2024 WOUNDS CANADA

NATIONAL HYBRID CONFERENCE

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TABLE OF CONTENTS

Table of Contents

Are we good? Are we getting better?

Establishing KPIs and OKRs for a Regional Wound Care Program

Dr. John Hwang MD MSc FRCSC

fraserhealth

Aim: Establish KPIs (key performance indicators) and OKRs (objectives and key results) to track Whole System Quality (WSQ) within a Skin and Wound Care Network in the Fraser Health Authority (FHA), Canada's largest health authority

Background: The delivery of high quality skin and wound care is dependent on a ***systems*** approach to designing the necessary infrastructure, capacities and capabilities. The "Quintuple Aim" can then be used as a framework to develop meaningful measures to track progress towards your desired future state.

Method: A regional committee of diverse stakeholders spent 12 months designing the elements and tracking measures of a skin and wound care network that will deliver high quality care in a reliable, efficient and equitable manner.

Results	Objectives	Key Results	KPI's (1 example)
Systems Level (macro)	Governance: Build a governance structure to drive the skin and wound care strategy across the province.	Create a skin and wound care program with dedicated leadership	• An org chart for FHA skin and wound care
		Participate in provincial committees to collaborate, learn, and share knowledge	• % FHA reps on provincial committees (target 100%)
	Infrastructure: Create skin and wound care capacity and capability to deliver equitable services.	Construct a network of skin and wound teams (CAPACITY)	• Regional skin and wound CNS hired
		Build exceptionally skilled teams of skin and wound care professionals (CAPABILITY)	• Provide advanced skin and wound education (target 2 external partnerships)
		Optimize lateral networking in standardization of skin and wound services (EQUITY)	• Single centre for referral and triage of complex and high-risk wounds
Local Level (micro)	Clinical Standards: Establish clinical standards to ensure high quality skin and wound care	Determine clinical care benchmarks for common wound entities	• Identify FHA skin and wound priorities (target: 3)
		Embed preventative holistic skin and wound care across the region	• Identify non-profit organization with whom to partner on prevention strategy (target: 1)
	"Data": Build a world-class skin and wound database to inform whole system quality	Select a single database for regional reporting	• Database needs assessment complete
		Establish a dashboard of meaningful skin and wound measures	• Literature search of skin and wound measures complete

For full list of OKRs and KPIs and documents about the FHA Skin and Wound Network, please scan the QR code

KEY LEARNINGS

- It takes a whole system to deliver high quality skin and wound care results
- Measurement to guide improvement involves tracking progress towards your desired future state
- If you build a wound care system, improved clinical outcomes will result

Wound Care Supply Cart in a Stationary Harm Reduction Setting: Efficiency, Satisfaction, and Quality of Care

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Consumption Treatment Services (CTS) with Sanguen Health Centre

Photograph #1 Anterior view of the wound care cart with labelled drawers for accessibility and ease of use.

Photograph #2 Lateral view of the wound care cart with attached resource folder for cart user reference.

ABSTRACT

Research Objective: Assess the impact of implementing a wound care cart into a safe consumption site setting .

Methodology: An anonymous, multiple choice online survey design used to execute this quality improvement project. Nurses also had the option for free-text on some questions.

Key Findings: Increased use of wound care cart from staff and increased visits for wound care and basic first aid.

Implications: Improved understanding and access to wound care supplies at the safe consumption site. Opportunity for expansion into other healthcare settings and further research.

INTRODUCTION

CONTEXT
Waterloo Region's first Consumption and Treatment Services (CTS) opened in 2019. Since then, wound care has been the overwhelming majority of healthcare services required by our clients outside of supervised consumption. Appropriate wound care can prevent serious illness requiring utilization of high barrier, inaccessible care within an overwhelmed hospital system (Sanchez, Tookes, Pastar, & Lev-Tov, 2021).

Initially, within our safe consumption site (SCS) setting, access to wound care materials were incredibly limited and did not allow nurses to provide effective wound care for people accessing the site. Over the past four years we have reviewed the current practices within the SCS and, as a team, we were able to collaboratively identify what the clients accessing the site needed for their unique wound care needs.

OBJECTIVES
Since 2019, we have reviewed the wound care practices within the SCS and, as a team, collaboratively identifying what wound care items the clients accessing at the site needed for their wound care needs; especially within this unique harm reduction setting. A stable formulary of wound care supplies was developed and consolidated within a mobile cart.

PROJECT DESCRIPTION

A stable formulary of wound care supplies was developed and consolidated within a cart, and separated into a logical order. To align with the steps in wound care, the cart begins at the top to save nurses time and simplify the overall process. In 2024, we have completed wound care training and surveys to nursing staff to evaluate the effectiveness of the wound care training and the wound care cart into their practice within the SCS.

Currently we have a stable formulary of wound care supplies and products that the nurses utilize within their daily practice. The wound care supplies and products were consolidated within a cart, and separated into a logical order. To align with the steps in wound care, the cart begins at the top to save nurses time and simplify the overall process.

PROJECT GOALS
The goal of this poster is to showcase the benefits of a wound care cart for nurses in settings with limited resources. Hypothesized an improvement in the delivery and efficiency of wound care within the safe consumption site setting Wounds have been the overwhelming majority of health care services required by our clients outside of supervised consumption. Appropriate wound care can prevent serious complications requiring utilization of high barrier, inaccessible care within an overwhelmed hospital system.

METHODS

he methods for gathering data include retrospective chart reviews from Neo360, a harm reduction tracking database, as well as several anonymous staff feedback forms (Neo360, 2020).

An anonymous online survey of CTS nurses was conducted in February 2024. This survey aimed to explore the nurses perceptions of the wound care cart within the SCS. There were six overall questions being asked; four questions were multiple choice and two questions were long answer text.

The multiple choice questions included:
- How often do you use the wound care cart?
- How are you liking the wound care cart?
- How helpful are the drawer labels?
- How helpful is the information hanging on the wound care cart?

The long answer text questions included:
- Products/supplies you would like to see added or more of?
- How else to update? adapt? change? remove? Improve?

RESULTS: WOUND CARE

Data surrounding wound care was retrospectively gathered from Neo360 between the years of 2020 to 2023. The results are outlined below in Table 1: instances of First Aid or Basic Care.

Since the development of the wound care cart the instances of first aid or basic care has increased.

Table #1 instances of First Aid or Basic Care

Total # of instances first aid or basic care (i.e. abscess, foot, wound) were provided within the CTS				
Year	**2020**	**2021**	**2022**	**2023**
# of instances	402	607	562	546

RESULTS: CTS NURSE SURVEY

Overall 11 nurses responded to the survey.

The results highlight that the majority of the nurses identified the wound care cart to have made their practice more efficient.

The remainder of the nurses identified as neutral - these results were provided in comparison to the nurses' knowledge and skill with wound care prior to the wound care training.

Table #2 Reported Frequency of Cart Use by Nurses

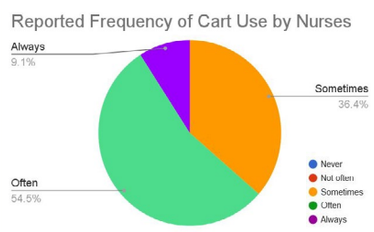
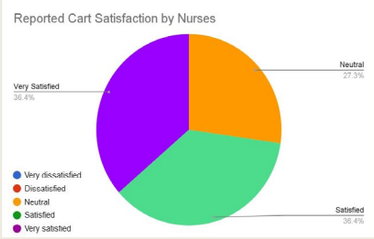


Table #3 Reported Cart Satisfaction by Nurses



DISCUSSION & CONCLUSION

The wound cart can empower nurses with the basic principles of wound care and demonstrate how nurses can lead effective wound care practices within settings with limited resources and supplies. This wound cart initiative aligns with the harm reduction principles and approaches to care.

INTERPRETATION

Based on our obtained data, there was positive responses of using the wound care cart in our CTS location, which aligns with the results reviewed from the limited existing literature on wound care carts. Informal feedback from the nurses included the the actual structure of the cart, for example the material of the cart for longevity of use and sterilization, as well as the size of drawers to account for the size of supplies and solutions stored.

IMPLICATIONS

The presence of a wound cart cart can improve efficiency in terms of total time on care spent and supply accessibility. The use of labels organized in a top-down structure also aids to efficiency and ease of use by the care provider.

In settings with minimal resources and wound care education provided, such as in mental health or harm reduction settings, these benefits can improve access to care and quality of care provided, as well as simplify the process for the cart user.

Where there are already known barriers to accessing traditional care settings, such as stigma and discrimination surrounding drug use and mental illness, this initiative can increase access to necessary care and promote liaising with other health services for holistic care.

LIMITATIONS
As wound care is manually entered in Neo360 under "First Aid and Basic Care", the reported data may not be representative of all instances of wound care that took place. Confirmation bias could be factor during the questionnaire, nurses may have provided positive feedback based on the increase in our wound care supplies and provision on site.
Limited staff response to the survey, only 65% of nurses completed the survey. We were limited in funds for initiating the wound care cart, and there are no funds dedicated for completing this review..
Cart resources were sourced from donations.

FUTURE DIRECTIONS

The future of this initiative can be applied to all settings and can empower nurses to support change and quality improvement in healthcare. This investigation guides future research on wound care implementation within various harm reduction and mental health settings.

Future research should include exploring the lived experiences of nurses and clients who access wound care services within harm reduction and mental health settings. Future research should also include the experience of both the nurses and the clients seeking wound care services from a harm reduction or mental health setting.

REFERENCES

ACKNOWLEDGEMENTS

We would like to acknowledge our brilliant and caring CTS coworkers with Sanguen Health Centre for the amazing care that they provide to the beautiful community members we serve. We have the privilege of providing clean supplies, reducing complications related to using drugs, minimizing burden on other health services, and most importantly helping people stay safe and have their voices be heard.

We would also like to acknowledge the Director of Consumption and Treatment Services Violet Umanetz, the nurses at the CTS, and Sanguen Health Centre overall.

We would like to recognize any funding sources, institutional support, or individuals who contributed to the project.

Skin & Soft Tissue Infections in Persons Who Inject Drugs-Dressing Choices: A Harm-Reduction, Community Clinic Initiative

Janet L. Kuhnke[1] & Sharon MacKenzie[2] [1]School of Nursing, Cape Breton University, Sydney, NS; [2]The Ally Centre, Sydney, NS.

