the occurrence of DFUs?
*What are the contributing factors related to DFUs? and
*What is the effectiveness of organizational-level strategies that address diabetic foot health?

Titles and abstracts of the articles retrieved were reviewed to determine relevance to the key questions and inclusion criteria. Following an in-depth screening of the full-text versions of relevant articles, five studies describing organizational-level strategies for HCPs to address DFUs were selected for inclusion in the review.[12-16] A high-quality systematic review and meta-analysis of 57 descriptive and analytic studies formed the basis of the evidence included in the integrated review.[12] The remaining studies consisted of a systematic review,[14] two cross-sectional [15,16] and one qualitative study.[13]

The Public Health Agency of Canada's (PHAC) Critical Appraisal Toolkit was used to guide the critical analysis of the quantitative articles selected, while the Critical Appraisal Skills Programme (CASP) qualitative checklist was used to guide the critique of the qualitative literature.[17,18] The reference lists of applicable articles were also reviewed as a secondary search strategy.

Step 2:

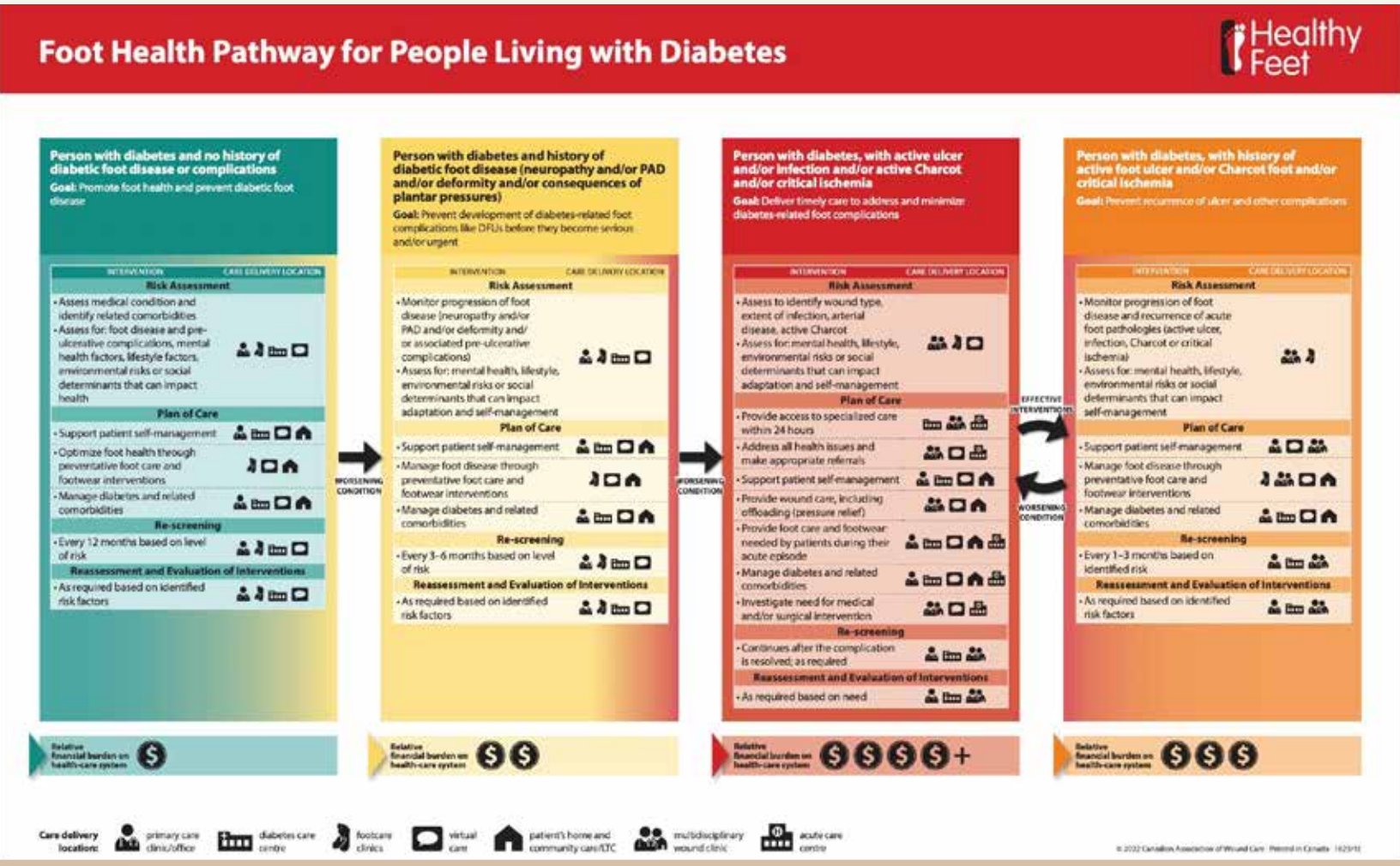
Environmental Scan: An environmental scan was performed to elicit existing knowledge from established internal and external databases and published guidelines and best practice recommendations to gain insight into managing diabetic foot complications on a provincial and national scale. The specific objectives for the environmental scan were to determine the extent of the available resources used by HCPs to direct diabetic foot management within the four NL regional health authorities, to determine the available resources for diabetic foot management used by HCPs across Canada and to identify tools recommended by leading national and international professional associations to assist providers with diabetic foot management. Sources of information for the environmental scan included provincial, national and international clinical resources for diabetic foot management. On a provincial level, clinical practice guidelines (CPGs) and policies for diabetic foot management were obtained from four NL regional health authorities by reviewing accessible websites and internal databases. On a national level, sources of infor-

Figure 2: Infographic

Applying the **WOUNDS CANADA**

FOOT HEALTH PATHWAY FOR PEOPLE WITH DIABETES

IN NEWFOUNDLAND AND LABRADOR



RISK ASSESSMENT AND SCREENING

GREEN **LOW RISK**	Person with diabetes and no history of diabetic foot disease or complications
YELLOW **MODERATE RISK**	Person with diabetes with foot disease (neuropathy, PAD, deformity, plantar pressure)
RED **URGENT RISK**	Person with diabetes with active ulcer, infection, Charcot or critical ischemia in need of acute care
ORANGE **VERY HIGH RISK**	Person with diabetes who has a history of an active foot ulcer, Charcot foot or critical ischemia

PLAN OF CARE

At every visit

Assess foot for foot disease

- Identify co-morbid conditions

Monitor regularly for signs of foot disease or pre-ulcerative foot changes

- Identify calluses, loss of protective sensation, change in foot structure

Evaluate psychosocial risk factors

- Identify lifestyle and environmental factors that impact self-management

Educate patient and support persons on what to look for and when to seek help

- Provide Diabetes Foot Care Handout (available on Intranet)

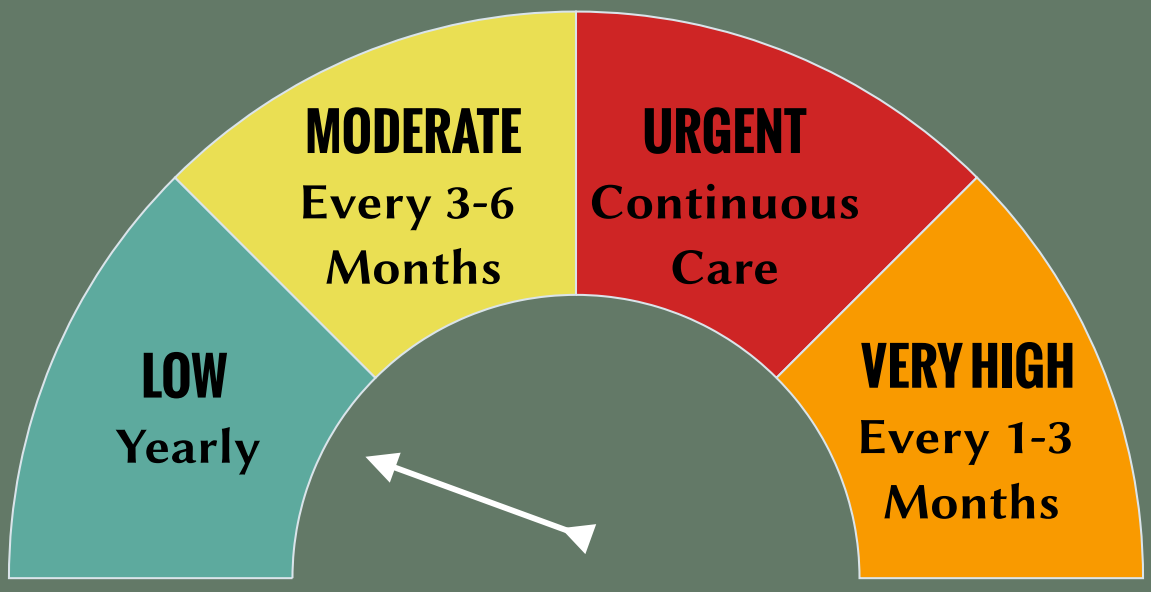
Optimize preventative foot care

- Encourage routine wear of appropriate protective footwear
- Ask about insurance coverage

Initiate referrals to appropriate health professionals

- Refer to local foot care nurses in your area for preventative care
- Refer to Diabetes Education Centre (DEC referral form on Intranet)
- Refer to the NL Federation of Podiatric Medicine for certified podiatrists
- Refer to Miller Centre Orthotics Services (Referral form on Intranet)
- Refer to Community Health or Wound Management Clinic as needed

How often do you need to follow up?



PLAN OF CARE BASED ON RISK ASSESSMENT

GREEN

LOW

- Assess yearly
- Follow steps outlined above

YELLOW

MODERATE

- Assess every 3-6 months
- Follow steps outlined above

RED

URGENT

- Provide access to specialized care within 24h
- Prioritize wound care
- Initiate offloading
- Investigate need for medical or surgical intervention
- Consult wound care nurse, vascular surgery or orthopedics as needed

ORANGE

VERY HIGH

- Re-assess every 1-3 months
- Refer to community health nurse as needed
- Refer to wound care clinic for outpatient management
- Refer to foot care nurses

Resources

Diabetes Education Centre

709-752-3687

Wound Care Clinic

709-752-6220

Check out *Foot Care for Diabetes* on the Intranet

Smoking Cessation Help Line

1-800-363-5864

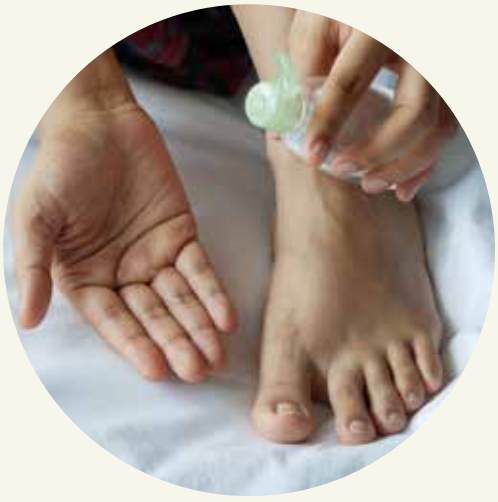
Diabetes Canada NL Chapter

709-747-4590

Podiatrists and Foot Care Nurses

Local Yellow Pages

The NL Federation of Podiatric Medicine website



Scan the QR code to access the latest **Diabetes Canada Guidelines**

mation were restricted to the provinces of Alberta (AB), British Columbia (BC), New Brunswick (NB), Nova Scotia (NS) and Ontario (ON) to ensure the amount of information in the environmental scan was manageable for analysis. On an international level, CPGs and best practice recommendations (BPRs) published by leading national and international associations were reviewed for relevancy to the key questions, including Diabetes Canada,[19] Wounds Canada,[7] International Working Group on the Diabetic Foot (IWGDF)[20] and the National Institute for Health and Care Excellence (NICE).[21]

Step 3:
Consultations: Consultations were conducted with ten key informants from diverse backgrounds and experiences. In total, nine consultations that consisted of semi-structured telephone and email-based interviews were conducted to gain insight into available resources for diabetic foot management in NL and to identify the priority needs of local HCPs. Participants consisted primarily of representatives from the nursing profession, including one licensed practical nurse (LPN), six registered nurses (RNs) and one nurse practitioner (NP). The LPN specialized in advanced foot care and provided private services in a remote region of NL. The NP was a practitioner who specializes in vascular surgery. The RNs interviewed included a vascular surgery nurse, a research nurse coordinator, a diabetes nurse educator, two wound care nurse consultants and a community health nurse. Consultations were also conducted with an endocrinologist and a local podiatrist. All data were managed, analyzed and properly secured on the principal author's personal computer. No identifiable information was kept beyond sharing with the practicum supervisor to protect the anonymity of the participants. Consistent with the environmental scan, descriptive analysis was performed to analyze the data collected during the consultations and a table was created to depict the results.[22]

Results

Results of Literature Review: The integrative review of the literature revealed four prominent organizational care processes to address DFU, including dedicated care teams (DCTs), CPWs, multidisciplinary care teams (MDTs) and approaches that combine CPWs and MDTs. A critical analysis of the studies using the PHAC[17] and CASP[18] criteria demonstrated moderate evidence to support the effectiveness of CPWs and MDTs in reducing LLAs in patients with DFU, yet inconclusive and contradictory evidence to support the effectiveness of multi-component interventions and DCTs. Clinical pathways, in particular, have been gaining momentum in the literature as effective tools to promote the uptake of best practice recommendations across healthcare institutions.[12,23] Information obtained from the literature review was used to direct the project's environmental scan and consultation phase and inform the development of the resource for HCPs described in this article.

Results of the Environmental Scan: An extensive review of the diabetes services in NL revealed a lack of clinical resources to guide HCPs in providing diabetic foot care. While a variety of services were offered for patients with diabetes at the St. John's Diabetes Centre, a broad review of policies and procedures available on internal websites provided no evidence of CPWs or foot care teams dedicated to the diabetic foot. The environmental scan also highlighted the existence of a specialized wound care clinic comprised of wound care experts from nursing, dermatology, plastics and orthopedic specialties. However, a significant limitation of that service was that it was only accessible to patients via referral by a physician or an NP. A review of the available resources within the remaining three Regional Health Authorities (RHAs) proved especially limited, with services varying considerably according to site. Advanced foot care services by nurses were available upon referral but were insufficient to meet the current demand. Across all health authorities, a consistent finding among providers was the usage of the Diabetes Canada CPGs to inform diabetes management.

In contrast to other provinces in Canada, NL was lagging in the systematic management of

diabetic foot. A review of the available resources implemented in the provinces of AB, BC, NS, NB and ON highlighted the widespread use of CPGs, BPRs, CPWs and MDTs by these provinces to improve the management of diabetic foot. Although there were differences in composition, function and target areas, CPWs for providers to assist in diabetic foot management were evident in these provinces.

A review of resources developed by Diabetes Canada, Wounds Canada, IWGDF and NICE revealed several resources to guide the provision of foot care. On a national level, Diabetes Canada and Wounds Canada provide detailed guidance for HCPs in the form of CPGs,[19] BPRs and CPWs.[7] Diabetes Canada's website also provided links to access resources such as a PowerPoint presentation and a Smartphone application for ease of knowledge sharing on various topics related to DFU prevention, screening, assessment, treatment and patient education. Consistent with Diabetes Canada, Wounds Canada has developed several resources for diabetes care, including the most recent development of an integrated CPW.[7] *[Editor's note: Wounds Canada's updated Best Practice Recommendations For Skin Health and Wound Management 2024 will be published later this year.]* On an international level, IWGDF and NICE continued to lead diabetes care by developing resources to guide management, advance knowledge and improve patient care. The environmental scan findings were used to inform the nature of the questions asked during the consultations and in conjunction with the other methods to inform resource content and delivery.

Results of the Consultations: The need for a clinical resource to improve the management of diabetic foot in NL became abundantly clear during the consultations with local HCPs. On an organizational level, a need for standardized resources was a consistent finding that emerged from the consultations. Other themes identified included a lack of funding to cover services such as podiatry and advanced foot care, lack of fiscal and human resources to meet the demands of the population in terms of diabetic foot needs, long wait times to see primary care providers and specialists and ineffective lines of communication between private and public sectors to optimize the coordination of care for patients with diabetic foot needs. On a provider level, inconsistencies in HCP practices and in the advice given to patients were identified. Other important themes included a critical need for HCP education and standardized resources for prevention and screening. On a patient level, many of the factors impacting HCP management of the diabetic foot were related to: socioeconomic factors such as soaring costs of supplies; lack of resources due to low-income and limited means to afford services; lack of knowledge regarding preventative care and maintenance; non-adherence with self-care recommendations and multi-chronicity.

Discussion

An integrative literature review provided insight into the best available evidence on strategies to enhance diabetic foot management. The environmental scan identified available resources implemented in jurisdictions across Canada with varying levels of success while also revealing the lack of resources within NL to support providers in the provision of diabetic foot care. Consultations with key stakeholders in NL provided a unique understanding of the local context, which was fundamental to customizing the best available evidence to the local context. It was clear from the literature review findings, environmental scan and consultations that several organizational-level, provider-level and patient-level factors influenced diabetic foot management. To address the problem on an individual and organizational level, a decision was made to develop two complementary resources to enhance diabetic foot management: an infographic and a custom 'button'.

Clinical Resource Development: *The Wounds Canada Foot Health Pathway for People Living with Diabetes*[7] was identified during the environmental scan as a comprehensive, high-quality, and clinically useful resource representative of current best practices outlined by the IWGDF and Diabetes Canada. Despite the many strengths of the Wounds Canada pathway, it became appar-

ent during the consultations that further guidance was needed to enhance application within a local context. For this reason, a decision was made to develop an infographic to assist local providers with applying the pathway. Wounds Canada granted copyright permission to use the pathway for this specific purpose. An infographic was chosen as the most suitable mode of delivery to achieve the identified goal primarily due to its ability to reach a large audience efficiently.[24] While little is known about the infographic's effectiveness as a medium to convey health information, a growing body of literature supports its use as a visual communication tool in a wide range of education, marketing and health-care settings. Infographics are useful visual tools for communicating information to vast populations clearly, concisely and compactly.[25-27]

Education is one of many interventions needed to evoke change. Still, it is a principal step in the knowledge translation process and fundamental to enhancing the uptake of best practices among HCPs.[10] According to Harrison and Graham (2021), developing materials to support an innovation makes it easier for stakeholders to learn about and deliver it. The principles of adult learning were taken into consideration to ensure that design, content and mode of delivery aligned with the needs of the target audience as identified in the consultation phase of data collection.[10] With Knowles' Theory of Andragogy (1984) in mind, an infographic was selected as a promising organizational-level strategy to address diabetic foot management among local primary.[9]

A custom button was also developed as an individual-level strategy to encourage open dialogue between patients and HCPs about keeping feet well. The button, as depicted in Figure 1, was developed to target diabetic foot management by promoting discussion of foot health. Customized buttons have been used in health-care settings for decades as a cost-effective visual aid to promote handwashing and vaccination uptake.[28,29] Through word choice that supports open dialogue, it is hoped that the button will encourage engagement between HCPs and patients and enhance the application of the Wound Canada pathway. We hope the collective use of the button and the infographic will improve diabetic foot outcomes for patients, providers and health-care systems in NL.

During the planning stages of the practicum, the visual elements of the infographic were carefully deliberated to enhance visual simplicity, establish logical flow and promote effective communication of the health information depicted within the pathway.[20,25,26] In their book *Infographics: The Power of Storytelling*, Lankow et al. (2012) emphasized the importance of tailoring infographic design to achieve an optimal balance between appeal and clarity.[27] In keeping with the latest evidence on infographic design, the colour palette and language selected for the infographic were designed to parallel that of the Wounds Canada pathway.[24,26,27,30] A series of consultations were held with a local wound care nurse and an endocrinologist to review content and visual appeal and gauge the relevance and acceptability of the infographic among target audience members. Based on the feedback from the consultations and discussions with my supervisor, the infographic was revised to optimize clinical usefulness, readability, relevance and visual appeal among the target audience. The infographic is depicted in Figure 2.

The infographic was developed not only to convey the information depicted in the Wounds Canada Pathway but also to serve to connect providers to local resources and materials. For this reason, a quick response (QR) code was added to the infographic to connect providers directly to the latest Diabetes Canada Guidelines via their Smart Phones. According to a scoping review by Karia et al. (2019), the use of QR codes in health-care education is gaining momentum as a way to communicate information quickly and efficiently.[31]

Efforts were made to coordinate the customized button with the infographic. To enhance visual appeal, the custom button was outlined in blue with an image of feet depicted in the background of the button. The phrase "If you have diabetes, ask me about keeping your feet well" was included on the button with the words "ask

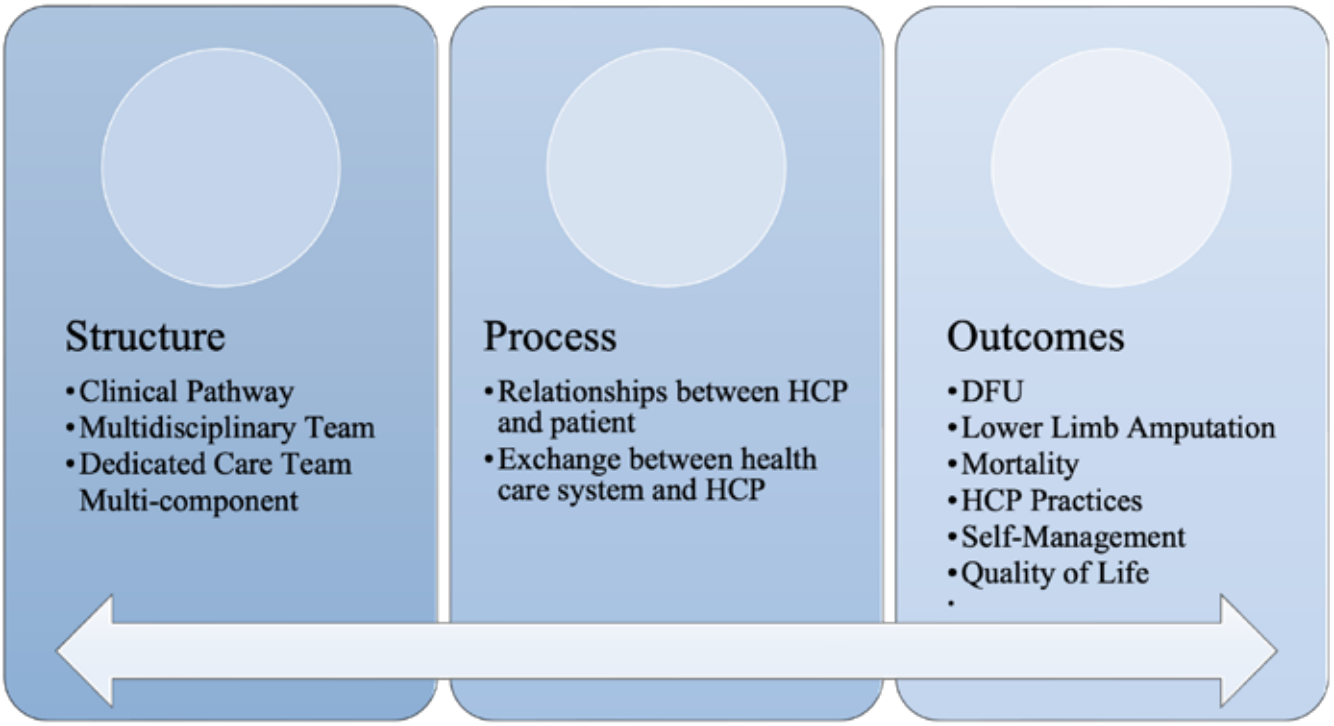


Figure 3: Donabedian Model of Care for the Diabetic Foot

me" in bold to emphasize the readiness of the provider to engage in discussion about the topic. Consistent with the infographic, a QR code was added to the button to provide quick access to Diabetes Canada patient information about foot self-care.

Overview of Next Steps: Now that evidence has been compiled and analyzed and the resource has been developed, the next step in the knowledge translation process involves establishing a working group and planning implementation and evaluation. Developing an implementation and evaluation plan that entails specific timelines and methods of assessing key indicators of success is critical to successfully integrating a knowledge translation initiative.[10,32] As a preliminary step in the implementation plan, copies of the resources were provided to former consultants for review and feedback. The feedback from the consultants, who included two wound care nurses, a nurse educator and a local endocrinologist, was incorporated into the final revisions of the resources. Now that a final version of each resource has been developed, approval will need to be obtained from appropriate decision-makers and stakeholders to promote implementation. To improve uptake of the resource, a virtual education session will need to be held for all HCPs to provide education about the resource before its distribution in clinical areas. Once implemented, ongoing evaluation will need to be initiated to determine the resource's acceptance, relevance and usefulness among the target audience. According to Harrison and Graham, ongoing support from key stakeholders, leaders and end users is instrumental to the success of a knowledge translation initiative.[10]

A tri-fold comprehensive evaluation includes assessing process, outcome and impact measures.[33] Evaluating process involves gauging the provider's perspective of the usefulness, acceptability and understanding of the content and intention of the initiative.[10] To evaluate outcome, it would be necessary to determine whether the resource has successfully achieved its intended purpose.[10] As the intended purpose is to support providers in applying the Wounds Canada pathway and improve screening and assessment of diabetic foot concerns, evaluating outcome measures would need to include assessing the HCP's perspectives regarding whether the resources

have supported their practice. In keeping with the process-outcome-impact nature of a comprehensive evaluation plan, evaluation of impact would need to measure indicators such as incidence and prevalence of LLAs, admissions to hospital for diabetic foot concerns and indicators of glycemic control such as Hemoglobin A1C. Based on the feedback from the evaluations, there may be a need to revise or expand the clinical resources to meet best the fluid needs of providers, patients and the health-care system.

To evaluate sustainability, ongoing assessment of barriers and drivers of implementation must be considered.[10] For this particular initiative, barriers that must be assessed include provider readiness, time and acceptance of the resources. Likewise, support for the initiative on an organizational level will need to be closely evaluated as it is a critical driver of success.