Introduction: Skin Infections

Persons who inject drugs may develop a skin or soft tissue infections (SSTI) / abscess and may care for their wound at home, on the street, access care from The Ally Centre, Victoria Order of Nurses, family physicians, pharmacies, and nurse practitioners (Kuhnke et al., 2022). Clients prefer wound and intravenous care delivery at The Ally Centre as there are trust-filled relationships (Bickerton, 2022).

- Nova Scotia Opioid Use and Overdose Framework (2021)
- The Ally Centre partnered with leaders at the emergency department & Continuing Care.
- The Ally Centre partnered with Mölnlycke Health Care to trial an all-in-one Flex Border technology dressing as it is conformable, discrete, and able to be lifted and reapplied.

Procedure/Method

Interprofessional team was formed to focus on SSTI prevention, wound treatment and management through a pilot care pathway.

The Bates-Jensen wound assessment tool is used to determine the wound status.

If appropriate, the all-in-one dressing was utilized. Patients are taught about the all-in-one dressing and to leave the dressing in place, and they may lift and replace the dressing over the wound. Dressings are dated and timed, and the person was given a date to return for reassessment.

Funding: Funding: Mölnlycke Health Care and CBU. CBU Research Ethics Board approved.

Objective

This case series explores cases where we used an all-in-one dressing. This research is ongoing.

Clinical Cases

CASE 1

- Male, 60's, uses substances and accesses safe supply, DM
- Right foot, forehands and forearm (4-year history with clinic team)
- Infection control, wound cleansing and Flex
- Care ongoing

Case 1: Multiple co-occuring wounds

CASE 2

- Male, 20's uses substances
- Wound right forearm (weeks to months) multiple injections
- Infection control, wound cleansing and Flex
- Taught self-care, wound closed

Case 2: Closed

CASE 3

- Female, 30's
- Right forearm (near elbow) and lower thigh, missed injection
- Infection control, wound cleansing and Flex
- Multiple wounds

Case 3: Multiple wounds - closed

What Are We Learning?

- Clients may have multiple wounds
- Prevention of skin infections is key – BC Centre for Disease Control "Skin Infections" modified poster for use at The Ally Centre.
- Referral, wound assessment and dressing follow up is challenging as the population we serve is mobile and not all persons return for wound care as planned.
- Partnering with industry to trial products
- We continue to aim to provide wound care regardless of the barriers.
- Trust-filled relationships are foundational to care
- Hard to serve populations need skin health assessment and timely wound care (Kuhnke et al., 2022).

Key Observations

All-in-one dressings provide an opportunity to provide timely dressing changes. In a case-by-case approach we continue to partner with industry to ensure we can trial this all in one dressing for clients with intravenous abscesses.

Skin health and wound care issues cross all populations

Interprofessional team work is essential for prevention and to initiate proactive wound care

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This poster was developed in connection with Cape Breton University, The Ally Centre of Cape Breton, Sydney, NS, Canada.

Graphical support from Global Medical Affairs at Mölnlycke Health Care.

Clinical and Patient experience with a Fluidized Offloading Heel Boot to Prevent and Manage Heel Pressure Injuries in a Nova Scotia Trauma and Burn Center.

Cho, B., BSC Kin, DPT[1], Kelly, E., RN [2]; Kuhn, A., OT Reg NS[3]

[1]Nova Scotia Health Authority, Halifax, NS, Canada;

Aim

Pressure injuries pose a significant challenge in health care, contributing to patient discomfort, increased care costs and may impact patients' quality of life. The main aim of this study was to test the feasibility of Z-Flex offloading heel boot to aid with the prevention and management of pressure injuries in acute care setting.

Procedure/Methods

Patient eligibility was determined using Braden sub scores, arterial perfusion assessment, existing wounds to heel or malleolus, and patient history. Education was provided to staff prior to the evaluation, with ongoing training over the 6-week period. Eligible subjects were placed in the boot as part of a 10 patient case study series. A survey was given to the staff to highlight experience using the boot. Patients were interviewed regarding their experience.

Patient Inclusion Criteria

- Visible signs of pressure injury

AND/OR

- Braden – Mobility ≤ 2 and Activity ≤ 2
- Fractured hip or lower extremity fracture
- Ischemia of the lower limb
- Remaining lower limb amputee
- Peripheral neuropathy–Diabetes mellitus
- Leg spasms/inadequately controlled pain
- Mental confusion
- Skin grafts to the lower leg or foot
- Paralysis of the lower leg or foot
- RAS less than or equal to -2
- GCS less than or equal to 8

Clinical Cases

CASE 1: Arterial Bleed managed with Fasciotomy and Skin Graft

- Braden – Mobility ≤ 2 and Activity ≤ 2
- Leg spasms/inadequately controlled pain
- Skin grafts to the lower leg or foot

Comments: Patient: stated very comfortable, has noticed a decrease in leg pain even when wearing boot for 24hrs. The patient has increased mobility and would highly recommend the boot. Clinicians: have observed the improvement in skin discoloration noted in lower extremity prior to using the boot. Clinicians felt they can confidently prevent medical device related pressure injuries, by easily placing tubing between straps.

CASE 2: Ischial Ulcer managed with Local flap and Skin graft

- Braden – Mobility ≤ 2 and Activity ≤ 2
- L3 complete SCI
- Sensory changes to lower extremities
- Paralysis of lower extremities

Comments: Patient: indicated the boots were comfortable for a 24hr wearing schedule.
Clinicians: noted the boot contoured the limb and created lift.

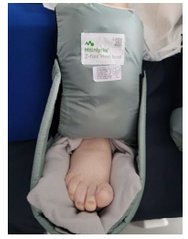
CASE 3: C4 incomplete Spinal Cord Injury

- Braden – Mobility ≤ 2 and Activity 2
- C4 incomplete
- Sensory changes to upper and lower extremities
- Paralysis of lower extremities

Comments: Patient: Very light, loves them at night and they are very comfortable for extended wear.
Clinicians: found boots to be a better fit to back of calf, side straps allowed the foot to be better aligned, also noted the Zflo technology protects the Achillies tendon.

Images

Case 1



Case 2

Case 3

Results

Clinicians agreed that the Z-Flex heel boot effectively offloaded the heel and was easy to use. The ability to open the foot gate, streamlined foot and heel assessment. The low profile of the boot prevents hyperextension of the knee; therefore, comfort is increased. The patients all agreed how comfortable and light the boot was whiling wearing for extended periods of time. The boot has improved compliance with their pressure injury bundle and has provided improvement to their current offloading practice.

Additionally, patient (n=10) comments were overwhelmingly positive and spoke to comfort, which aids in the wear time of the boot which assists to prevent and treat pressure injuries.

This poster was developed in connection with Nova Scotia Health , Nova Scotia, Canada, with support from Global Medical Affairs at Mölnlycke Health Care.

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ANTIMICROBIAL WOUND GEL

Thermo-reversible Hydrogel to Target Wound Antibiotic Tolerant Biofilms with Prolonged Activity

Miloslav Sailer, PhD; Jeyachchandran Visvalingam, PhD; Anna Muzaleva, BSc; Robert B. Huizinga PhD RN, CNeph(C)

Abstract

Chronic wounds are often colonized by biofilm forming bacteria and one of the key characteristics of chronic biofilm-based infections are extreme tolerance to antibiotics and to many other conventional antimicrobial agents[1]. Thus, any wound care treatment targeting chronic wound infections need to be able to inactivate antibiotic tolerant biofilm. A thermo-reversible hydrogel (TRH) was tested for its effectiveness against antibiotic tolerant biofilms using colony biofilm and porcine skin explant biofilm models. In both models, TRH effectively reduced viable numbers of antibiotic tolerant biofilm of *S. aureus* and *P. aeruginosa*.

Introduction

Chronic wounds are often colonized by biofilm forming bacteria and one of the key characteristics of chronic biofilm-based infections are extreme tolerance to antibiotics and many other conventional antimicrobial agents[1]. Thus, any wound care treatment targeting chronic wound infections need to be able to inactivate antibiotic tolerant biofilm.
A thermo-reversible hydrogel (TRH) has been formulated with metal chelators, an antimicrobial agent, and a non-ionic surfactant to disrupt extra polymeric matrix of biofilm and to enhance inactivation of biofilm embedded microorganisms. In this study, the ability of TRH to control antibiotic tolerant biofilms was evaluated using conventional colony biofilm and pig skin explant biofilm model.

Materials and Methods

Colony Biofilm[2]: Mature biofilms of *Staphylococcus aureus* and *Pseudomonas aeruginosa* were grown on nitrocellulose membrane for 72 h at 37°C on Tryptic Soy Agar (TSA). *S. aureus* and *P. aeruginosa* biofilms were washed twice in PBS to remove loosely attached and planktonic cells and treated for 24 h at 37°C in 50x of minimal inhibitory concentration (MIC) of oxacillin (3.125 µg/mL) and gentamicin (312.5 µg/mL), respectively. Antibiotic treated biofilms were washed twice in PBS and treated for 24 h at 37°C with TRH. Viable numbers of biofilm embedded organisms were determined before antibiotic treatment, after antibiotic treatment and after TRH treatment. Experiments were performed in triplicate and at least two independent experiments were performed (n=6).

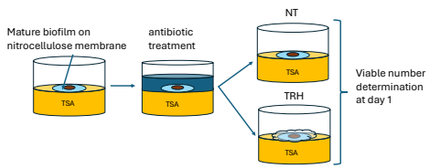

Figure 1: Schematic diagram of antibiotic and TRH treatments

Porcine Skin Explant Biofilm[3]: Mature biofilms of *S. aureus* and *P. aeruginosa* were grown on 13 mm diameter porcine skin explant containing 2-3 mm partial thickness wound which was placed onto 0.5% TSA for 24 h at 37°C and 48 h at 37°C on 0.5% TSA containing 1.5625 µg/mL oxacillin and 62.5 µg/mL gentamicin, respectively. *S. aureus* and *P. aeruginosa* biofilms were treated for 24 h at 37°C in 1.5625 µg/mL of oxacillin and 62.5 µg/mL gentamicin, respectively. Antibiotic treated biofilms were washed three times in PBS and treated for 7 days at 37°C with TRH to mimic clinical dressing change interval. Viable numbers of biofilm embedded organisms were determined before antibiotic treatment, after an tibiotic treatment and after day 1, day 3 and day 7 of TRH treatment.