Conclusion

Newfoundland and Labrador is exceptionally burdened by diabetes and diabetic foot disease and needs a solution to address the problem. This article describes the development of a joint organizational and individual-level strategy to improve diabetic foot management in NL. An infographic was developed as a guide using the *Wounds Canada (2022) Foot Health Pathway for People Living with Diabetes*[7] in NL. A custom button was also developed as an individual-level strategy to encourage dialogue about foot care between patient and provider and enhance foot screening. The development of these clinical resources was informed by Knowles' Theory of Andragogy and the Donabedian Model of Quality of Care and is intended for use by providers to aid in the systematic prevention, screening, assessment and treatment of diabetic foot concerns. This resource is currently in the process of being implemented within the local regional health authority. Once implemented through an education initiative, ongoing evaluation of process, outcome and impact measures will be needed to promote sustainability and facilitate the successful integration of the resources.

Conflicts of interest

The authors declare there are no conflicts of interest.

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Diversity, Equity And Inclusion (DEI) In Wound Care: An Interview With Andrew Springer, Chair, Wounds Canada

By Andrew Springer BSc DCh DE WCC(c) FRSH, Christina Locmelis MA and Mariam Botros DCh DE IIWCC MEd

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Andrew Springer BSc DCh DE WCC© FRSH is the current Chair of Wounds Canada. Andrew is also Wounds Canada's first BIPOC (Black, Indigenous, and People of Colour) Chair. He has been a member of the organization since 2013, serving on the Board for approximately ten years.

In recognition of *Black History Month* in Canada in February of this year, we asked Andrew to reflect on his experiences and hopes for the future.

Wound Care Canada: In light of *Black History Month*, how do you see the role of Wounds Canada and similar organizations in promoting diversity, equity and inclusion (DEI) within the health-care sector, especially in skin health and foot care?

Andrew Springer: Talking about it and putting it at the forefront of practice and care, not only for health-care professionals, but for patients and caregivers is extremely important. Promoting DEI in the health-care sector is not only about promoting it in the health-care profession, but also includes advancing the awareness of it in patient care as well.

For example, we talk about the importance of early detection in wound care and how it is paramount to avoid more serious complications, but the early signs of a severe wound can appear differ-

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ently on different colour skin tones. Individuals on all sides of the care spectrum need to be aware of these differences in order to ensure optimal care. Research has also demonstrated that people of colour receive inferior care and have poorer outcomes when it comes to health care. In breast cancer, for example, there seems to be later diagnoses, more aggressive forms of cancer in black women, leading to poorer outcomes and higher mortality.[1] There are indications that this may also be true in the wound care world. It is my hope that Wounds Canada and like-minded organizations can promote research to not only shine a light on this inequity but propose and promote viable solutions, as lives are at stake. These trends are concerning and need to be examined, discussed and addressed so that they stop, or are at least are diminished.

"Talking about [Diversity, Equity & Inclusion] and putting it at the forefront of practice and care, not only for health-care professionals but for patients and caregivers is extremely important. Promoting DEI in the health-care sector is not only about promoting it in the health-care profession but also includes advancing the awareness of it in patient care as well."

Individuals and patients also need to be encouraged to be their own best advocate for their care, and health related organizations need to support individuals in this by developing tools and resources that best equip them to advocate for themselves. Opportunities and arenas need to be identified and/or created for patient voices to be heard when they feel they are not receiving the best care possible. Why? Because everyone deserves the best possible care.

Wound Care Canada: Considering the theme of *Black History Month 2024*, 'Black Excellence: A Heritage to Celebrate; Future to Build,' how do you envision the future of health care in Canada becoming more inclusive and representative of the BIPOC community?

Andrew Springer: Health care in Canada, like all specialized communities, i.e. education, law enforcement etc., reflects Canadian society. Black excellence exists in all these arenas. The issue is whether it is supported, is being allowed to thrive, is recognized, and whether achievements are celebrated – not just within the black community, but across the broader Canadian landscape.

In my lifetime I have seen, and experienced, prevalent trends move from blatant animosity and active undermining and inhibition to acceptance of black people in educational programs and in the workplace. It is time that the significant contributions of black professionals in health care are acknowledged. Those difficult conversations about inequities in health care must occur so that we can move forward into a future where professionals can offer their best, and all patients can receive the best care available.

These conversations can sometimes be awkward, but they are essential. These conversations can help illuminate unconscious biases that people do not realize they hold that are impacting their interactions with others. For health care in Canada to become more inclusive we first need to be willing to admit that it is not as inclusive as we would like to think. Then we need to find effective means of addressing existing inequities. Mandatory training in unconscious bias might be a great first step in encouraging these conversations and ensuring the best possible care for all.

Health-related organizations can also continue to provide opportunities for research and examination into the difference between practice and care for people of different races and ethnicities. One article that comes to mind touched upon why gender, race and ethnicity matter in wound care, specifically in limb preservation and was authored by my Wounds Canada Board colleagues Virginie Blanchette BSc MSc DPM PhD and Ahmed Kayssi MD MSc MPH FRCSC CWSP.

Within this paper, they highlight the concept and need for health equity; "Health equity aims to ensure no person is denied the possibility of good health as the result of belonging to a group that has historically been economically or socially disadvantaged." This article was published in Wounds

Canada's *Limb Preservation Journal* in 2022 and was a summary of the session they delivered previously at Wounds Canada's 2021 National Fall Conference the year before.[2] Further exploration, further discussion and action against these issues and disparities needs to be done.

Wound Care Canada: As a leader in the health care profession, what strategies do you believe are most effective for mentoring and supporting young BIPOC professionals entering the field of skin and foot care?

Andrew Springer: The reality is there are still many people that choose to focus on the colour of someone's skin and treat them differently because of it. We need to support and stand up for one another, not only those within the health care profession but those seeking the services of health-care professionals as well. All health-care professionals and patients need to understand and be aware of the barriers that others may encounter and to speak up when they witness or are faced with these barriers themselves. For health-care professionals specifically, business and professional networks within their community or province can be a great way to connect with others and support each other. It also gives them the opportunity to inform each other of what they have witnessed or experienced and strategize together on how to address these issues.

Wound Care Canada: How do you balance the importance of acknowledging and celebrating Black history and contributions in health care, while also working towards a future where racial and ethnic diversity is the norm rather than the exception in professional environments?

Andrew Springer: Racial and ethnic diversity in health care will become the norm only when the systemic and individual barriers are identified, spoken about and addressed. This requires a change in societal attitudes. As much as I have seen incredible movement in my lifetime, there is much still to do. In the interim, the celebration of Black history and contributions in health care is a start. It raises awareness and keeps the conversation going. In the meantime, the struggle continues.

Andrew Springer BSc DCh DE WCC(c) FRSH has been a practicing chiropodist since 1983. Andrew possesses a special interest in diabetes and related foot conditions, has a post graduate diploma in Diabetes Education and is in the final stages of completion of the Ontario Wound Care Champions Program. During his career he has been active in several professional activities, including serving as President of the Ontario Society of Chiropodists and the College of Chiropodists of Ontario. Andrew is the current Chair of Wounds Canada and has been a member of the organization since 2013. Andrew is also Wounds Canada's first BIPOC (Black, Indigenous and People of Colour) Chair and has served on the Board of Directors for approximately ten years.
Christina Locmelis MA is a communications and marketing specialist.
Mariam Botros DCh DE IIWCC MEd is Chief Executive Officer of Wounds Canada, a chiropodist and an educator.

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CASE REPORT

Maskwio'mi (Birch Bark Extract): A Case Study Exploring The Use Of A Traditional L'nu Medicine On Skin Conditions

By Lauren O'Donnell RN MN, Audrey Walsh PhD RN, Matthias Bierenstiel PhD, Claudette Taylor NP PhD and Janet L. Kuhnke RN BA BScN MSc NSWOC FCN DrPsychology*

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Introduction

According to the Canadian Dermatology Association (2024), more than 1 in 4 Canadians live with chronic skin conditions such as eczema, psoriasis, acne and atypical dermatitis.[1] There are many different treatment options, including prescription medications,[2] over-the-counter drugs, natural remedies and herbal folk medicines.[3,4] Folk medicines have a long history, and birch trees (genus betula) have shown great utility for treating skin conditions in societies of temperate and boreal climate zones[5,6] and have been listed in pharmacopoeias published in many different languages for several centuries.[7, 8] Each natural health product (NHP) is identified by species, part of species and processing method either under NHP or cosmetic regulation. Currently, there are more than 60 birch species known,[9] with different methods of obtaining birch extracts from various parts of these trees, including from the bark, root and leaves.[5] However, commonly used terms such as 'birch extract', 'birch oil' or 'birch bark oil' often complicate accurate assessments as the chemical composition, and thus medicinal modes of actions can vary greatly.[5] Despite the wealth of knowledge of birch extract treatments, understanding is not comprehensive as some traditional Indigenous folk medicines utilizing birch have been under-reported.

Maskwio'mi

Maskwio'mi (maskwi = birch, o'mi = gathering or oil) is such a traditional skin remedy from the L'nu (Mi'kmaq) people of Atlantic Canada that was almost forgotten.[10] Maskwio'mi is prepared traditionally by a pyrolytic process using a 'can-over-can' fire method with the outer bark of betula papyrifera, commonly known as paper birch.[10,11] The bark is thermally broken down in a low oxygen environment inside a metal container and a viscous oil (maskwio'mi) drips out at the bottom of a perforated container into a receptacle can. This oil is the concentrated form of the extract and subsequently co-formulated into creams or

soaps in concentrations of 1 wt% (weigh percentage) to 15 wt%. Stories of L'nu state that the traditional cream base was bear grease or goose fat. Maskwio'mi is a complex organic matrix consisting of over 200 chemical compounds. It is safe for topical treatment, due to trace amounts of cresols,[11] and has shown in vitro broad-spectrum antibiotic properties.[12]

The Maskwiomin™ company mimics the traditional fire method with a proprietary, electric extractor equipment producing the bark extract more consistently and in larger quantities. Maskwio'mi falls into the International Nomenclature Cosmetic Ingredient (INCI) category of betula papyrifera bark extract.[13] Maskwio'mi products are sold under the brand name Maskwiomin™ in Canada and the US under 'cosmetic' regulations, as there is no equivalent NHP entry.

Case studies in health research are significant as they provide evidence related to context and a medium for understanding the complexity of how, where and why interventions have their observed effects.[14] This case is part of a larger study and the first to document usage of maskwio'mi for skin conditions, with a goal of future in-depth clinical studies and hopes of recognizing it as an NHP.

Client/Patient Characteristics

MC is a 41-year-old male who reported living with skin issues for most of his life. MC received various diagnoses from physicians and dermatologists, including acne, seborrheic dermatitis and

eczema. MC described his skin as, "red, itchy, dry, and hot" (July 2023), affecting mostly his face and neck area. He also experienced "breakouts" on his torso (chest, back) and fingertips. His skin condition and symptoms were worsened by exposure to the sun. He was unable to use sunscreen as it triggered the skin symptoms and "set off a whole other set of skin issues" (August 2023). Further, MC described having patches of skin discolouration on his back and chest. A dermatologist diagnosed these spots as seborrheic dermatitis. MC described the dermatitis as presenting "differently on certain areas of his body." At times, "it would be red and flaky on the neck, face and eyelids but be darkened or lightened spots on my back and chest" (August 2023).

Data Collection

Data for this case study was collected with the permission of MC. He read and discussed the Letter of Information and granted his Informed Consent. MC engaged in two interviews for this case study report. In addition, he offered and provided photographic images of his skin health progression. Interviews were conducted via phone at MC's request and a non-directive approach to data collection was used. The interview started with a single open-ended question; "Can you share with me your experience of using maskwio'mi?". Additional questions or prompts were used at the end of the story to clarify incidents. The second interview was completed to provide MC with an opportunity to further clarify his statements and his progress regarding his use of maskwio'mi for his skin conditions. A case study emerged and is presented herein.

Examination/History

MC's earliest experience of consulting a physician for a skin condition was as a teenager (approximately 1997). At this time, MC was prescribed isotretinoin (Accutane™) which he referred to as, "the intense stuff", to treat acne. As an adult, he developed red rashes that were diagnosed by a dermatologist as eczema. MC was prescribed a variety of creams and ointments over the years. The most recent prescription from a dermatologist in 2020 was Protopic™/tacrolimus ointment 0.03% to be applied to his face twice daily. MC stated that this treatment never helped. Over the years with lack of skin improvements, MC tried multiple skin creams in an attempt to alleviate his skin conditions. If he had success, it was short-lived, only lasting a few days. He explained, "There is side effects [to the skin treatments] of dry skin. I felt like I could not win." (August 2023).