Results

Colony Biofilm: Treatment with 50x MIC of oxacillin and gentamicin treatment caused significant ≥2 and ≥4 log reduction ($p \leq 0.001$) in viable numbers of *S. aureus* and *P. aeruginosa* biofilm, respectively. Proportion of antibiotic tolerant *S. aureus* and *P. aeruginosa* in biofilms were ≥7 and ≥6 log CFU, respectively. TRH reduced viable numbers of both organisms below detection after 24 h treatment at 37°C (Fig 2).

Porcine Skin Explant Biofilm: Treatment with TRH was performed for 1, 3 or 7 days to mimic clinical dressing change intervals. After 24 h antibiotic treatment of *S. aureus* and *P. aeruginosa* biofilms, viable numbers remained ≥ 7 log CFU (Fig 3). Viable numbers of NT control increased to similar level as initial viable numbers by day 1 and remained at that level for 7 days. After 3 days of TRH treatment, viable numbers of antibiotic tolerant *S. aureus and P. aeruginosa* biofilm reduced by ≥ 5 and ≥ 3.5 log CFU, respectively and no further change was observed for 7 days.

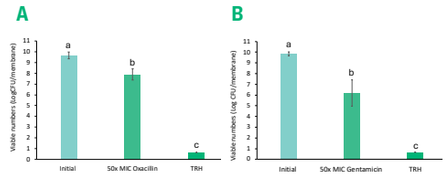

Figure 2: Effect of TRH on antibiotic tolerant biofilm of A) *S. aureus* and B) *P. aeruginosa* using colony biofilm model. Mean values identified with different letters are significantly different (p<0.001).

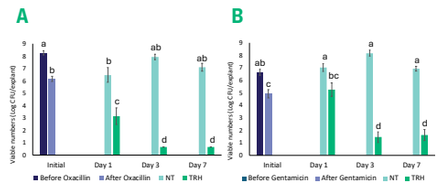

Figure 3: Effect of TRH against antibiotic tolerant biofilm of A) *S. aureus* and B) *P. aeruginosa*. Mean values identified by different letters are significantly different (p<0.001)

Discussion

Tolerance of biofilm embedded bacteria to antibiotics has been attributed to restricted penetration of the antibiotics, restricted growth at low-oxygen tension, expression of biofilm-specific genes and the presence of persister cells. Presence of antibiotic tolerant cells in biofilm related chronic wound infections may lead to treatment failures and prolonged infection or other complications. Results from this study demonstrated that ≥ 5 log CFU of biofilm embedded cells of *S. aureus* and *P. aeruginosa* were resistant to treatment with oxacillin and gentamicin, respectively. Testing against antibiotic tolerant biofilms using *in vitro* and *ex vivo* models showed that TRH was effective at reducing viable numbers of antibiotic tolerant *S. aureus* and *P. aeruginosa* in biofilms.

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Use of CDO therapy for Limb Salvage in a Complex Diabetic Foot Ulcer

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Seniors Health, Central Zone, Wound & Ostomy Consulting Team
Patti Burke Martin, RN, BScN, Canadian Manager EO2

Aim: The aim of this poster is to present a case study implementing Continuous Diffusion of Oxygen (CDO) therapy to prevent amputation in a complex DFU.

Procedure/Method:

- CDO is an adjunctive therapy that delivers 100% oxygen to the wound bed using a proprietary dressing.
- Research shows its impact on diabetic foot ulcers, hard-to-heal wounds and on pain.
- CDO was trialed to assess effect on wound pain and limb salvage.
- A 75-year-old male with 2 DFU wounds on his left foot with acute osteomyelitis (treated).
- Wound team were concerned that this client would require further amputations. Medical history: Diabetes, Acute MI, Atrial fibrillation, TIA, Toe infection and 2 left toes were amputated. Toe PPG 28 mmHg, surgeon chose not to do a vascular referral.
- Wounds developed as client is not compliant with offloading.
- Pain had been an issue with levels of 8/10 to 9/10. Initial wounds volume was 4 cm^3 wound bed initially was 100% necrotic .

Findings/Results:

- Best practice recommendations were also in place for offloading and CDO therapy started, wounds volume decreased to 1.1 cm^3 with pain reduction now to 0/10.
- Wound bed initially was 100% necrotic and became 100% granulation tissue with serial debridement used in combination with the therapy.

.

Findings/Results:

- CDO therapy stopped May 2024 due to infection, increased drainage and odour
- Next steps include a potential for a skin graft, and a return to CDO therapy. .

January 2, 2024

5.5 cm by 3.6 cm and 0.2 cm deep = 4 cm^3

May 23, 2024

2.7 cm by 2 cm and 0.2cm deep = 1.1 cm^3

August 8, 2024

1.2 cm by 0.5 cm and 0.1 cm deep = 0.6 cm^3

Implications/Applications: This adjunctive therapy works most effectively when combined with best practice recommendations. CDO therapy was able to prevent a further amputation, manage pain and reduce the wound size significantly. The therapy can be used to prepare the wound bed for potential skin graft.

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Canadian Consensus Statement on the Management of Venous Leg Ulcers

MC Stacey (1), RG Sibbald (2), RM Evans (3)

1. McMaster University and Hamilton Health Sciences, Hamilton 2. Womens College Hospita Torontol and University of Toronto 3. Womens College Hospital

BACKGROUND

New research data provide evidence that the calf muscle pump function and venous leg ulcer (VLU) healing can be improved with the Muscle Pump Activator device (MPA) in addition to compression therapy, and also on how to use advanced wound treatments to promote VLU healing [1]. Existing guidelines are good reference guides for clinicians [2,3], however there is a need for a concise document that clinicians can use in their clinics.

OBJECTIVE

To incorporate new clinical research findings on improving calf muscle pump function and the use of advanced wound therapies in accordance with Wound Bed Preparation (WBP) principles into a concise clinical guide for clinicians.

METHOD

- This work was led by DR M Stacey, Dr K Harding, Dr RG Sibbald and Dr R Evnas
- 15 health care providers with experience in managing VLUs with new and advanced therapies were added to the panel:

Dr Asem Saleh	Dr John Hwang	Rosemary Hill,
Josee Senechal	Michele Langille	Bev Smith
Carly St Michel	Paulo da Rosa	Amanda Loney
Michele Labbie	Sheri McPhee	Helen Arputhanathan
Allison Luther	Maryse Beaumier	Shannon Handfiled

- From January to June 2024 an initial document was developed and revisions were made with panelists' feedback. The document was separated into 23 sections for 2 rounds of consensus feedback with a goal of 80% for each section.
- 100% consensus was obtained for 20 sections and 85% for the other 3.

References:
1. Int Wound J. 2024;21:e70040 Stacey M, Sibbald RG, Evans R.
2. Int Wound J. 2023;20:2260-8. 20. Bull RH, Clements D, Collarte AJ, Harding KG
3. Journal of Tissue Viability 2020;29:180–183. Stacey M.

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CONSENSUS STATEMENT

Key elements

- Clinical assessment
- Investigations
- Diagnosis
- Treatment of the underlying cause – improving impaired calf muscle pump function
- Management of the ulcer – incorporating the Principles of Wound bed preparation
- Options when not entering a healing trajectory – use of advanced wound therapies
- Management post ulcer healing

Treat the underlying cause of impaired calf muscle pump function

- Apply an optimal compression system if - ABPI is normal (0.9 to 1.4); ABPI is elevated and TBPI or toe pressure is normal; or if the hand-held Doppler waveform is multiphasic
  - Optimal multi-layer bandage system (30 – 40 mm Hg at the ankle) or other compression system options
- Encourage calf muscle contraction exercises
- Consider venous ablation if indicated

Steps if unable to wear optimal compression

- ABPI is reduced but greater than 0.5, OR if the patient is not able to tolerate compression
  - Apply a lower compression multilayer system that the patient will tolerate, with the aim to progress to optimal compression as symptoms and tolerance allow
    - Caution at ABPI between 0.65 and 0.9
    - Extra caution between 0.5 and 0.65 when stockinette with tubular or longitudinal compression may be considered in place of compression system
  - Add Muscle Pump Activator (MPA) in addition to the compression that the patient can tolerate
- If not able to tolerate any compression due to pain or other causes
  - Add MPA with the aim to progress to add lower compression and then optimal compression
  - Recommend daily leg elevation above the level of the heart and regular exercise

Treatment of the VLU – Using WBP/TIME principles

- Cleanse with antimicrobial solution (e.g. hypochlorous acid), Debride, Treat infection, Manage moisture, Manage pain, Protect surrounding skin and treat if needed
- Measure ulcers weekly or at each visit if seen less often

Actions if not on a healing trajectory – no size reduction in 2 to 4 weeks, or reduction less than 30% at 4 weeks after initiating treatment

- Re-evaluate
  - Review the assessment and diagnosis of ulceration to exclude other ulcer etiologies or causes of impaired healing
  - Assess if treatment protocol –
    - Is it being properly implemented and adhered to
    - If infection is present and being managed
  - Reassess the compression system
  - Add MPA if not already in place
  - Consider superficial venous ablation if indicated
- Consider advanced wound treatments in a sequential manner
  - A dressing that is antimicrobial and that can disrupt or eradicate biofilm
  - A dressing with protease inhibition properties
  - Improve the wound bed with negative pressure wound therapy or with a matrix substitute
  - Deliver growth factors through dressings that release physiological growth factor levels
  - Add new cells to the wound as skin grafts, cultured cells or skin substitutes
- Consider other adjunctive treatments as appropriate

Prevent ulcer recurrence

- Lifelong compression therapy
- Fit compression stockings (below knee in most cases)
- Encourage calf muscle contraction exercises

NEXT STEPS

- Submitted for publication to International Wound Journal
- Endorsed by Nurses Specialized in Wound, Ostomy and Continence Canada, 2024

NURSES SPECIALIZED IN WOUND, OSTOMY AND CONTINENCE CANADA
INFIRMIÈRES SPÉCIALISÉES EN PLAIES, STOMIES ET CONTINENCE CANADA

Muscle Pump Activation in the treatment of patients with venous leg ulcers

MC Stacey(1), RG Sibbald (2), RM Evans (3)

1. McMaster University and Hamilton Health Sciences, Hamilton 2. Womens College Hospital Toronto and University of Toronto 3. Womens College Hospital, Toronto

BACKGROUND

The standard treatment for patients with confirmed Venous Leg Ulcers (VLUs) is compression therapy on the legs to improve the function of the calf muscle pump. There is a significant cohort of patients who are unable to tolerate optimal compression therapy or indeed any level of compression therapy and who are unable to participate in a supervised exercise program. In addition, there is a cohort of patients who can tolerate compression whose ulcers show little or no evidence of healing. There is a need for ways to further improve calf muscle pump function in these patients.

There is a growing body of evidence that demonstrates that calf muscle pump function can be improved by neuromuscular electrical stimulation (NMES) of the common peroneal nerve by a muscle pump activator device (MPA – Figure 2a). As compared to direct stimulation of calf muscles or stimulation through a footplate which are recommended for 30 mins per day, MPA can be applied continuously and is recommended for up to 12 hours per day.

OBJECTIVE

To determine from available published literature –

- the impact of NMES of the common peroneal nerve using individual electrodes or MPA on venous return and microcirculation in normal subjects, in patients with venous disease and in patients with VLUs.
- the impact on MPA on VLU healing

METHODS

Searches incorporated databases including Medline, CINAHL, Web of Science, Cochrane database and Google Scholar. Further papers were assessed from the references in papers that were identified. 112 articles were identified and 90 were excluded after reviewing the abstract or full article

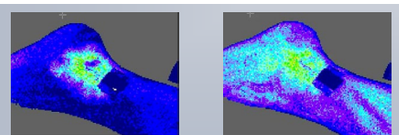

Figure 1. Laser speckle contrast imaging of leg with VLU - left with no MPA, right with MPA activated

FINDINGS

Improvement of calf muscle pump function and skin microcirculation

- **Healthy volunteers –**
  - There was of improvement in calf muscle pump function using electrodes placed over the common peroneal nerve and connecting those to an electrical stimulation device. There was a significant increase in flow velocity and flow volume, by ultrasound evaluation in both the femoral vein and the popliteal vein (Table 1).
  - Use of the MPA device has also been used in healthy volunteers (Table 1). Flow velocity was improved in all 7 studies. Only 3 studies measured flow volume and in 2 there was significant improvement compared to baseline. In one there was significant improvement compared to intermittent pneumatic compression and a non-significant increase compared to baseline
- **Patients with venous disease –**
  - 2 studies used the MPA device, and there was improvement in flow velocity in both studies (Table 1). In one study there was a significant improvement in flow volume in patients with superficial venous disease and those with deep vein reflux, but not those with deep vein obstruction. In the other study, there was a non-significant increase in flow volume.
- **Microcirculation impact of MPA –**
  - Healthy volunteers demonstrated significant improvement in microcirculation in the skin using Laser Doppler assessment on the foot and leg, and Laser Doppler Speckle Contrast Imaging in the thigh (Table 1).
  - In patients with venous disease there was a significant improvement in Laser Doppler flux on the foot in patients with superficial venous disease and with deep vein obstruction, but not with deep venous insufficiency. In patients with active VLUs, there was significant improvement using Laser Speckle Contrast Imaging in both flux and pulsatility, in both the ulcer base and in the ulcer surrounding skin (Figure 1).

Table 1 Impact of NMES of common peroneal nerve (using electrodes at common peroneal nerve (CPN) or MPA) on venous function of the leg as assessed by ultrasound (1)

Subjects	Device	Venous Flow Velocity	Venous flow Volume	Microcirculation
Healthy	Electrodes at CPN	↑ (3 of 3)*	↑ (3 of 3)*	
Healthy	MPA	↑ (7of7)*	↑ (2 of 3)* ↑ (1 of 3)#	↑ (4of 4)*
Venous disease	MPA	↑ (2 of 2)*	↑ (1 of 2)+ ↑ (1of2)@	↑ (1of1)^
VLU	MPA			↑ (1of1)*

*p<0.05 # Significant change compared to intermittent compression but not with baseline
+ P<0.05 for superficial venous disease and deep vein reflux @ p>0.05
^ p<0.05 for superficial venous disease and deep vein obstruction

a b

Figure 2. a - MPA device applied to a leg, b – findings of RCT of compression v compression + MPA

RESULTS

Improvement of venous ulcer healing with MPA

- **Case series** – 6 case series included patients with difficult to heal venous ulcers, and provided consistent indications of improved healing with MPA with and without compression therapy. An amalgamation of case series of patients from the community found that 30 of 70 patients achieved complete healing after an average of 9 weeks of MPA application.
- **Randomized controlled trial** of MPA plus compression therapy compared to compression therapy alone (2), showed significantly faster rates of healing with the use of MPA device in addition to compression therapy(Figure 2b).

CONCLUSIONS

There is a clear indication from published studies for the use of MPA to enhance calf muscle pump function as an adjunct treatment in the following patient groups with VLU –

- patients who cannot tolerate compression therapy
- patients who can only tolerate suboptimal low-level compression
- patients whose ulcers healing remains slow or stalled with the use of optimal compression

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References:

1. Int Wound J. 2024;21:e70040 Stacey M, Sibbald RG, Evans R.
2. Int Wound J. 2023;20:2260-8. 20. Bull RH, Clements D, Collarte AJ, Harding KG

Ontario Health atHome

Ontario Health atHome
Revitalizing Total Contact Casting for Diabetic Foot Ulcers: A Home Care Nurse Education Initiative

Sarah Gurney RN, BScN, NSWOC WOCCc, Anne Shantz RN, BScN, MClScWH NSWOC, Jenny Su NP-PHC, MClScWH

South West Regional Wound Care Program

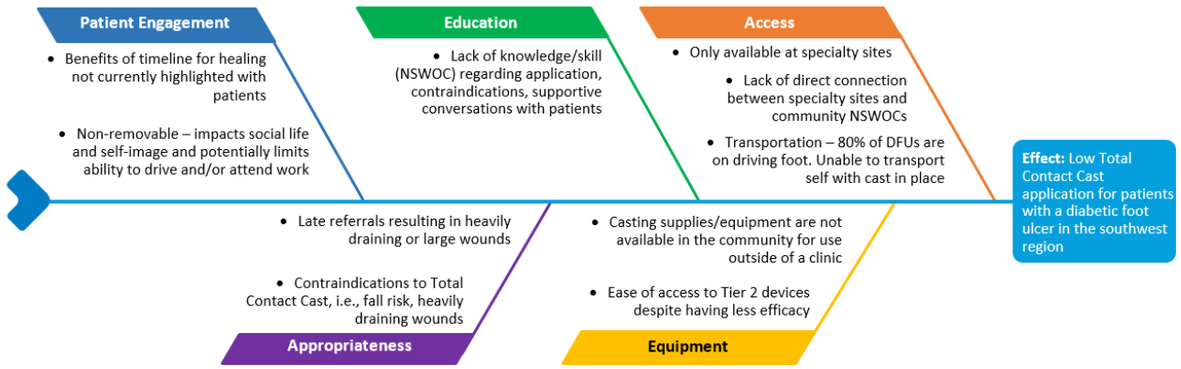
Introduction

Total contact cast (TCC) is the gold standard offloading device for treating diabetic foot ulcers (DFU). The non-removable device redistributes and relieves plantar pressure, which is vital to wound healing [1].

Our aim is to increase the utilization of gold standard Total Contact Cast offloading for patients with diabetic foot ulcers receiving home care services in the southwest region.

Methods

Assess the data	• Only 11 patients received a Total Contact Cast in the fiscal year of 2022-2023
Engaging Stakeholders	• Multi-sector working group
Identify barriers to Total Contact Cast uptake	• Access, education, equipment, patient identification, engagement
Equipment	• Procurement of equipment and supplies for Total Contact Cast / Offloading
Three-pronged education initiative	• Prevention and identification • Management • Skills workshop
Sustainability Plan	• Development of overarching guidelines endorsed by service provider organizations

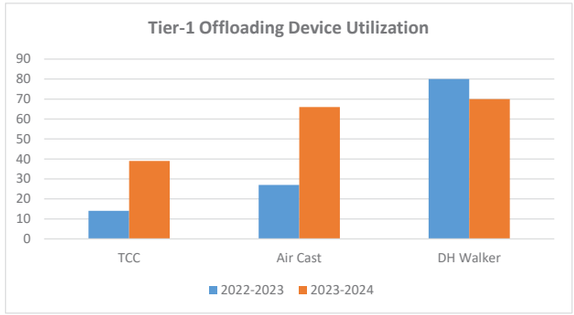


Results

Since project implementation (six months), nurses have improved application of appropriate offloading practices. Wound care specialists have reported increased competence and confidence in the initiation and application of Total Contact Cast.

A total of thirty-six (36) patients have received Total Contact Cast with a wound closure rate of seventy-five percent (75%) and no instances of wound recurrence.

If offloading practices maintain consistency for the remainder of the year, Total Contact Cast use is projected to increase by more than six-times that of pre-initiative volumes.



Implications

Developing and delivering robust education integrating theory and practice to nurses and wound care specialists, along with equipping nursing clinics, has significantly boosted Total Contact Cast use among patients with diabetic foot ulcers. Through increased utilization of gold standard offloading, patients in the southwest region are experiencing improved diabetic foot ulcer outcomes.

Sustainability plans will emphasize data collection and the development of metrics to monitor efficacy. It is essential to maintain policies and guidelines to ensure alignment with best practices. Additionally, establishing routine, accessible educational opportunities for nurses and wound care specialists will be crucial for ongoing success.

Conclusion

Our findings underscore the critical importance of robust education, resource allocation and consistent processes in overcoming barriers to gold standard treatments. As we continue to monitor and support these practices, we anticipate even greater advancements in patient care and diabetic foot ulcer management.

References

1. International Working Group on the Diabetic Foot. IWGDF guidelines on offloading for the prevention of diabetic foot ulcers. 2023 Jul. Available from: https://iwgdfguidelines.org/wp-content/uploads/2023/07/IWGDF-2023-06-Offloading-Guideline.pdf

Foot Health: Implementing a Validated 60-Second Foot and Diabetic Foot Screen

AIM

1. To implement a quick, validated foot screening tool for all patients on admission in Transitional Care Units (TCU) at Misericordia Health Centre to improve early detection and management of foot related complications.

2. Nursing staff were provided education on how to use the foot assessment tool and if the patient has diabetes to also perform Inlow's 60-second Diabetic Foot Screen. Also taught to provide education for patients with high-risk foot conditions and make referrals to ensure optimal care outcomes for foot health.

PROCEDURE/METHOD

1.Literature review and expert consultations were conducted to identify key components of effective foot screening including medical history, current infection, structural changes, and circulation.