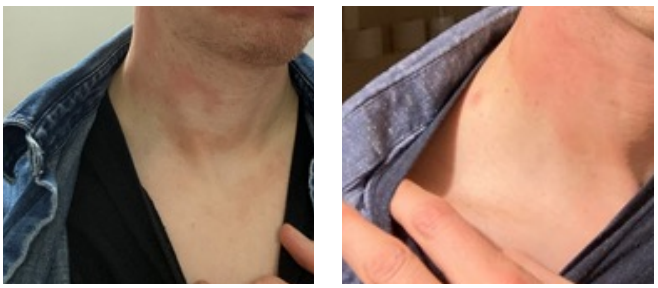

Figure 1: Red and itchy skin status before trialling Maskwiomin (May 2019 & Dec 2021).

MC had little success as his skin would only temporarily heal. He explained, "I tried a library of different creams, night creams, exfoliating cleansers in the past. Some would work for a little while then stop working." (July 2023). He further stated, "I had been seeing dermatologists my whole life and I was getting desperate and I was fed up." (July 2023). Figure 1 shows example of redness and soreness of skin of MC's lower neck. MC stated, "After years of trying different things [creams and ointments], I heard about Maskwiomin and haven't looked back." (March 2024).

MC shared his thoughts upon reviewing earlier images of his skin which display the persistent rash on his neck, face and right eyelid. He stated:

"It was crazy finding the before photo because it brought me back and it was a dark emotional time. It was all over my neck and there was a couple of weeks where I was very self-conscious, and I would try to hide my neck with clothing during interactions in public and in meetings. I would intentionally put my hands on my neck to hide the spots. It was tough to hide my skin, as this was before the pandemic and mask wearing. I was hyper-aware and self-conscious of my skin and was a little depressed over it. I felt like my

skin was just going to continue to get worse. It would start at my temples, spread to my eye and to my neck. I was really low emotionally, had low self-confidence and low self-esteem." (Aug 2023).

Use Of Maskwiomin For Skin Conditions

MC became aware of the usefulness of Maskwiomin for the treatment of skin conditions via a friend's recommendation. He ordered a sample pack containing birch bark extract ointment (extra strength), cream and soap.[15] MC states, "I started using the cream as a moisturizer and the concentrated stuff (ointment) for flare ups." (July 2023). He used the cream twice per day, in the morning and in the night, after washing his face with an over-the-counter skin cleanser. He described applying a very small amount of maskwio'mi ointment on the tip of his finger to the irritated skin areas. He also stopped using all other skin products to determine the benefit of Maskwiomin. MC shared: "The skin rash was the worst part on my face. It [Maskwiomin] cured it. It's gone. I have no red spots on my face now." (July 2023).

When asked how long it took to see an improvement, MC replied, "Two days after using it, I saw a difference." He continued, "As I am getting older, I have random skin tags or miscoloured patches on my skin. I had two strange patches of skin, and I tried it on those spots. It worked. The brown spots were gone and it isn't coming back!

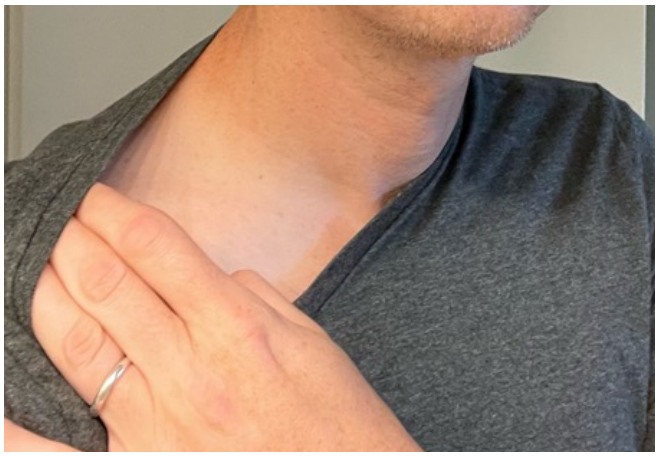

Figure 2: Eighteen months with much improved skin after treatment with Maskwiomin (August 2022).

It is now a cure all for my skin conditions. "(July 2023).

MC explained that he used the cream as a daily moisturizer for several months and then was able to stop when his skin was consistently clear. Provided photos show clear and irritation-free skin of the neck after using maskwio'mi (See Figure 2).

"Now I use the ointment for spot treatment when I have a flare up," he notes. "I experiment and when I see a dark spot. I will try it and see if it works and it usually does lighten it or clear it" (July 2023).

MC reported that the improvement in his skin condition had a positive effect on his self-esteem and self-confidence. He stated:

"The change in me is amazing. I don't think about my skin anymore. It is the first time in my entire life and now I think I take it for granted. Now I go weeks without using Maskwiomin but a few weeks ago, around my eye got dry and so I started putting it on as needed. I know it's going to work so I don't worry about it anymore. I feel like I now have normal skin problems. It is truly amazing. I definitely am feeling more confident now." (August 2023.)

Overall, MC reported an extreme improvement in his skin conditions. Another benefit he shared, "I've had one small ointment container for months and months because you only need to apply a small amount. Others should know that you only need to use a small amount" (July 2023).

Discussion

In two interviews and through images, MC shared his experiences with maskwio'mi for the treatment of chronic skin conditions that were diagnosed by a dermatologist as seborrheic dermatitis, eczema and acne. As he experienced skin problems for much of his life and was unsuccessful in finding an effective and sustainable treatment, he was encouraged to use maskwio'mi to clear his skin. He reported an extreme improvement in his skin conditions within a few days of trying the product. The redness, itching and dry skin was improved significantly following two days and completely healed within a couple

of months. Having clear skin, he identified an improvement in his self-esteem and self-confidence. As only a small (i.e., fingertip) application of ointment is needed for treatment, MC viewed this as another benefit to using the product, implying low cost of the treatment.

In March 2024, MC was asked, "Has your skin condition changed in its presentation or symptoms?" He responded, "It's honestly the best it's ever been. One of my oldest friends mentioned just last week how good my skin looked and I was over the moon."

At present, MC is no longer required to use Maskwiomin daily. He stated he now feels, "completely cleared up of all my long-standing skin issues...I haven't had even a hint of a flare up or red spot on my skin since treating it with Maskwiomin."

This case study is the first formal dissemination of the impact of maskwio'mi on skin issues and it is a part of a larger CIHR project to study this product. The project is led by Matthias Bierenstiel, a chemist, and Tuma Young, L'nu and ethnobotanist and lawyer, who 'rescued' the knowledge of maskwio'mi in the 1990s. The project is founded on *eptuaptmumk* (Two-eyed Seeing),[16] balancing science and Indigenous knowledge and working with the local L'nu community.

There have been numerous anecdotal stories about a variety of skin conditions, with people reporting that "maskwio'mi works." The research team is in the early stages of determining the exact mode of actions. We hypothesize that it is not one single chemical compound within the bark extract that is responsible for alleviating the variety of skin symptoms. Chemical analysis has shown that the extract contains over 200 chemical compounds.[11] We maintain that it is this multitude of pharmaceutically active compounds that generate the skin improvement. Essentially, we believe that there is a symphony of compounds working together to improve skin issues. We have found antibacterial properties in the extract[12] and have indication and preliminary in vitro results regarding anti-itch, anti-inflammatory and cell-growth promotion properties. It is this combination that is likely to assist with alleviating skin issues.

Skin conditions are highly complex and while one underlying condition causes irritation subsequent interactions will cause complications. For example, the skin may feel itchy and scratching the area creates a break in the skin, causing a secondary bacterial infection, inflammation and pain. Thus, a multitude of compounds in a topical cream can address these different symptoms and reduce their respective and different impacts, allowing for initiation and progression of the skin healing process. The extract is also highly hydrophobic and thus very lipophilic so that the pharmaceutically active compounds can readily penetrate the skin layers. This approach of multi-component treatments is in alignment with the L'nu view of holistic medicine and in contrast to the single compound treatment approach dominant in current medicine.

Bierenstiel and Young have been working with the local L'nu community to demonstrate and share this knowledge with L'nu members in an effort to keep these important traditions alive. However, making the maskwio'mi bark extract is laborious and there was a demand for the products. Bierenstiel and Young consulted with the local community of Membertou First Nation, Sydney, Nova Scotia and were given support to commercialize in an ethical way. This is how maskwio'mi products are now available in the market through the Maskwiomin company.

Clinical Implications

It is important to continue research into the use of traditional L'nu knowledge for skin conditions. This L'nu knowledge of maskwio'mi will be used towards future research related to the potential reformulation and commercialization of maskwio'mi for present day use as a natural healing ointment in the treatment of various skin conditions.

The team acknowledged that they need to develop a 'How to Use' tool for users. The tool will be used to increase knowledge related to how birch bark extract (in its various forms of soap and cream) is used by individuals, for what conditions and the general healing experience.

There is a need to enhance Indigenous community engagement to co-create knowledge.[16] This process will be guided by 'Two-eyed Seeing' as it is central to the whole of a co-learning journey. People familiar with both Western and Indigenous knowledge systems can share their knowledge of maskwio'mi use to augment treatment benefits.

Lessons learned have resulted in Maskwiomin adjusting the user directions to indicate use twice a day, or as needed, and to apply product to affected skin area.

Summary

This study is a part of a larger, five-year multiphase research project to explore the uses of maskwio'mi (birch bark extract) for the treatment of skin conditions. This case study was used to develop an in-depth understanding of a person's thoughts and actions in treating their skin conditions using Maskwiomin.[17,18] MC excitedly stated, "I finally found something that works!" (July 2023). It is suggested in the literature that birch bark is the first medical plant with a high potential to improve wound healing.[19] The participant in this case study identified birch bark extract as a successful treatment for his skin conditions, supporting the fact that the medicinal plant can be used for treating skin conditions. There is a need for further systematic approaches to gather knowledge of maskwio'mi use in treating skin conditions.

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Conflict of Interest

Tuma Young and Matthias Bierenstiel acknowledge a competing financial interest in Maskwiomin™, a company that produces and sells maskwio'mi skincare products. This company could potentially benefit from the findings of this research. All other authors declare there are no known competing financial interests.

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Steer Clear: Inadvertent Use Of Antimicrobials Can Cause Unintentional Harm To Wound Healing

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Introduction

Wound hygiene is considered the cornerstone of wound care.[1,2,3] In fact, it is only with an appropriate wound bed preparation that a wound is set up to heal in a timely manner. Effective management of bacterial balance depends on utilizing products that lower infection risks, foster an environment conducive to healing and prevent delays in the critical phases of wound healing, such as proliferation and remodelling.[3] While specific antimicrobial agents, such as iodine and iodine-releasing compounds, alcohol, hydrogen peroxide, acetic acid, hypochlorite and saline, have beneficial properties when used appropriately, their misuse can actually compromise wound healing and cause harm due to their adverse effects.[3] In this regard, many commonly used, easy-to-access, over-the-counter topical antimicrobials can cause unintentional harm, such as dryness of wound bed or cytotoxicity to new cells if used improperly.

Despite extensive literature detailing the proper use of antimicrobial products,[1,2,3] their misuse persists in clinical practice and community settings, underscoring the need for further education and guidance of individuals managing

wounds. As clinicians specialized in wound healing (first and third authors), we have observed prolonged misuse of antimicrobial products, such as iodine, to manage wounds, resulting in delayed healing and frustration among patients, families and health-care providers. Motivated by these observations, we hope to raise awareness of this issue and encourage health-care providers involved in wound care to assess and reassess product outcomes, making informed decisions based on their findings. Therefore, it is imperative to bridge this gap by reviewing the utilization of common antimicrobials in clinical practice and synthesizing evidence-based research and clinical guidelines and best practice recommendations. This review aims to determine the appropriate indications, concentrations, benefits, adverse effects, recommended duration of use and, ultimately, the ensure benefit over harm. By understanding the process of wound healing and carefully assessing and selecting the right product based on the specific characteristics of the wound bed and stages of the healing process, as well as the preferences and needs of individuals with wounds, clinicians can enhance the likelihood of achieving desired outcomes, thereby effectively supporting individuals along their healing journey.

Understanding The Dynamic Process Of Wound Healing

In general, the efficacy of wound healing depends largely on intrinsic and extrinsic factors concerning the cause, depth, healing process, time of occurrence, infection status and the individual's overall health.[4,5] For instance, an acute full-thickness burn covering 10% of the body's surface area in an otherwise healthy person will heal very differently than a diabetic foot ulcer. However, regardless of the etiology, wound healing occurs in four distinct yet overlapping phases, including hemostasis, inflammation, proliferation and remodelling.[5]

Immediately following an injury, damaged blood vessels constrict to reduce bleeding and hemostasis begins. Platelets begin aggregating at the injury site to form a clot, which creates a temporary barrier and helps stop bleeding, leading to the inflammation phase, where neutrophils and macrophages migrate to the wound site to remove bacteria, debris and damaged tissue. Concurrently, inflammatory mediators, such as pro-inflammatory cytokines and chemokines, are released to promote the recruitment of additional immune cells, while growth factors are released to stimulate the growth and deposition of the extracellular matrix (ECM).[4,5] The proliferation phase is characterized by the turnover of the ECM, the

formation of new tissue to replace the damaged tissue, and the production of collagen by fibroblasts, which provides structure to the wound and plays a vital role in this phase. New blood vessels are formed to supply oxygen and nutrients to the healing tissue and epithelial cells and then multiply to cover the wound surface via re-epithelialization, also known as the remodelling or maturation phase. In the remodelling phase, the newly formed tissue undergoes structural and functional changes, which progress into maturation—the development of newly formed tissue.[5] At this point, collagen fibres are reorganized and strengthened (collagen synthesis) and excess scar tissue is gradually broken down (degradation), making the wound stronger and more resistant to injury.[4,5]

To effectively determine the appropriate treatment for wounds, clinicians must grasp the dynamic nature of wound healing and recognize what phase the wound is in. It is crucial to comprehend the various factors influencing wound healing, including age, nutrition, environmental conditions and underlying diseases. Antimicrobial agents are crucial for preparing the wound bed, helping it move from the inflammatory phase to the later stages of healing. However, misuse of certain antimicrobial agents—either through inadequate dilution or prolonged use—can impede wound healing by exerting cytotoxic effects on fibroblasts, responsible for collagen synthesis.