2.Staff were trained to use the foot screening tool through a workshop, which included demonstrations and practice sessions.

3.The screening tool was then validated through a series of tests for reliability and accuracy.

Emmanuel Magalong LPN, IIWCC (CRN TCU) and

Sarah Brown BSc, RN, MN, IIWCC (CNS)

FOOT ASSESSMENT

Addressograph

Where Applicable
Check both feet and circle responses

Completed by: _____ Date of Exam: _____

HISTORY	1. Does the patient have diabetes mellitus type 1 or type 2? (If yes, ALSO perform Inlow's 60-second Diabetic Foot Screen)	Yes		No	
	2. Is the patient currently a smoker? (If yes, counsel on smoking cessation)	Yes		No	
	3. Does the patient have neuropathy? Ask about burning, stinging, shooting or stabbing in either foot. (Any person with neuropathy-perform Inlow's 60-second Diabetic Foot Screen)	RIGHT Yes	No	LEFT Yes	No
	4. Has the patient had a previous foot ulcer (U) or amputation (A) on either foot? (If yes, perform Inlow's 60-second Diabetic Foot Screen)	Yes ☐ Ulcer ☐ Amputation	No	Yes ☐ Ulcer ☐ Amputation	No
INFECTION	5. Are there signs of toenail fungal infection? (If yes, should be treated)	RIGHT Yes	No	LEFT Yes	No
	6. Are toe webs abnormal, especially 4/5th toe web? (If yes, should be treated)	Yes	No	Yes	No
	7. Is the bottom of the foot dry? (If yes, should be diagnosed and treated)	Yes	No	Yes	No
STRUCTURAL CHANGES List specific changes in the comments section below	8. Are there any foot deformities? (e.g. Charcot foot, bunions, hammertoes, claw toes etc.) (Any significant bony change should trigger a foot specialist and other referrals such as orthotist, occupational therapy)	RIGHT Yes	No	LEFT Yes	No
CIRCULATION	9. Can you feel a foot pulse? (Absent or diminished dorsalis pedis & posterior tibial pulse –Do ABPI/toe pressure assessment, possible vascular laboratory assessment and/or referral vascular specialist)	Yes	No	Yes	No
	10. Any pitting edema of the feet/ ankle? If yes, should be diagnosed and treated (Refer to physician or start compression therapy)	Yes	No	Yes	No

List of all Comments/Abnormalities/ Treatments/ Recommendation and Treatments

Most Recent Ankle Brachial Pressure Index (ABPI) and/or Toe Pressures (if Known):
Left Leg: _____ **Right Leg:** _____
Current Compression? Y / N **Type/Size:** _____

Positive Screen
- Refer to a Foot Specialist or team.
- Create an Individualized Care Plan.
- Educate patient to observe changes and report immediately.

Negative Screen
No referral but educate patient to observe changes and report immediately.

FINDINGS/RESULTS

Overall the tool was valid and reliable in the TCUs.

Validity: The tool had high sensitivity and specificity in detecting foot health issues compared to the non-validated foot screen that Misericordia was using previously.
Inter-Rater Reliability: Nursing staff were able to consistently identify foot health issues to provide timely care and referrals.
Patient Feedback: Reported high satisfaction with the screening process, quick and non-invasive.

IMPLICATIONS/APPLICATION

The integration of this foot assessment tool is important to determine early detection of foot issues and interventions to prevent serious complications.

Clinical Practice: The simplicity of the screening tool makes it easily adoptable by healthcare professionals across various clinical settings.

Research: Promising results from implementing this foot tool provide further opportunities for research to explore the tool's applicability in other populations and settings.

Application of an Advanced Regenerative Tissue Matrix to Optimize Healing Outcomes for People with Diabetic Foot Ulcers (DFUs)

Michele Labbie RN, MN, NP, WestView Health Centre, Stony Plain, Alberta, Canada & Dr. Paul Gratzer Ph.D., Dalhousie University, Halifax, Nova Scotia, Canada

Background

Current Standard of Care for DFU's represents a growing cost to healthcare and produces sub-optimal clinical outcomes resulting in avoidable complications including amputation and significant quality of life implications for people with diabetes.

Here we report on the treatment of five patients with non-healing DFU's using an Advanced Regenerative Tissue Matrix.* This product is a decellularized human skin that maintains the structural matrix through a unique cell extraction and non-gamma sterilization process.[1] This preserves the biochemistry of the skin's healing environment and provides one-and-done application aimed at improving healing outcomes, improving the patient and clinician experience and lowering health care costs.

Purpose

This case series was conducted at WestView Ambulatory Outpatient Wound clinic in Stony Plain, AB. The purpose of this case series was two-fold. First, was to determine the effect of an Advanced Regenerative Tissue Matrix* on wound healing trajectories. The second was to examine clinician and patient reported experiences related to application and outcomes.

Methods

Five patients with DFUs received a one-time application of the regenerative matrix. Wound duration ranged from three months (post-surgical) to more than two years. One patient had three wounds, and another had two for a total of eight wounds receiving matrix application. Each patient followed a strict plantar pressure off-loading plan, regularly attended West View Ambulatory Wound Clinic, and performed diabetes self-care.

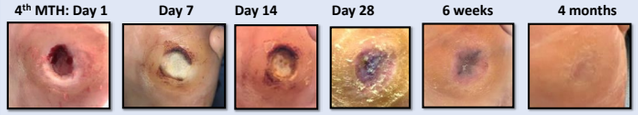
Infection was ruled out or treated prior to matrix application. Each wound was sharply debrided, and the matrix applied according to protocol. An appropriate cover dressing was then applied, and a strict offloading plan was followed.

Patients attended at least weekly dressing changes with close monitoring. This included photo documentation. Diabetes management was assessed through review of HgA1C within 3 months of matrix application.

*- *DermGEN™- DeCell Technologies inc.*

Findings

Case 1: 49-year-old male with Type 1 diabetes. Wound history of 2 plus years to left 4th MTH present. Treated for osteomyelitis 4 months prior to graft application. Recent traumatic wound present on left 2nd toe. HgA1C 8.2. Matrix applied to both wounds.



"I'm smiling now and feel like weight has lifted off my shoulders, I'm truly thankful…

Case 2: 83-year-old male with Type 2 diabetes, CAD, PAD and amputation of right D1-3 toes. Non-healing wound to right forefoot amputation sites, and chronic trauma related wounds to left shin and dorsum of left foot. HgA1C 8.1

NOTE: further complication resulted in amputation of right D4-5 toes 3 months after graft application.

Case 3: 54-year-old female with Type 1 diabetes and chronic kidney disease. Long history of diabetic foot ulcerations including amputation of multiple toes. Ulcer to right 5th MTH for 6 months. 2mm wound at 6 weeks, when patient moved out of province. HgA1C 8.6.

Case 4: 73-year-old male with PAD and revascularization history. Recurrent osteomyelitis resulting in left forefoot amputation; non-healing for 3 months. HgA1C 6.6

Case 5: 70-year-old male with Type 2 diabetes, PAD and history of osteomyelitis to right 1st MTH resulting in ray amputation of right D1 toe. Non-healing for 4 months. Unable to bring to closure with negative wound pressure therapy.

Results

Wound outcomes were assessed by wound closure. Five of eight wounds closed in 27-29 days from application. The two most complex wounds involving forefoot amputation (Cases 2 & 4) closed in 84 and 119 days, respectively. One patient's wound (Case 3) progressed to a 2 mm superficial wound in 39 days before the patient moved out of province preventing further follow-up.

Wound closure was significantly expedited compared to current practice. Clinicians reported high satisfaction with application, management protocol, and wound outcomes. Patients reported a positive experience and were very satisfied with wound outcomes and its impact on their quality of life.

Implications

This Advanced Regenerative Tissue Matrix* has the potential to improve DFU healing outcomes. Findings here were consistent with previously reported results.[2] The product's one-and-done application saves health resources and clinician time. Ultimately, patients benefit the most, with a timely return to skin health and activities of normal life.

References

1) Ontario Health (June 2021) Skin Substitutes for Adults with Diabetic Foot Ulcers and Venous Leg Ulcers: A Health Technology Assessment. *Ontario Health Technology Assessment Series*. Vol. 21, no. 7, pp 1-165.

2) Costa, I.G., Glazebrook, M., Lu, S., McLaren, A and Gratzer, P.F.A.(2022) A feasibility and safety study of a novel human decellularized dermal matrix to accelerate healing of neuropathic diabetic foot ulcers in people with Type 1 and Type 2 diabetes. *Canadian Journal of Diabetes*. Vol. 46, no. 7, pp 671-677. DOI 10.1016/j.jcjd.2022.03.010..

Complete Solutions for Venous Leg Ulcers: Infection, Exudate Management & Appropriate Compression

Healthy Life garments

Helen Garfield CMP Certified Fitter, Bonnie Draper RN ISWA, Rochelle Macpherson LPN Vanessa Reali RN MN & Elizabeth Trudeau RN INF

AIM:

Venous leg ulcers (VLUs) are the most severe symptom of chronic venous disorder (CVD). Approximately 360,000 Canadians suffer from VLU.

The aim of this case study is to evaluate the Total Therapy Solution to include the effectiveness of a noncytotoxic strategy to heal VLUs by reducing endotoxins and bioburden, managing exudate, and treating the underlying cause.

METHODS:

This patient began treatment plan:

- Cutimed® Sorbact® Swab Hydrophobic Dressing and Cutimed® Sorbion® XL Hydration Response Technology superabsorber cover dressings-initiated March 06, 2022.
- Jobst® Farrow® Wrap short stretch compression-initiated March 13, 2022, to treat underlying cause of CVI
- Dressing changes done 2x weekly with effective management of exudate and infection

RESULTS:

- Wounds healed in 10 weeks with treatment with Cutimed® Sorbact® a noncytotoxic antimicrobial, with Cutimed® Sorbion® XL an effective exudate management and Jobst® Farrow® Wrap an appropriate gradient compression garment.
- Antibiotics discontinued when wound started to heal. No further antibiotics required.

IMPLICATIONS/APPLICATIONS:

Patient tolerated application of all aspects of new treatment plan very well.

- Higher patient satisfaction and greater cost savings with using Velcro compression wraps compared to multi-wraps
- Patient's quality of life improved; was able to go back to playing cards and socializing with friends.

essity

Case 1: Left Lower Leg Venous Ulcer

Medical History: Diabetes, Afib, HTN, Severe Arthritis, Depression.
Medications: Metformin, Amoxi/Clavelin, Escitalopram.
Prior Treatment: 2x weekly dressing changes x 4 years. Hospitalized 4 times. Previous custom Garment
Previous compression wrap
Psychosocial Impacts: Employment impacts including: accessing disability and forced retirement.
Long-term antibiotics due to chronic infections over the 4 years. Patient was instructed to keep legs elevated, resulting in feeling isolated at home.
Not able to participate in social events, including: joining friends to play cards or have coffee; worsened depression
Financial Impacts: $200.00 monthly for dressings x 4 years.

March 11, 2022 | March 14, 2022 | April 22, 2022 | May 16, 2022

Cost Savings Analysis

CHRONIC OEDEMA							
Competitor products	**Qty/ week**	**Cost/unit**	**Total**	**Essity products**	**Qty/ week**	**Cost/unit**	**Total**
Inadine, Silver, Mesorb,	2	$ 8.00	$ 16.00	Super Absorbant dressings **Cutimed Sorbion XL** 1 X / week	1	$ 15.00	$ 15.00
Custom Garment **(For 6 months of Tx)**	1	$240.00	$ 240.00	**Cutimed Sorbact Swab**	1	$ 8.00	$ 8.00
Nursing time (1 hour)	2	$ 56.00	$ 112.00	Compression garment **Jobst Farrow 4000 (For 6 months of Tx)**	1	$ 180.00	$ 180.00
				Nursing time (1 hour / week)	1	$ 56.00	$ 56.00
Treatment cost - X 1 week			**$ 368.00**	**Treatment cost**			**$ 259.00**
Lenght of treatment / Week			208	Lenght of treatment / Week			12
Cost per patient (8 garments/duration of Tx)			$ 28,544.00	Cost per patient			**$ 1,032.00**
**Does not include costs associtated 4 hospital admissions						**Savings**	**$ (27,512.00)**
**Does not include costs of antibiotic Tx						**%**	**-96%**
						Nursing time Savings (Hr)	**404**

Higher patient satisfaction and greater cost savings with using Velcro compression wraps compared to multi wraps[1]

96% cost savings

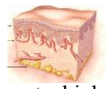
1 Boxall SL, et al. Adjustable Velcro® compression devices as compared to 4-layer compression bandages for the treatment of venous leg ulcers and optimization of patient satisfaction. Wound Practice and Research. 2024;32(3):120-128

Implementing an Evidence-Based Skin Care Guideline to Reduce Incontinence Associated Dermatitis (IAD)

Carla Arpa BScN IIWCC, Kim Johnston MN and Steve Ramganesh NP

Introduction

- The skin covers 20 square feet, and is the largest organ in our body, the main function is protecting against cold, warmth, ultraviolet radiation, pressure, friction, chemical substances and microorganisms. [1]



- The rate of IAD occurs at a higher rate in acute care settings, and organizations require additional support on prevention with guidelines to help support clinicians in the day-to-day practice. [2]
- Clinicians tend to have low knowledge and recognition of IAD and PI with limited education on prevention and management strategies. [3]
- Studies show that training and introduction of structured skin care guideline reduced occurrence of IAD. [4]

Aim

- To identify and disseminate an evidence-based skin care guideline, specifically related to IAD/moisture associated skin damage (MASD) and its role in developing PI. The guideline would be implemented within an acute medicine unit over 3 months, with a goal of preventing/reducing the occurrence of IAD/MASD/PI.

Methods

- Extensive literature review of IAD, MASD and its relationship to PI through:
  - Webinars
  - Literature search
  - Environmental scan
  - Wound NP mentor

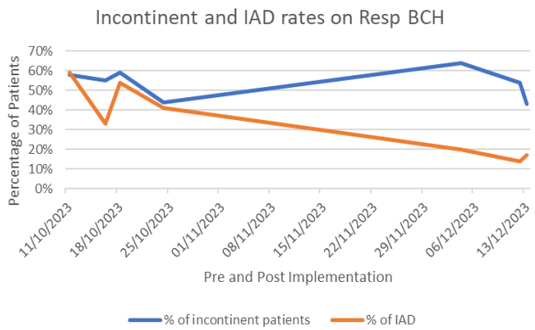
- Literature identifies 3:1 product saves time and increases adherence to a regimen
- Educational plan for staff included:
  - PowerPoint
  - Education board
  - PowToon video
  - Lunch and Learns/huddles/emails

- Pilot project on BCH Respirology implementing continence care cloths (3-in-1) and bathing cloths
- Standardized approach to patient care
- Audit tool
  - Braden and skin assessment documented
  - Prevention & Management Strategies implemented
- Data collection over 3 months
  - Nursing knowledge questionnaire
  - Pre and Post implementation
  - Staff satisfaction Questionnaire
  - Patient/Family Questionnaire

Results/Conclusion

- A standardized approach is now in place as the IAD guideline was implemented: Wounds international IAD Best Practice Principles (PDF) Incontinence-associated dermatitis: moving prevention forward

- Pre-implementation: 54% IAD rate
- Post-implementation: 17% IAD rate
- **Reduced IAD by 74%**
- Reduced bathing time by 12 mins per staff member per patient per bath
- Increase in documentation and identification of IAD/PI



- The education/prevention for IAD and PI were provided to 80% of nursing staff at BCH Respirology unit
- 100% satisfaction in all function of products for both Bath and Shield in Respirology unit
- Staff easily adapted to the change in products.
- Combining products reduced the number of steps involved, saving time and encouraging adherence
- Increase in knowledge of IAD/PI on Respirology unit

Implications/ Applications:

- These applications underline the importance of integrating evidence-based guidelines in wound care to enhance patient outcomes and streamline clinical practices.
- Simplifying the skin care regimen enhances nurse compliance and satisfaction. These findings can be broadly applied across medical and surgical units, leading to widespread patient outcome improvements and reduced hospital stays.

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Ease of Use, Porcine Model Preclinical Study, and Finite Element Analysis of a Novel 7- Day Peel and Place Negative Pressure Wound Therapy Dressing

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Purpose

Reticulated open cell foam (ROCF)* is well-established for use with NPWT†, but tissue ingrowth may occur if left in place for greater than 3 days. A novel, peel and place dressing‡ was created to address this challenge (**Fig 1**).

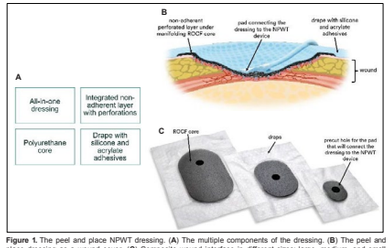

Figure 1. The peel and place NPWT dressing. (**A**) The multiple components of the dressing. (**B**) The peel and place dressing as a wound cover. (**C**) Composite wound interface in different sizes: large, medium, and small (left to right).

Methodology

Usability Study

- Usability studies were conducted to determine if participants could successfully complete dressing application and sealing.
- All participants were experienced NPWT users (6 surgeons and 6 nurses).
- The participants demonstrated how they would apply traditional ROCF and the peel and place dressing on a wound model. The time required for each dressing application and complete sealing was noted.
- The same series of questions regarding performance were asked to ensure direct comparisons.

Preclinical Study

- Full-thickness excisional wounds were created along the spine of 11 swine. Peel and place dressing or ROCF dressing was applied at -125 mmHg continuous NPWT for each wound for 7 days. No dressing changes were performed.
- At pre-euthanasia, the force required to remove the dressings from the wound beds were measured.
- Also on Day 7, wounds were collected for histopathology evaluations and morphometry measurements.
- Animal work was approved by relevant Institutional Animal Care and Use Committee (IACUC) and complied with applicable national/local regulations, including appropriate pain management and anesthesia methods.

Finite Element Analysis (FEA) and Computational Tomography (CT)

- Finite element modeling of tissue strains was conducted using clinically relevant dimensions and mechanical properties.
- In this simulated environment, deformational strain field differences were assessed between the dressings under NPWT.
- A swine cadaveric CT study was performed to assess tissue and dressing behavior before and after application of negative pressure.
- CT imaging was used to confirm the translation of the FEA's theoretical model to a practical scenario.

Data Analysis

- Analysis of variance (ANOVA) was performed for normally distributed data sets and Wilcoxon Test/ Kruskal-Wallis rank analysis for non-parametric data sets. Student's T-test and Kruskal-Wallis post-hoc analyses were then performed and adjusted for multiple comparisons using Bonferroni correction. Alpha was set at 0.05. Statistical analysis was performed using JMP 13.0 software (Cary, NC). Data is presented as mean ± standard error of the mean (SEM).

Results

Usability Study

- All participants (100%) applied both dressings under NPWT (compressed dressing without leaks), but there were differences in the amount of time users required for application. Application time of the peel and place dressing compared to ROCF was 2.5 times faster for the surgeons and 2.6 times faster for the nurses, $p < 0.01$ (**Fig 2**).
- Participants rated the peel and place dressing as "Easy" to use whereas ROCF was rated in between "Neither Easy nor Difficult" and "Slightly Easy" (**Tables 1 and 2**). When asked for reasons for the peel and place dressing rating, verbatim comments included: "Game changer. All done for you. No cutting. Can't be easier" and "Quick, easy, [and] effective".

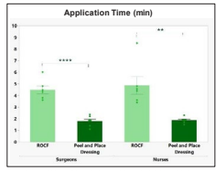

Figure 2. Dressing application times by clinician type of ROCF or peel and place dressing under NPWT. n = 6 surgeons and n = 6 nurses. ****p < 0.0001.

Table 1. Usability Likert Scale

Ease / Difficulty of Use	
7	Very Easy
6	Easy
5	Slightly Easy
4	Neither Easy nor Difficult
3	Slightly Difficult
2	Difficult
1	Very Difficult

Table 2. Dressing Usability and Ease / Difficulty of Use Ratings (All Users)

Dressing Type	Mean Application Time (min)	Slowest Application Time (min)	Mean Subjective Rating
ROCF	4.7	8.5	4.6
Peel and Place Dressing	1.8	2.3	5.8

Preclinical Study

- After 7 days in place, there were no visible dressing material fragments disrupting the peel and place dressing-treated wound beds, whereas foam fragments were embedded onto the ROCF-treated wound beds. Wounds treated with the peel and place dressing did have proteinaceous material present on the surface of the wounds but was not accompanied by signs of irritation, infection, or any indication of impaired healing. The periwound area was also devoid of signs of tissue breakdown or irritation (**Fig 3**).
- The peel force required to remove the peel and place dressing from the wound beds was 35.7 times lower than the force required to remove ROCF $p < 0.0001$ (**Fig 4**).
- Granulation tissue thickness was significantly greater in the peel and place dressing treatment group, $p < 0.01$, and granulation tissue ingrowth was limited to the ROCF group (**Figs 5 and 6**). The granulation tissue quality of wounds treated with the peel and place dressing was better or comparable to ROCF-treated wounds (**Table 3**).
- The percent re-epithelialization promoted was significantly greater in the peel and place dressing treatment group compared to the ROCF group, $p < 0.01$, (**Fig 7**).