Health-care providers involved in wound care must discern the optimal timing for initiating and discontinuing antimicrobial therapy, remembering that antimicrobials alone are insufficient treatment options. Therefore, conducting a comprehensive wound assessment is paramount to identifying the wound phase and any hindering factors, whether wound-related or patient-related. As clinicians continually assess patients and the wound bed, they can determine phase-specific treatments accordingly. As advocated by Sibbald and colleagues,[6] a holistic approach encompasses understanding the wound's etiology, addressing patient-centred concerns, evaluating wound healability, ensuring adequate blood supply and moisture balance, performing wound debridement and assessing for local or systemic infection.[6] It is important to note that wounds generally heal better in a moist environment, yet certain antimicrobials, such as iodine, tend to dry out wounds, thereby delaying healing.[3] Therefore, clinicians should exercise caution when selecting antimicrobial agents to avoid exacerbating this issue. Treatment should be reevaluated and potentially modified if a wound fails to demonstrate healing despite consistent assessments.

Assessing And Selecting Wound Cleansing And Antimicrobial Agents

Each wound cleanser and antimicrobial serve distinct purposes, contributing to wound healing when used correctly. However, misuse can exacerbate wound conditions, leading to increased wound size, delayed healing, heightened infection risks (both local and systemic) and prolonged discomfort for the individual. Thus, prior to selecting a cleansing solution or antimicrobial, it is imperative to assess the wound for signs of infection, both locally and systemically, as well as determine the current healing phase of the wound.[7]

Local infection is discernible through the presence of three or more NERDS criteria (Nonhealing, Exudate increase, Red friable granulation, Debris or dead cells and Smell).[6] The presence of local infection requires the use of topical antimicrobials according to product recommendations and directions for use. Conversely, evidence of deep and surrounding infection can be indicated by the STONEES criteria, which encompass increased Size, elevated Temperature (exceeding three degrees Fahrenheit comparing affected and unaffected locations such as both feet – mirror image), New or satellite areas of involvement, surrounding cellulitis (Erythema or Edema), probing to bone, increased Exudate and Smell.[6] The presence of four out of seven STONEES criteria signifies systemic infection and may warrant systemic antimicrobial intervention.[6]

Before initiating or continuing any cleansing solutions or antimicrobials, wound care professionals should employ the aforementioned criteria to evaluate treatment efficacy. Monitoring

the wound's healing rate is crucial; if there is less than a 20-40 percent reduction in wound size by week four, complete healing by week 12 becomes unlikely and necessitates reevaluation.[4,5] Various underlying factors, both local and systemic, can delay wound healing, including excessive inflammation, moisture loss, wound microbiome, hormonal imbalance, cytokines, growth factors, age, circulation and nutritional status.[4,5] Neglecting these criteria, risks inadvertent harm to the wound and undermines effective treatment outcomes.

Below, we provide an overview of the antimicrobial agents that are most commonly used, due to their over-the-counter accessibility, which often leads to misuse or overuse. Antimicrobial agents such as chlorhexidine (CHG) and polyhexamethylene biguanide (PHMB) are not covered in this paper, as they do not meet the inclusion criteria of being widely accessible over-the-counter by the community.

Iodine and iodine-releasing compounds:
Povidone-iodine in solution is one of the most commonly used antimicrobials due, in part, to its relatively low levels of cytotoxic effects when compared to other antimicrobials. Although its bactericidal efficacy is also proportionally lower,[3,8] iodine can inhibit excessive protease levels in chronic non-healing wounds, thereby facilitating a faster wound-healing process.[3,9] Lodosorb (Cadexomer iodine) contains a modified starch matrix that absorbs moisture up to six times its weight. As the lattice swells, the size of its micropores expands, facilitating the steady release of iodine that reduces exudate, pus/debris, slough, bioburden and infection.[8,10] Research indicates that Iodosorb is ideal for chronic and infected wounds because of the slow iodine release, ease of application, lack of toxicity and antibacterial properties.[8-12] It also retains antibacterial properties against common chronic open-wound pathogens, such as *Pseudomonas spp*. and MRSA.[8]

The safety profile of iodine is well established, yet it becomes harmful when used in concentrations at or above 5% or for prolonged periods. Iodine can impair wound healing due to its cytotoxic effects on chondrocytes, which are important for cartilage regeneration and fibroblasts, the cells responsible for collagen production.[3] Furthermore, studies have demonstrated that diluted povidone-iodine can have deleterious effects on articular cartilage and can interact with other antimicrobials to form toxic byproducts.[3,8,13] Although iodoform has been used to prevent or manage wound infection for almost two centuries, currently there are more effective and non-toxic options for this purpose.

In our clinical experience, it is not uncommon to encounter patients with chronic wounds where non-specialized wound care providers have applied iodine directly during dressing changes for extended periods.

For example, HB, a lady who had a venous leg ulcer (VLU) for over six years, reported that the wound never completely healed and that iodine was the main solution being applied to their wound in the community setting. Figure 1, taken during the initial assessment on July 24, 2023, depicts iodine adhered to the wound bed. This is a typical situation where iodine was being used longer than the product recommendation and the care plan was not being adapted according to wound assessment. After discontinuing iodine and starting treatment according to best practice (e.g., compression therapy), this wound progressed to the proliferation and remodelling phases (Figure 2).

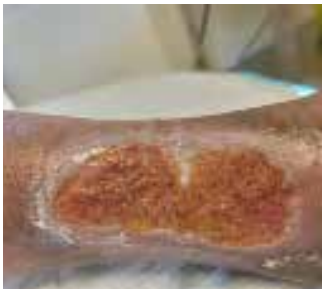

Figure 1

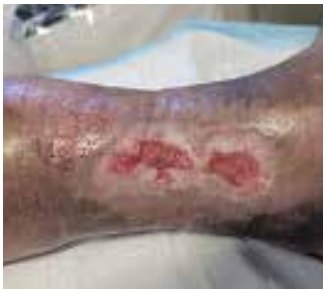

Figure 2

Considering the drawbacks highlighted in the literature and our own observation of iodine's tendency to dry out the wound bed and impede wound healing, we recommend a cautious approach to its usage. Limiting its application to short durations, such as two weeks, is advisable to

disrupt the bacterial biofilm and mitigate the risk of potential harm and delays in wound closure.

Alcohol: Alcohol, like ethanol or isopropyl alcohol, is frequently utilized for its cost-effectiveness and ability to eliminate both gram-positive and gram-negative bacteria, including *Mycobacterium tuberculosis*, various fungi and certain enveloped viruses.[3,13] However, despite its widespread use in wound care, alcohol has potentially cytotoxic effects on fibroblasts and inflammatory mediators, as well as a tendency to hinder wound closure via dehydration of tissue.[3,13] Additionally, prolonged exposure to alcohol can impede the formation of new blood vessels crucial for delivering oxygen and nutrients to healing tissue.[14] Considering the disadvantage of alcohol on open wounds, its recommendation should be restricted to intact skin and not open wounds. Healthcare providers should choose antimicrobials that favour wound healing and lead to wound closure as quickly as possible by assessing the wound bed to determine the appropriate treatment.

Hydrogen Peroxide: Hydrogen peroxide has been widely, and historically, used as a disinfectant and antimicrobial due to its ability to generate reactive oxygen species that kill anaerobic bacteria.[3] Mounting evidence suggests that hydrogen peroxide can prolong inflammation, angiogenesis and cell migration in concentrations below 0.5% and in exposure for less than five minutes.[15,16] At concentrations above 0.5%, or exposure greater than five minutes, however, it can impair wound healing through oxidative damage to tissues, causing cell membrane damage, protein denaturation, DNA damage and inflammation, and by inhibiting the migration and proliferation of fibroblasts and keratinocytes.[3] Additionally, hydrogen peroxide can impair the function of phagocytic cells, such as macrophages, which play a crucial role in clearing debris and promoting tissue repair. Indeed, as is common with topical antimicrobials, the extent of tissue damage depends largely on the concentration and duration of exposure.

As with many topical antimicrobials, the extent of tissue damage caused by hydrogen peroxide largely depends on the concentration and duration of exposure. Consequently, health--care providers should carefully reconsider its use in wound treatment, as the risks may outweigh the benefits for wound healing. Equally important is the need for comprehensive education initiatives targeting individuals and families who may be unaware of the potential drawbacks of hydrogen peroxide. Given its widespread availability over the counter, educating the public about its disadvantages is essential to prevent its inappropriate use and mitigate potential harm in the wound healing processes.

Acetic Acid: Acetic acid, commonly known as 'vinegar', is sometimes used as an antimicrobial agent in wound management. However, limited evidence exists supporting its efficacy across various wound types, with a substantial body of research indicating its cytotoxic effects on key wound-healing cells—particularly fibroblasts and keratinocytes.[3] Studies have demonstrated that concentrations of acetic acid exceeding 0.0025% can impair wound healing by impeding essential processes such as cell migration and proliferation, which are vital for achieving wound closure and re-epithelialization.[3,12,17] Prolonged exposure to acetic acid has been associated with delayed wound healing due to its disruptive effects on the normal inflammatory and proliferative phases of wound repair.[3,17]

Of particular note, the acidic nature of acetic

acid can exacerbate wound bed conditions if not properly diluted, potentially leading to further delays in healing.[12] Furthermore, overuse of acetic acid may result in initial discomfort, manifesting as burning sensations, and can progress to tissue damage over time.[12,17] Therefore, its application should be judiciously assessed for each wound, optimizing healing outcomes through expert evaluation and tailored treatment approaches.

Sodium Hypochlorite (Dakin's Solution): Sodium hypochlorite (popularly known as 'bleach') is a potent oxidizing agent that reduces bacterial bioburden within wounds while maintaining a relatively low toxicity profile.[3] Its efficacy lies primarily in its ability to eradicate bacteria, biofilms (such as those produced by *Pseudomonas spp*.), fungi and viruses.[3] It is also often employed as an irrigant to eliminate debris and contaminants from wound beds.

Although diluted hypochlorite has a good safety profile, it is crucial to exercise caution due to its cytotoxic effects on cells during the proliferation phase of wound healing. At concentrations above 0.005%,[12,18] or for prolonged periods, this cytotoxicity manifests as inhibition of fibroblast proliferation and collagen synthesis, ultimately impairing wound closure and tissue remodelling.[3] Consequently, while hypochlorite effectively eradicates pathogens, its potentially detrimental impact on wound healing underscores the importance of strategic application. Indeed, it is most effective when used during the active stage of infection,[12] rather than as a routine cleansing agent. Thus, its application should be carefully guided by the specific needs and stage of wound management to optimize therapeutic outcomes and because household bleach can cause significant tissue damage and delay healing, it should altogether be avoided for wound care.[3,12]

Saline: Saline is a fundamental tool in wound management, facilitating the cleansing and irrigation of wounds to create an optimal environment for healing. Its primary role lies in the effective removal of debris, exudate and bacteria from the wound site, thereby promoting a conducive milieu for tissue repair.[3] In addition, its biocompatibility enhances its utility, ensuring minimal risk of adverse reactions during irrigation and fostering patient comfort and safety. Moreover, saline's ability to maintain a moist wound environment is integral to supporting the natural healing process. This moist environment facilitates cell migration, proliferation and tissue regeneration, contributing to expedited wound closure and repair.[3] The mechanical action of saline in dislodging contaminants from the wound surface further augments its effectiveness, aiding in the removal of foreign materials and promoting wound cleanliness.

It is important to note that saline solution does not possess direct antimicrobial properties, limiting its ability to eradicate bacteria present in wounds.[3] Indeed, compared to specialized wound cleaning agents, saline may exhibit reduced efficacy in removing tenacious debris or biofilms from chronic or complex wounds.[19] Furthermore, improper handling or storage of saline solutions can introduce contamination, posing risks of secondary infection at the wound site.[20] Of course, the recommendation is to follow facility protocol first. When in doubt, consider 0.9% saline as a soak for no more than 10-15 minutes at a time.[20] When used to irrigate, apply pressure between 8 and 15 psi,[12] according to the wound treatment protocol.