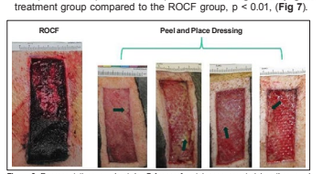

Figure 3. Representative wounds at day 7. Areas of proteinaceous material on the wound bed surfaces are indicated by closed arrows. On day 7, ROCF-treated wounds had the dressing bisected with a scalpel; the medial portion of the dressing was utilized for peel testing, the lateral for histology. Peel and place dressing-treated wounds were randomized to either peel testing and removal of the dressing prior to histology or histology with the dressing intact. ROCF: reticulated open cell foam; IFL: interface layer.

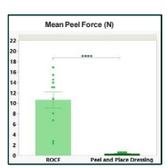

Figure 4. Dressing removal peel forces at days 7. n = 11 Connected bars indicate statistical significance. ****p < 0.0001. ROCF = reticulated open cell foam.

Results (Cont'd)

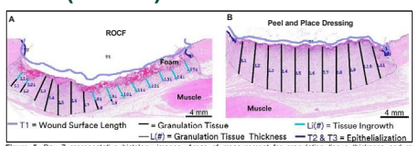

Figure 5. Day 7 representative histology images. Areas of measurement for granulation tissue thickness and re-epithelialization are also indicated. (**A**) ROCF-treated wound bed. (**B**) Peel and place-treated wound bed. Granulation tissue thickness (black and light blue vertical lines) was calculated by measuring every 2mm and the values averaged. Granulation tissue ingrowth (light blue vertical lines) was calculated by measuring every 2mm and values averaged. Percent re-epithelialization was calculated as follows: (regions of re-epithelialization (denoted by dark blue lines)/overall wound surface length (denoted by lavender horizontal lines)) x 100. ROCF = reticulated open cell foam. Note the foam fragments in Figure A in the granulation tissue ingrowth areas marked by the light blue vertical lines versus the lack of foam fragments in the granulation tissue wound bed areas demarcated by the black vertical lines.

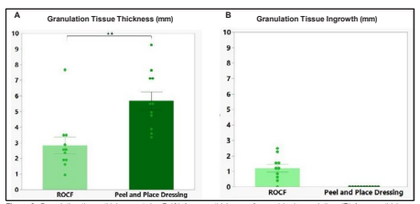

Figure 6. Granulation tissue thickness at day 7. (**A**) Average thickness of wound bed granulation. (**B**) Average thickness of granulation tissue ingrowth into the dressing material. n = 10 to 11 For some wounds, the dressing was left intact on the wound bed to determine tissue ingrowth into the dressing material via morphometrical analysis. Connected bars indicate statistical significance. **p < 0.01. Statistical analysis was not performed for granulation tissue ingrowth. ROCF = reticulated open cell foam.

Table 3. Granulation Tissue Quality Pathology Assessments

Tissue Quality Parameters	
Collagen Maturation	●
Vascularization Levels	●
Inflammation Levels	●
Edema/Seroma Presence	●

● Better than ROCF treatment
● Comparable to ROCF treatment

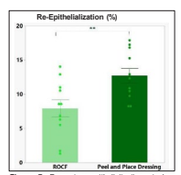

Figure 7. Percent re-epithelialization at day 7. n = 11. Connected bars indicate statistical significance. **p < 0.01. ROCF = reticulated

Finite Element Analysis (FEA)

- FEA of the peel and place dressing under NPWT produced peak and lower tissue strains that extended several mm into the wound bed, while ROCF exhibited peak strains at shallower depths (**Figs 8A to 8C**).
- Downward displacement was also seen in the peel and place dressing along the wound edge, whereas ROCF produced downward tissue displacement at wound-strut contacts (**Fig 8C**).
- **Figure 8C** provides a conceptualized image of the tissue displacements at the wound bed surface as informed by the *in silico* results.

Results (Cont'd)

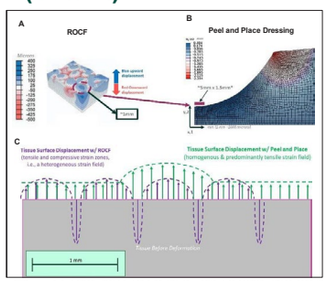

Figure 8. Finite element models depicting vertical tissue displacement under negative pressure of (**A**) ROCF and (**B**) the peel and place dressing under NPWT. The purple rectangle represents the ROCF model size compared to the peel and place dressing model. (**C**) Illustration of superimposed vertical tissue displacements for the peel and place dressing (green lines) and ROCF (purple lines) relative to the tissue before deformation (gray box with pink outline). ROCF = reticulated open cell foam.

Computer Tomography (CT)

- Cross sectional CT images of ROCF and the peel and place dressing applied to a 4 cm deep wound confirmed that downward deflection occurs at the superficial wound edge and that there is vertical tissue distension at the base of the wound (**Fig 9**).
- Compared to the ROCF dressing (**Figure 9A**), tissue displacement at the base of the wound appeared more homogenous in the wound managed with peel and place dressing (**Figure 9B**).

Figure 9. Superimposed CT images of tissue surface deformations before and after application of negative pressure of (**A**) ROCF and (**B**) Peel and Place dressing. ROCF = reticulated open cell foam.

Conclusions

Results of the usability and preclinical studies illustrate that the peel and place dressing provided more favorable results compared to ROCF. Also, the observed absence of tissue ingrowth, with a correspondingly low dressing peel force, may allow it to be used as an extended-wear 7-day NPWT dressing. An initial look into how the peel and place dressing promotes granulation tissue could be, in part, due to the greater tissue engagement compared to ROCF, as seen in FEA.

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Presented at Wounds Canada, October 17-19, London, Ontario, Canada

*3M™ V.A.C.® Granufoam™ Dressing; †3M™ V.A.C.® Therapy; ‡3M V.A.C.® Peel and Place Dressing (Solventum, formerly 3M Health Care, San Antonio, TX, US)

The authors would like to thank Christina Hernandez, Solventum, for assistance with the poster.

MULTI-NATIOTIONAL RADIATION DERMATITIS PREVENTION EDUCATIONAL INITIATIVE ON PROTECTIVE FILM APPLICATION

Rosemary Hill BSN CWOCN WOCC (C), Lions Gate Hospital • Vancouver Coastal Health, Canada

Radiation Dermatitis in Breast Cancer Patients

- Radiation dermatitis (RD) is a common adverse effect of radiation treatment (RT).
- **95% of breast cancer RT patients experience radiation induced skin reactions**, such as erythema, pruritis, pain and edema[1]. 33% of post-mastectomy radiotherapy patients experience severe dermatitis including burn wounds.
- **Strong evidence, including RCTs[2,3] and meta-analysis[4], has emerged on the uniquely protective effect of a soft silicone film dressing**, if applied prior to the first RT treatment and monitored and maintained across all RT treatment weeks.
- Despite level 1 evidence[4] and recommendation in some guidelines[5], film usage remains low in many radiation treatment centers. Hindered patient access is partly due to resource constraints and a lack of education, i.e. limited availability of clinicians and patient caregivers trained in the film application procedure. This educational video initiative aimed to address that challenge.

Methods

- A multi-national team of radiation oncologists, radiation technologists, and wound clinicians, with direct experience of film usage, shared experiences with optimization of film use across patients of various body types and healthcare systems. This resulted in a step-by-step guide that was used as a script.
- Using a patient volunteer, two **6-minute videos** were created to visually demonstrate and describe film application:
  - one directed towards **wound clinicians** without prior experience of application, and
  - the other directed to **patients and caregivers** who would apply the film at home, without clinician assistance.

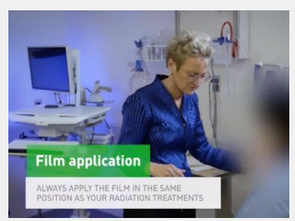
The multi-national team reviewed the videos and will monitor impact on their patient population.

Videos to Educate Clinicians and Caregivers on Protective Soft Silicone Film Application Prior to RT

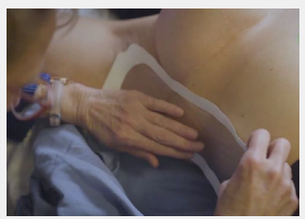
The **resulting step-by-step videos** are freely available for online access (YouTube) and are being widely distributed in some countries (e.g. Canada). These can be accessed from the QR codes below. Excerpts of the videos are highlighted here, to demonstrate application considerations.

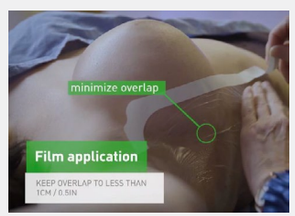
Videos walk viewers through key application information:

- Timing (apply the day before radiation treatment begins & keep on through RT duration)
- Need for clean & dry skin (avoid deodorants & lotions)
- Supplies needed for application (e.g. specific sizes of silicone film, scissors)
- Where to apply the film and how to smooth
- Minimizing film strip overlap
- Special placement considerations post a complete mastectomy
- How to patch film if sections lift
- How to remove film post RT and wash area
- Importance of re-applying film to keep on for 2 weeks post RT

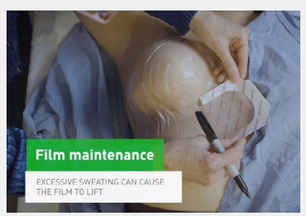


Patient positioning during application

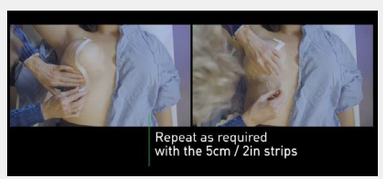

Location to apply & how to smooth film strips



Minimizing overlap to less than 1 cm



How to patch & tips to avoid film lifting



Covering entire region

Video Access

Clinicians

Patients & Caregivers

Results and Next Steps

- To date, these videos have been **viewed over 1700 times** across numerous countries.
- Cancer societies (e.g. Canadian Cancer Society) have contributed to distribution.
- Initial **feedback from patients has been positive**, and a trend in reducing clinician face-to-face time with the patient regarding film application has been observed.
- Translation of the videos into other languages is ongoing.
- The multinational team will continue to monitor impact on their patient population as this evidence-based RT prevention approach becomes more widespread.