Unfortunately, it is not uncommon in our practice to encounter cases where individuals have been advised by health-care providers to soak their wounds in saline for prolonged periods. Unfortunately, following well-meaning but incorrect advice can have serious outcomes. For instance, the first author encountered a case (See Figure 3) where a person with a diabetes who had an amputation of the left Hallux was advised by a non-specialist to soak his open wound in a saltwater solution. The patient diligently followed this advice for several months, during which time—regrettably—their bone began to decalcify and soften. The patient later observed a fragment of bone protruding from the wound, a distressing situation he reported to the first author. Fortunately, after being seen by the

Table 1 provides a concise summary of common antimicrobial agents, including their names, indications, benefits, adverse effects, and recommended concentrations and duration. This resource aims to assist health-care professionals in selecting the most appropriate antimicrobial agent for wound management, taking into account specific patient needs, wound characteristics and clinical guidelines and best practice recommendations. By referring to this table, clinicians can quickly access essential information to make informed decisions regarding antimicrobial therapy, optimizing patient care and promoting effective wound healing strategies.

Product	Common Names	Indication	Benefits	Adverse Effects	Optimal Concentration And duration
Iodine	• Povidone-Iodine • Inadine • PVP-I • Iodosorb	• Bite, stab, puncture and gunshot wounds[22] • Chronic open wounds[6] • Used only to clean to reduce bacterial load[6]	• Improves wound healing[3] • Stimulates epidermal regeneration[9] • Effective against *Pseudomonas spp*. and MRSA[9] • Can disrupt biofilms[9]	• In high concentrations, may interfere with the proliferation phase of healing by inhibiting fibroblast migration and collagen synthesis[3,13] • Should be used with caution in infants under six months and those with thyroid disorders, deep ulcerative wounds, burns or large injuries[26] • It is a potent allergen and is incompatible with silver nitrate, metallic salts, strong oxidizers and strong bases	• ≤5% [22,23] • Short period of time (e.g., 2 weeks)
Alcohol	• Ethanol • Isopropyl • Isopropanol • n-propanol	• Avoid in open wounds • Uncertainty in the estimates of benefits, risks and burden[3]	• Reduces bacterial burden[3]	• Interferes with the proliferative phase of healing • Impairs early inflammatory response • Inhibits wound closure, angiogenesis and collagen production • Alters protease balance • Causes tissue dehydration[13]	• 60% to 90%[3,15] • Short period on intact skin
Hydrogen Peroxide	• Peroxide	• Avoid applying after crust separation[15] • Use only as a cleanser to detach dry debris	• Reduces bacterial burden and debrides wounds[3] • Stimulates inflammation, angiogenesis and cell migration[15]	• At high concentrations, destroys fibroblasts, keratinocytes, platelets[3,13]	• 0.5% for <5 mins[16] • Short period of time
Acetic Acid Derivatives	• Acetate • Vinegar	• Paronychia • Moistened gauze dressings with acetic acid[12] • Not indicated as continuous treatment option • Wound irrigation[23]	• Reduces bacterial burden[3]	• In high concentrations, may inhibit keratinocytes, fibroblast migration and collagen synthesis • May decrease moisture in the wound bed[3,7]	• 0.0025%[12] • Short period of time
Hypochlorite	• Sodium Hypochlorite • Dakins Solution • Bleach	• Most effective during the active stage of infection[12] • Contaminated acute and chronic wounds[22] • Should not be used on or packed in clean wounds[26]	• Reduces bacterial burden[3,18]	• In high concentrations, may inhibit fibroblast migration and collagen synthesis[12,21,24-26]	• 0.005%[12,25,26] • Short period of time
Normal Saline	• Saline • Salt Water • Sterile Salt Water	• Paronychia • Improves local fluid balance • Not indicated to soak wounds for long periods of time • Recommended as a cleanser, but not as first-line antimicrobial option	• Removes exudate below the visible wound bed[19] • Mechanical removal of pathogens and debris when used as an irrigant[18]	• Alters local fluid balance • Limited bactericidal efficacy[25]	• 0.9% • As a soak, 10-15 mins[20] • As an irrigant, between 8 and 15 ps[i12]

first author, a wound specialist, who advised the patient to discontinue soaking the wound with salted water and adjusted treatment according to evidence-based practice, the wound healed completely (See Figure 4). Complications of prolonged wound soaking or continuous irrigation include visibly damaged bone, potential bacterial seeding into the bone marrow and delayed healing.[21] Additionally, high-pressure lavage may inadvertently push surface contaminants into the mucosal epithelium, further complicating the wound healing process.[21]

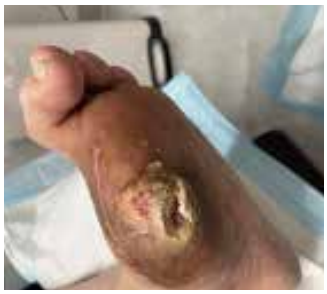

Figure 3
Before - Open wound with maceration due to soaking it with salted water.

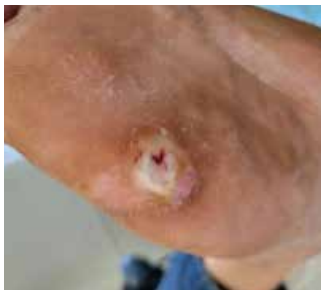

Figure 4
After adjusting treatment leading wound to close.

It is crucial to emphasize the importance of using the listed antimicrobial agents as intended and adhering to the recommendations provided by the product developer. However, it is equally essential to exercise clinical judgment and expertise or consult with a wound care specialist to evaluate individual cases and consider alternative treatment options aligned with clinical guidelines and best practice recommendations.

Caution: Discontinue The Overuse/ Misuse Of Antimicrobial Agents

In summary, overuse or misuse of topical antimicrobials can hinder wound healing progress, making them detrimental to the process of wound healing. Therefore, their application in wound care should be reserved for cases where there is a clear indication, such as the presence or high risk of infection. However, they should never be used routinely or without a specified treatment duration. When signs of infection are present, topical antimicrobials may be necessary to control bacterial growth. It is crucial to consider the long-term health of the tissue and select antimicrobial agents that support tissue viability, especially in patients with compromised immune systems or underlying health conditions, such as those with surgical wounds or traumatic injuries. For chronic or non-healing wounds, or those susceptible to biofilm formation, topical antimicrobials can be useful for managing bacterial load and disrupting biofilm structure. Nonetheless, they should not be relied upon as the sole treatment for wound healing, particularly when more effective options are available. Overall, the decision to use topical antimicrobials should be based on a comprehensive assessment of the wound, taking into account risk factors for infection (using NERDS and STONEES criteria), and following wound-specific and facility-specific protocols to ensure appropriate and efficient wound management.[27]

Closing The Gap: Advancing Clinical Practice Through Evidence-Based Research

Because health-care practices and guidelines evolve over time based on new research and changing health-care needs, it is crucial for health-care professionals to stay current with the latest evidence and best practice recommendations in their field. This may involve attending continuing education courses, participating in professional development activities and actively seeking out new research findings related to the specialized field. Involving the individuals in their own care is crucial to ensuring positive outcomes.[28] It is important to use a patient-provider collaborative approach that considers individual needs and preferences and values their expertise in what is working for their wound and what is not. [29] For instance, if an individual with a wound states that they are using a product on their wound, but it is not showing results, the health-care provider should consider making changes to the treatment plan.

As articulated by Sibbald and colleagues,[27]

tailoring wound care plans to meet individual needs necessitates sensitivity to various factors, including socioeconomic status, cultural background, psychosocial dynamics and other personal aspects. A model proposed by Keller and colleagues,[27,30] emphasizes the importance of enhancing patient communication by incorporating the four 'Es' during every patient interaction: Engaging, Empathizing, Educating and, perhaps most importantly, Enlisting them in their care. Furthermore, the importance of advocating for the availability of the right products and the correct use—and intent—of the products to nursing managers cannot be overemphasized. Nursing managers play a key role in ensuring health-care facilities have access to the appropriate products and resources to deliver quality patient care. Wound care specialists should advocate for the availability of evidence-based wound care products and educate their colleagues about the importance of their proper usage.[3,27] This advocacy may involve disseminating information on the latest research findings, sharing best practice recommendations and highlighting the potential risks associated with the misuse and/or overuse of certain products. By advocating for the correct use of wound care products, wound care specialists can contribute to positive outcomes for individuals and mitigate the risk of complications arising from improper product usage.

Conclusions

In conclusion, while commonly used topical antimicrobials in wound care offer beneficial properties when appropriately applied, caution is warranted due to limited evidence regarding their clinical effects on wound healing and potential cytotoxicity controversies. To prevent misuse of antimicrobial solutions that may be harmful for fibroblast, best practices recommend their use only when there is a high bacterial load. However, once the deep infection is controlled, these solutions should be discontinued and moist interactive dressing instituted to promote healing and optimal wound bed preparation.[6,31] Therefore, understanding their mechanisms of action, correct application, potential adverse effects and appropriate indications is crucial to ensure careful use and optimize best therapeutic outcomes. Each antimicrobial has its role in wound bed preparation, but extra vigilance is necessary to prevent inadvertent harm. Therefore, institutional policies should prioritize evidence-based practices, benefits and patient outcomes over cost considerations. By embracing evidence-based approaches, institutions and wound care specialists can elevate the quality of wound care, enhance patient safety, minimize risks and improve patient outcomes. Fostering research, collaboration and knowledge-sharing is essential to advance wound care practices and meet the evolving needs of individuals with wounds.

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Preventing And Managing Pressure Injuries: An Evidence-Based Approach To Optimizing Patient Outcomes

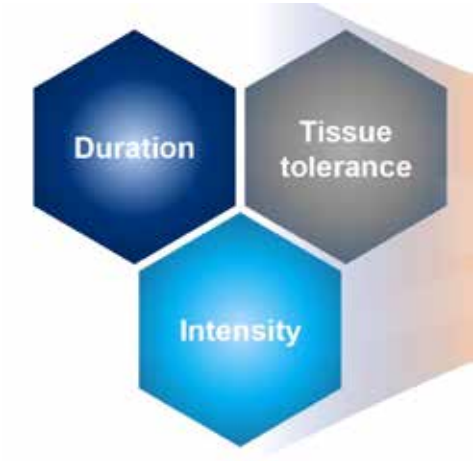
Presenter: Kersten Reider MSN AGPNP-C CWOCN CFCN

The Burden Of Pressure Injuries

Pressure injury (PI) is localized damage to the skin and/or underlying soft tissue over a bony prominence or related to a medical or other devices. PIs can present as intact skin or open wound and can be painful. They may also become infected and negatively affect a patient's quality of life. PIs are costly to the health-care system as well. In the US, management of PIs costs the government approximately $9.1-11.6 billion USD per year. The cost of individual patient care is approximately $21,000-152,000 USD per PI.[1]

The Pressure Injury Triad

There are three main factors that contribute to the development of PIs: the duration of pressure, the intensity of pressure and the patient's tissue tolerance. These contributory factors are interrelated. Low-intensity forces over a long period of time can cause as much tissue damage as high-intensity forces over a short period of time. Tissue tolerance is an important factor clinicians must consider in the prevention and management of PIs. Tissue tolerance is the condition and integrity of skin and supporting structures that can influence the skin's ability to redistribute pressure. Once the skin becomes 'sensitized' by sustained pressure, lower pressure to the same area for a shorter period of time may cause skin breakdown. This is especially important for patients who are bed-bound for extended periods of time and those with fragile skin (e.g., geriatric patients). It only takes seconds to minutes and several hours of sustained pressure to cause cell deformation and impaired tissue perfusion, respectively.



The Challenges Of Skin Microclimate

The skin microclimate can affect tissue tolerance. Local skin microclimate includes skin temperature, humidity and airflow. An imbalance of these factors can cause over- or under-hydration of the skin, predisposing it to the development of PIs. Skin that is underhydrated (i.e., dry) is prone to mechanical damages and inflammation due to increased epidermal structural stiffness. Skin that is overhydrated (i.e., too wet) can lead to softening, increased permeability and decreased barrier function. Increased local skin temperature causes an increase in blood flow and sweat gland activity. This in turn increases the local humidity and tissue oxygen demand. It also increases adjacent stiffness of the skin and causes the loss of dermo-epidermal adhesion, predisposing the skin to injuries. Other sources of humidity contributing to PIs include incontinence, wound exudate, occlusive clothing, sweating, transepidermal water loss and body worn products.[2,3]

The (Continued) Evolution Of Pressure Injury Prevention Initiatives

There is a continual effort to develop and improve PI prevention strategies. PI prevention initiatives include, but are not limited to, support surfaces, repositioning strategies, transfer aids and nutrition and hydration assessments. Interactive dressings have also been used for the prevention of PIs. An ideal dressing should have:[4]

- An outer surface made of low friction material
- A low friction coefficient
- Reduced friction forces transmitted to the patient's skin
- Adequate adhesion
- Absorption to alter microclimate
- Soft interface structures with adequate mechanical absorption capacities.

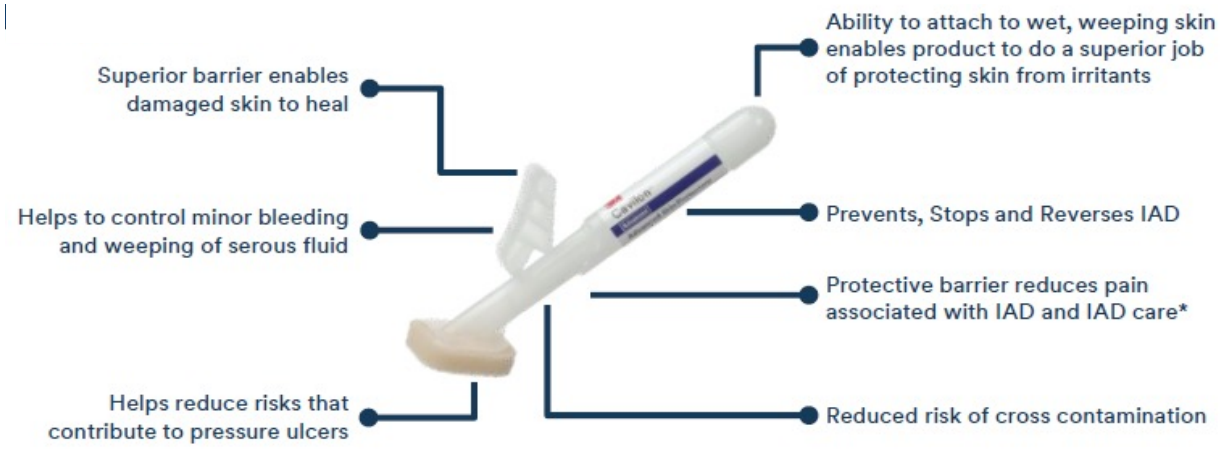
Traditionally, hydrocolloid, polyurethane foam, transparent film and hydrocellular foam dressings have been used for the prevention of PIs.[5] However, the incidence of PIs remained quite high (up to 60%) with the use of these dressings.[4] In the early 2010s, the development and use of silicone foam for the prevention of PIs significantly reduced the incidence of PIs.[4]

The Benefits of Silicone Foams for the Prevention of PIs:[6]

- Low surface tension
- Consistent adhesive strength
- Conforms quickly
- Can be repositioned
- Does not cause traumatic removal of skin cells.

Solventum™ Solutions For The Prevention And Management Of Pressure Injuries

The 3M™ Cavilon™ No Sting Barrier Film can help control the skin microclimate. Cavilon™ Barrier Film can protect intact or damaged skin from body fluids, adhesives and friction. It has non-cytotoxic and has low dermatitis



*Cavilon Advanced Skin Protectant is not an analgesic.

potential. It is ideal for routine skin protection and prevention of PI development.

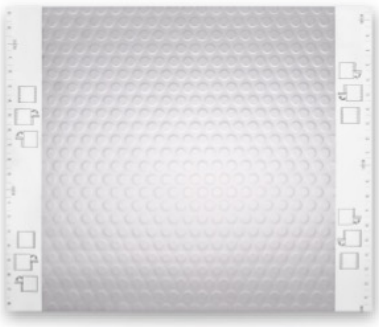
The 3M™ Cavilon™ Advanced Skin Protectant is a superior barrier dressing that can protect at-risk skin and enable damaged skin to heal. Incontinence associated dermatitis (IAD) and intertriginous dermatitis (ITD) can cause moisture associated skin damaged (MASD), predisposing patients to PIs. The Cavilon™ Advanced Skin Protectant prevents, stops, and reverses incontinence-associated dermatitis (IAD) and thus, prevents the development of PIs.

Negative pressure wound therapy (NPWT) is a useful modality for the management of PIs. The 3M™ Veraflo™ Therapy combines NPWT with topical wound solution instillation and removal. Veraflo™ can aid wound healing by:

- Cleansing the wound through instillation (with a topical wound cleanser)
- Softening, loosening and removing wound debris
- Managing bacterial bioburden through contained and controlled wound cleansing
- Promoting granulation tissue formation and perfusion.

The 3M™ Veraflo™ Cleanse Choice™ Dressing can be used in conjunction with the Veraflo™ Therapy. This dressing has a unique-constructed three-layer design to facilitate the removal of thick exudate material. It can provide immediate wound cleansing and is ideal for when surgical debridement is delayed or not possible or appropriate.

The 3M™ V.A.C. Dermatac™ Drape is a silicone-acrylic hybrid drape that improves on and replaces traditional methods of NPWT draping. The Dermatac™ drape has a single-release liner and reduces the need to 'windowpane' around the wound. This also reduces the amount of 'arts and crafts' (e.g., cutting) required for busy clinicians. The acrylic 'circles' of the drape ensures a tight seal around the wound; the silicone allows for non-traumatic removal and initial repositioning when necessary.



Kersten Reider MSN AGPNP-C CWOCN CFCN has been a nurse for 17 years. Reider has worked as a Certified Wound, Ostomy, Continence nurse (CWOCN) serving as an in-patient specialist for a licensed 700 + bed Level I Trauma Centre in West Reading, Pennsylvania for 12 years. She focused on the care of surgical patients with an interest in nursing and physician education along with fistula management and negative pressure wound therapy. She recently took a role as a nurse practitioner in a private practice performing primary care as well as running an outpatient wound and ostomy clinic.

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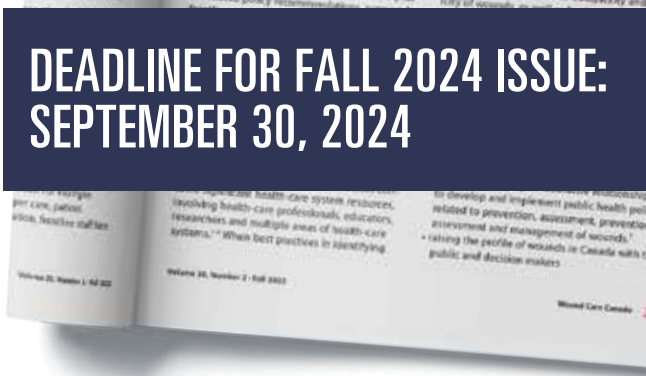

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It's Time For Evidence-based Wound Care Education For All: Excellence In Skin Health And Wound Management Education

Welcome To The Wounds Canada Institute

Health-care providers across all specialties and levels of education need to remain up-to-date on the latest best practices, research and tools in the field to ensure optimum patient care and recovery.

The Wounds Canada Institute provides an ideal space for these essential professionals to obtain flexible, interprofessional education to meet their continuous educational goals and help advance their careers. The Institute delivers learning opportunities for the full spectrum of health-care providers, both regulated and unregulated, including: hands-on skills labs, synchronous webinars and online courses. The programs are specifically tailored to the industry health-care providers' practice in they accommodate learners who prefer to learn at their own speed. Following are the programs currently offered at the Institute.

Skin Health Program For Personal Care Providers

The *Skin Health Program for Personal Care Providers* is a groundbreaking initiative in skin health education from Wounds Canada and the Registered Nurses' Association of Ontario (RNAO) that was first introduced in 2023, based on a previous partnership between the two organizations. The focus of this new program is supporting unregulated health-care professionals to tackle skin health and wound prevention. Wounds Canada aims to train a sizable number of these crucial frontline workers in 2024. As a bonus, the Ontario Ministry of Health provided support and funding to ensure that 200 personal care providers who work in

Ontario in the home and community care sector were eligible for free registration in this program this year.

Wound Care For Community-Based Paramedics Program

The *Wound Care for Community-Based Paramedics Program* aims to give participants the fundamental abilities and information needed to succeed in wound management in community settings, especially wound assessment, infection diagnosis and treatment strategies. The program consists of a well-rounded online and in-person curriculum that strongly emphasizes the learners' capacity to assess wounds in diverse patient demographics, and successfully communicate their assessment to the necessary health-care team members.

The next opportunity to take part in the *Wound Care for Community-Based Paramedics Program* will be on October 17th, 2024 at the RBC Place in London, ON. The program is offered through the Wounds Canada Institute parallel to the first day of the 2024 Wounds Canada National Hybrid Conference.

To learn more and to register for this program please click here.

Skin Health Advocate And Resource Professional (SHARP) Program

Based on the most current available research and guidelines found in *Wounds Canada's Foundations of Best Practice for Skin and Wound Management* documents, this self-paced yet extensive program aims to improve health-care clinicians' competencies in wound prevention and care by fine-tuning and strengthening their fundamental knowledge and critical thinking abilities and responses. The program empowers practitioners to be better equipped to support and care for those with common yet difficult-to-heal wounds or who are at risk of developing such conditions.

Individual Programs For Regulated Health-Care Providers

Explore the complexities of wound management with Wounds Canada's Individual Programs. With a mix of virtual and hybrid offerings, the evidence-based courses are designed for the learner to take away best practices, innovative strategies and interdisciplinary collaboration, without the extended commitment to the Super Program (SHARP).

Some of the individual programs include in-person Skills Labs, which provide hands-on training and practice for specific skills or procedures. These labs offer a structured setting where participants can learn and refine technical skills under the guidance of the instructors. They often feature simulation equipment, or models which replicate real-life scenarios, allowing learners to practice in a safe learning environment.

Wound Care Champion Program (WCCP)

The purpose of the Wound Care Champion Program (WCCP) both in Ontario and Nova Scotia is to equip regulated health-care providers and front-line medical professionals with the information and skills they need to recognize patients who are at risk for wounds and to deliver the proper preventative and therapeutic care in a manner that is methodical, interdisciplinary and person-centered allowing for the best treatment possible.

The WCCP is delivered in partnership with the Registered Nurses' Association of Ontario (RNAO) and funding for the development of the program was provided by the Ontario Ministry of Health.

Wound Care Champion Program: Ontario

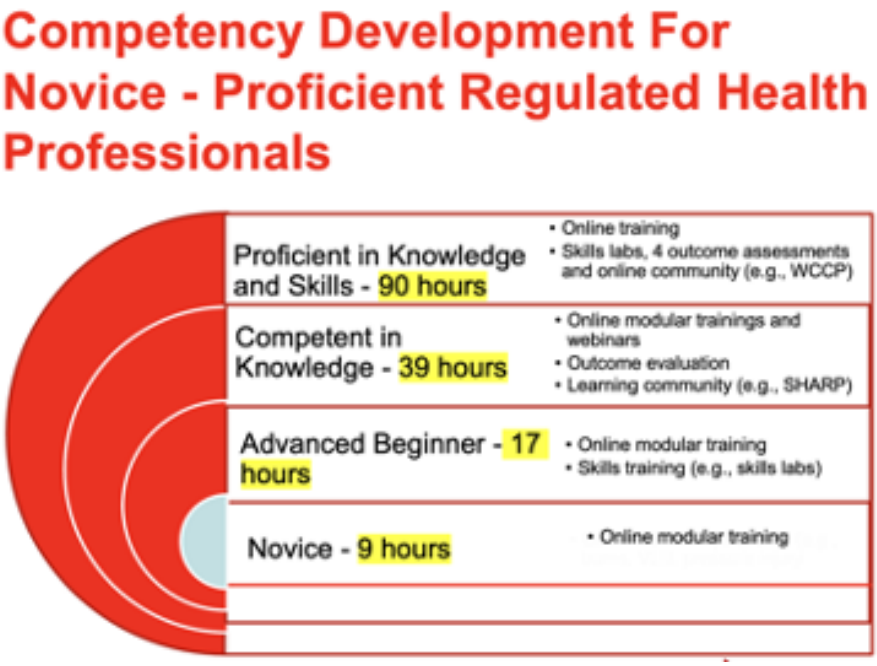
With 200 practitioners actively participating in online modules, the Wound *Care Champion Program: Ontario* made great strides in 2023 and continues to do so with plans to conduct skill labs across the province in the following areas: Thunder Bay, Sudbury, Kingston, Cambridge, Toronto and Markham. In the past, similar initiatives have been undertaken across Ontario, including in Thunder Bay, Sudbury, Kingston, Cambridge, Toronto and Markham.

Last year, the program received accreditation from the Canadian Nursing Association and recognition from the University of Toronto, lead-

ing to an advanced certificate of completion. Currently, there is a submission for accreditation from Dalhousie University in Nova Scotia.

Wound Care Champion Program: Nova Scotia

The Wound Care Champion Program's success is currently spreading across Nova Scotia, where there are now one hundred long-term care practitioners in the province enrolled. Their enthusiastic involvement is a positive and encouraging milestone for our project.



Wounds Canada sincerely thanks Health Association Nova Scotia for organizing the roll-out of the WCCP in Nova Scotia with support and funding from the Government of Nova Scotia's Department of Health and Wellness and Department of Seniors and Long-term Care. Wounds Canada would like to especially thank the Truro Campus at Nova Scotia Community College - NSCC for their hospitality.

For more information about the Wounds Canada Institute please visit: https://www.woundscanada.ca/wci-home

About The Wounds Canada Institute

The Wounds Canada Institute stands as a beacon of excellence, deeply rooted in Wounds Canada's decades-long tradition of providing top-tier educational programs for health-care professionals in skin health and wound management. Our commitment to quality education is reflected in our rigorous standards, which ensure that our competency-based programming remains current and relevant across all professions, sectors and wound types, continually advancing levels of wound care competence.

At the Wounds Canada Institute, we pride ourselves on our expert interprofessional faculty. These leaders in the field not only deliver but also meticulously evaluate evidence-informed education and clinical interventions. This ensures that our programs are both impactful and practical, equipping health-care professionals with the knowledge and skills they need to excel.

We offer flexible, interprofessional education tailored to meet the diverse learning needs and professional growth aspirations of health-care professionals at all levels, from novice to proficient. Our comprehensive educational offerings are designed to be inclusive of all health-care disciplines, applicable across all sectors and relevant to all wound types.

Our curriculum is evidence-informed and competency-based, ensuring that every educational experience is rooted in the latest research and best practices. We adopt a team-based approach to learning, recognizing the importance of collaborative practice in effective wound care. Additionally, our programs are reflective of the social determinants of health and focused on improving population health outcomes.

Certified and accredited, Wound Canada Institute's educational programs are recognized for their quality and effectiveness, providing health-care professionals with the credentials they need to advance their careers and improve patient care outcomes. Join us at Wound Canada Institute and elevate your expertise in wound management through our unparalleled educational offerings.

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Pressure Injuries And The Use Of Hypochlorous Acid (pHA)-Based Cleanser: What Is The Science And What Are The Best Ways To Leverage This Technology With Maximal Effect?

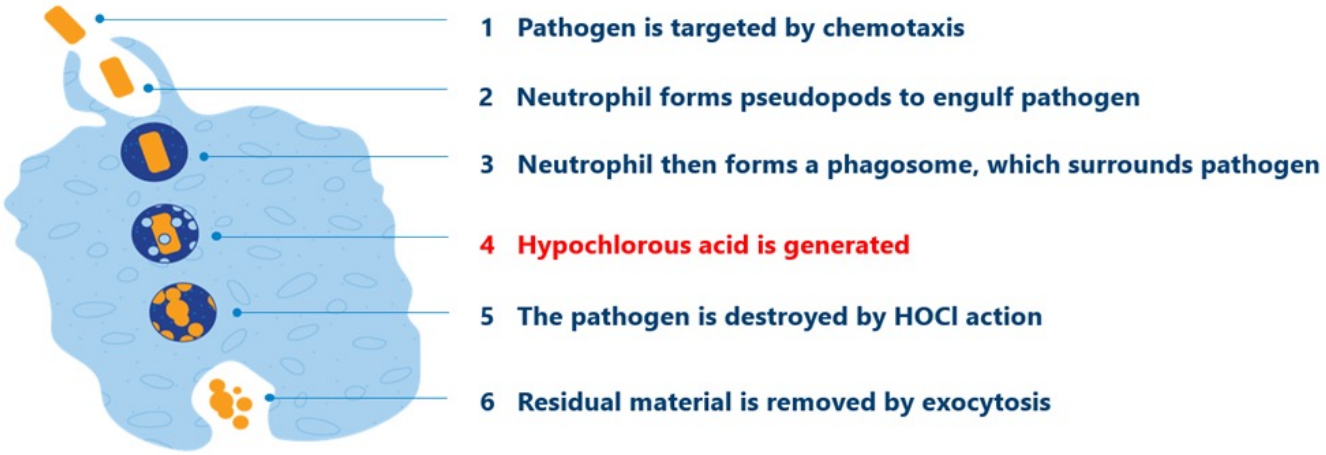
Presenter: Britney Butt BScN RN MClSc(WH) NSWOC WOCC(C) and Gregory Schultz PhD

Is Standardization Possible In Wound Care?

Wound care is complex and requires a holistic and interdisciplinary approach. Often times, more clinicians involved in the care process translates to more opinions, subsequently leading to redundant or unnecessarily convoluted management plans. A survey of wound and ostomy care nurses (WOCNs) in the United States demonstrated that there are often more than four departments and more than four prescribers involved in wound treatment.[1] Almost half of the WOCNs surveyed reported four or more wound cleansers used in wound treatments.[1] So, the question is: is it possible to standardize wound care protocols, for example, wound cleansing? According to wound care clinicians, standardization and evidence-based practice in wound care is achievable when there is compelling evidence and continuous clinician education.[2] Therefore, it is imperative to have best practice guidelines and recommendations for wound management strategies.

The Case For Hypochlorous Acid For Wound Cleansing

Hydrogen peroxide, sodium hypochlorite (e.g., Dakin's solution) and chlorhexidine have traditionally been used as wound cleansers. Recent studies and best practice guidelines no longer support the use of these products on open wounds as they have been found to damage tissues in the wound.[3]



Hypochlorous acid (HOCl), a naturally occurring reactive oxygen species (ROS), has been shown to be a suitable alternative for wound cleansing. Human neutrophils produce HOCl as part of the defense mechanism against bacteria. HOCl exerts its antimicrobial effect via oxidative burst.

Compared to sodium hypochlorite, HOCl has been found to be non-cytotoxic in in vitro and in vivo studies.[4] HOCl is FDA-approved and does not cause irritation to tissues, such as the eyes or the skin.[5] Though it is effective in killing bacteria, HOCl is much safer for fibroblasts and keratinocytes in the wound compared to traditional wound cleansers (i.e., Dakin's solution, hydrogen peroxide, povidone-iodine, chlorhexidine gluconate).[5] HOCl has a pKa of 7.5, mimicking the normal pH of healthy, human skin. HOCl has almost twice the oxidation reduction potential (ORP) compared to hypochlorite (e.g., Dakin's solution) at equivalent concentrations.[6] When compared to hypochlorite and hydrogen peroxide, HOCl has a much lower comparative minimum bactericidal concentration.[7] HOCl can kill bacteria commonly found in wounds (i.e., E. coli, P. aeruginosa and S. aureus) at a significantly lower concentration than hypochlorite and hydrogen peroxide. HOCl also has a much higher relative therapeutic index than hypochlorite and hydrogen peroxide.[6] It has the best balance between effectively killing bacteria without harming healthy wound cells (e.g., fibroblasts).

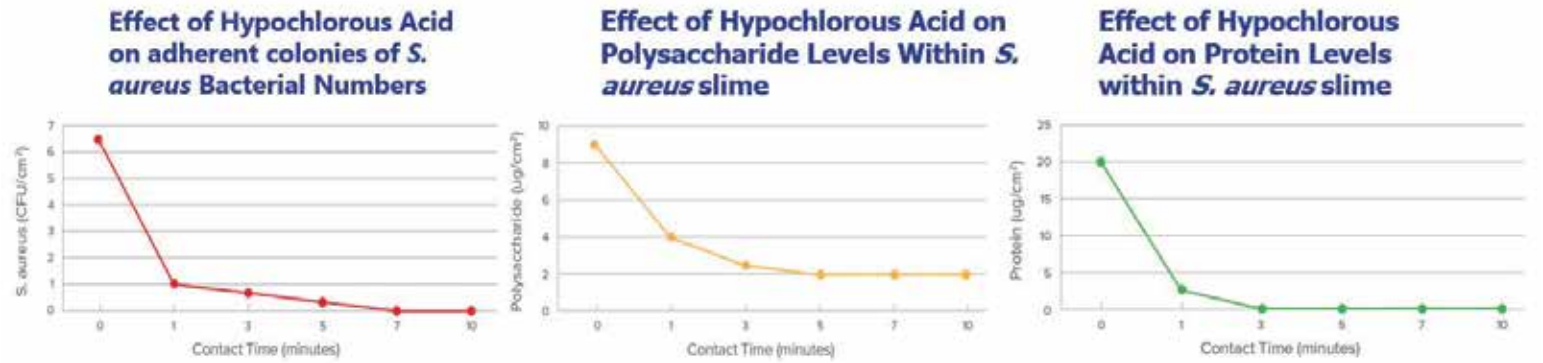
Maximizing The Benefits Of Hypochlorous Acid (Vashe® Wound Solution)

The HOCl-soaked gauze is an effective method of wound cleansing. HOCl can remain stable for up to 20 minutes when poured onto a cotton gauze. Once it makes contact with the wound, HOCl rapidly biodegrades (within 30 seconds), rendering it safe as a wound cleanser. *In vitro* studies have found that Vashe® wound solution can effectively kill 99.999% of common bacteria and spores found in wounds in 15 seconds.[8,9,10] Other studies have also demonstrated that a 5- to 10-minute soak with Vashe® can reduce bacterial colonies and proteins and polysaccharides associated with biofilm.

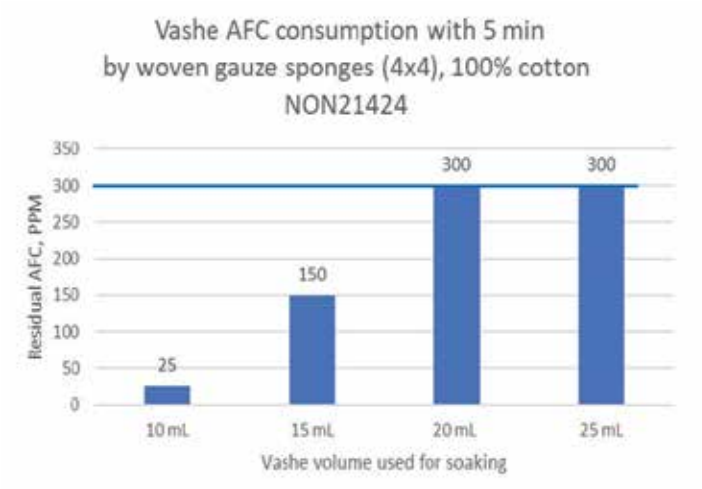
More recently, HOCl has been used in combination with negative pressure wound therapy (NPWT). Instillation

Organism	Time to kill	% Reduction
MRSA	15 seconds	99.999%
VRE	15 seconds	99.999%
Escherichia coli	15 seconds	99.999%
Acinetobacter baumannii	15 seconds	99.999%
Bacteroides fragilis	15 seconds	99.999%
Candida albicans	15 seconds	99.999%
Enterobacter aerogenes	15 seconds	99.999%
Enterococcus faecium	15 seconds	99.999%
Haemophilus influenzae	15 seconds	99.999%
Klebsiella oxytoca	15 seconds	99.999%
Klebsiella pneumoniae	15 seconds	99.999%

Organism	Time to kill	% Reduction
Micrococcus luteus	15 seconds	99.999%
Proteus mirabilis	15 seconds	99.999%
Pseudomonas aeruginosa	15 seconds	99.999%
Serratia marcescens	15 seconds	99.999%
Staphylococcus epidermidis	15 seconds	99.999%
Staphylococcus haemolyticus	15 seconds	99.999%
Staphylococcus hominis	15 seconds	99.999%
Staphylococcus saprophyticus	15 seconds	99.999%
Streptococcus pyogenes	15 seconds	99.999%
Staphylococcus aureus	15 seconds	99.995%
C. difficile endospores	15 seconds	99.93%



with HOCl aids with reducing bacterial bioburden and oxidative debridement of the wound. HOCl oxidation helps degrade, soften or eliminate necrotic tissue in the wound bed.[11] Consensus guidelines for the use of wound antiseptics recommend a soak of 3-10 minutes with an oxidative antiseptic (e.g., HOCl) to cleanse and debride a wound.[10] This a relatively new concept known as oxidative debridement. 20 to 25mL of Vashe® should be used on a woven cotton gauze sponge (4x4) to achieve maximum effects.



A Sample Vashe® Packing Protocol for Local Wound Management:

1. Cleanse wound(s) with Vashe® (Soak for 15 minutes).
2. Apply barrier spray to peri-wound skin
3. Fill wound(s) with Vashe®-soaked gauze
4. Cover with low-adherent adsorbent dressings
5. Change dressings daily and as needed.

Britney Butt BScN RN MClSc(WH) NSWOC WOCC(C) graduated from the University of Ottawa's nursing school in 2012 and began her career in an acute care surgical unit that specialized in general, urology and plastic surgery. Butt then earned her Wound, Ostomy and Continence Certification from the WOC Institute and Master of Clinical Science in Wound Healing from Western University in 2014 and 2018, respectively. Since 2015, Britney has been working as a clinical nurse specialist lead for wound, ostomy and continence care at North York General Hospital, where she provides direct patient care for complex cases, ongoing education and develops and implements hospital policies about wound management and pressure injury prevention and management.

Gregory Schultz PhD was a Professor Emeritus of Obstetrics and Gynecology at the University of Florida where he served as the Director of the Institute for Wound Research for 32 years. A major focus of Dr Schultz's more recent research had been on understanding the role that bacterial biofilms play in stimulating chronic inflammation that leads to highly elevated levels of proteases in wounds that impair healing.

Editor's Note: We are saddened to report that Dr. Gregory Schultz passed away unexpectedly on April 12, 2024. Wound Care Canada extends its condolences to his family and colleagues.

To access the full presentation click here: https://drive.google.com/file/d/1CMn-0RFlHzaPppBlB-ReZ-8G5AogPiqLU5/view?usp=sharing

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