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Disclaimer: This educational initiative was conducted outside the US. Use of the soft-silicone film for the prevention of RD has not been reviewed or cleared by US FDA.

Acknowledgement and appreciation to the breast cancer survivor who volunteered to be the model for these videos.

Muscle Pump Activator (MPA) Device-geko™ : A Case Study of Chronic Venous Ulcers (VLUs)

Authors: Sharlenne Sanchez RN, BScN, MN, NSWOC Francis Schweitzer Liao RN, BScN, NSWOC

Aim

To evaluate the geko™ device to treat bilateral non-healing (VLUs) with the aim to manage in Long Term Care (LTC).

Procedure/Method

A 64 male was admitted December 24th,2022 from a reactivation centre to complex care with bilateral VLUs. Left leg - 16 L x 0.4 D – circumferential width, Right leg – 12 x 26 x 0.1

Co-morbidities included Type I diabetes, heart and renal disease, hypothyroidism, and obesity. He experienced chronic infections (pseudomonas and Strep B). The wounds did not respond to many multimodal evidence-based treatments[1] and he was unable to tolerate compression therapy. His ABPIs were Rt. 1.6 mmHg and Lt. 1.5 mmHg (falsely elevated due to Type I Diabetes).

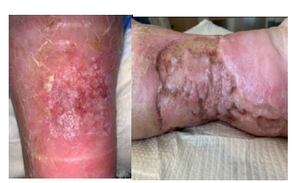
April 28, 2023, consent for photos and publication was obtained and the geko™ was initiated to both legs. The the geko™ device was placed over the femoral head to stimulate the common peroneal nerve and activate the calf and foot muscle pumps. This increases blood flow,[2] reduces edema, and improves wound healing.[3] The geko™ device was worn for 12 hours/day for 7 days per week as per Manufacturers Instructions[4]

Findings/Results

Within one week of treatment with the geko™ device, the frequency of dressing changes decreased from TID to BID due to reduced drainage. Reepithelization was noted on the left leg wounds. August 15, 2023, the wound consultant reported the surface area wounds to the left leg were reduced, the right leg wounds were almost closed, and drainage was minimal. Dec 29, 2023 – all wounds resolved; no dressings required, and compression was tolerated. Patient discharged to LTC January 3, 2024

Rt Tibial Lt Tibial-medial

Baseline- April 26-2023



Rt Tibial Lt Tibial-medial

June 14-2023

Rt Tibial Lt Tibial-medial

October 28-2023

Implications/Applications

Venous leg ulcers are very challenging to manage. They often take a long time to heal and are prone to recurrence. The geko™ device provided an option to manage edema, increase blood flow, and improve wound healing. Overall, it was felt that the geko™device was easy to use, performed well in this case study and could offer clinicians a viable option in treating patients with VLUs

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MDPOCAN0689v2

A best practice guideline on diabetic foot ulcer prevention, assessment and management

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RNAO Best Practice Guideline Program

The **Registered Nurses' Association of Ontario** (RNAO) is the professional association representing registered nurses, nurse practitioners and nursing students in Ontario, Canada. The International Affairs and Best Practices Guidelines Centre is a signature program of the RNAO which focuses on the development, dissemination and active support of the uptake of evidence-based clinical and healthy work environment best practice guidelines (BPG), and the evaluation of their impact on patient/resident/client, organizational, and health system outcomes (Figure 1).

Fig. 1 RNAO's Integrated BPG Model

Purpose

RNAO is releasing the third edition ***Diabetic foot ulcer: Prevention, assessment and management*** **BPG**. The purpose of this guideline is to provide nurses and members of the interprofessional team, adults at risk of or living with a diabetic foot ulcer (DFU) and their care partners with evidence-based recommendations on the prevention, assessment and management of DFUs.

The BPG is to be used:

- For adults at risk of or living with DFUs (≥18 years of age)
- Across the continuum of care
- By nurses and members of the interprofessional team in all domains of practice

Methods

An expert panel of interprofessional health providers, researchers, and a person with lived experience was convened. A 6-step process was then followed to develop the BPG. The Grading of Recommendations, Assessment, Development and Evaluation **(GRADE) approach** was used to conduct systematic reviews, develop recommendations and formulate good practice statements. A scoping review and guiding principles also support this BPG (Figure 2).

Fig. 2 BPG topic areas

5 Guiding principles

- Person- and family-centred care
- Social determinants of health and wellness
- Cultural safety
- Trauma-informed care approach
- Intersectionality

4 Good practice statements

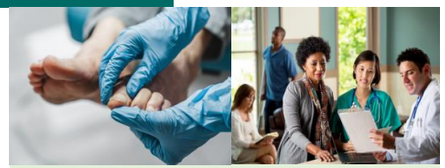
- Risk screening
- Self-management
- Wound assessment
- Plan of care

4 Recommendations

- Person engagement strategies
- Self-screening
- Specialized wound care team
- Virtual care platforms

1 Scoping review

- Cultural safety strategies



Implementation

There are many implementation resources within the guideline. This includes **implementation tips**, **supporting resources** and **appendices** (of tools checklists, etc.) to help put good practice statements and recommendations into practice.

Evaluation and Monitoring

Process and outcome indicators were developed and included in an evaluation and monitoring chart in the BPG to support evaluation and quality improvements in health service organizations for effective DFU care. Process indicators support the evaluation of practice changes during implementation and corresponding process improvements. Outcome indicators assess the impact of implementing evidence-based practice changes.

Next steps

The guideline is expected to be published online in Fall 2024.

Please contact Gladys Hui (ghui@rnao.ca) for any correspondence.

This work is part of the Best Practice Guidelines (BPG) Program, funded by the Government of Ontario.

www.RNAO.ca/BPG

Enhancing Diabetic Foot Ulcer Care for Remote Rural Seniors: The Power of Mobile NIRS Imaging Technology

Tracey Rickards,* Christina Roberts*, Tracey Smith*,Surajudeen Shittu*, Anna Khimchenko, Chris Boodoo**, Karen Cross*****

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Introduction

Patients diagnosed with diabetes mellitus confront a 20-fold increase in the risk of lower extremity amputation compared to the general population. The success of preserving limbs relies heavily on prompt intervention to prevent irreversible tissue damage. Regrettably, many patients seek intervention too late. In Canada, proximity to specialists emerges as a significant risk factor for limb amputation, with individuals residing in rural or remote areas facing 2-3 times higher chances of amputation due to delayed access to care. The pivotal Gemini study (Syed et al., 2020) revealed that patients located just 50 km outside of urban centers experienced elevated amputation rates, underscoring the critical role of access to care. This study investigates novel strategies for foot care in rural settings, focusing on incorporating mobile multispectral near-infrared spectroscopy (NIRS) imaging technology into a community-based foot care initiative for older adults residing in remote areas (Rickards et al., 2023).

Study Design

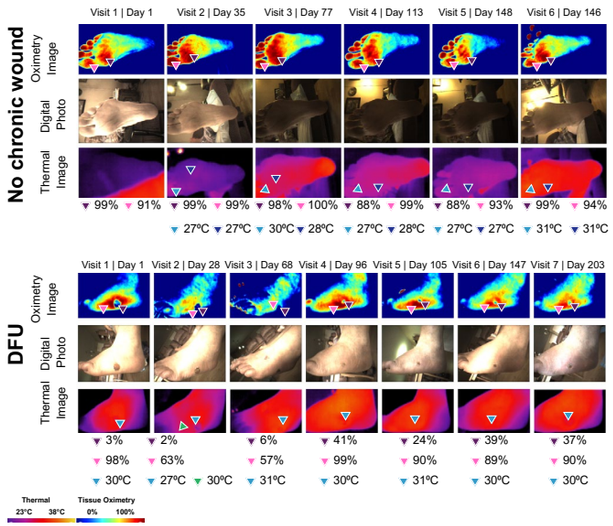
The Mobile Seniors' Wellness Network (MSWN) conducted an intervention study between November 2020 and December 2022. The study enrolled 366 seniors living within a 90-minute radius of the city's community health center, visited by foot care trained nurses and a Registered Social Worker (Rickards et al., 2023). NIRS and thermal imaging device (MIMOSA Pro, MIMOSA Diagnostics Inc., Toronto, Canada) was integrated into the foot care workflow. This study was reviewed by Research Ethics Board (#2020-026, #2020-2916). The study included individuals without chronic wounds and with chronic wounds of various etiologies, including diabetic foot ulcers (DFUs). The collected data included patient demographics, clinical characteristics, and imaging findings. A subset of 16 high-risk participants was analyzed.

Demographic and Clinical Characteristics of Study Participants

Variables	Analysis cohort n = 16	No chronic wound (NHW) n = 11	Chronic wound (DFU) n = 5
Gender			
Male	9 (56.25 %)	5 (45.45 %)	3 (60 %)
Female	7 (43.75 %)	6 (54.55 %)	2 (40 %)
Age			
<60	2 (12.5 %)	0 (0 %)	2 (40 %)
60-70	7 (43.75 %)	6 (54.55 %)	1 (20 %)
>70	7 (43.75 %)	5 (45.45 %)	2 (40 %)
Comorbidities			
Diabetes mellitus	7 (43.75%)	2 (18.18%)	5 (100%)
Peripheral Vascular Disease	4 (25%)	2 (18.18%)	2 (40%)
Hypertension	7 (43.75 %)	3 (27.27%)	4 (80%)

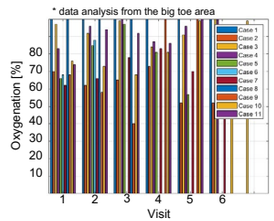
This program was funded by the Healthy Seniors Pilot Project

Results



Case 1 (NCW): 79-year-old male with multiple comorbidities but no chronic foot wounds. The patient has a history of cerebrovascular accident, arthritis, and venous insufficiency. Throughout all visits, the mean tissue oxygenation in the big toe area has remained consistently above 70% and the mean temperature has stayed within a stable range of 27–31.0 °C.

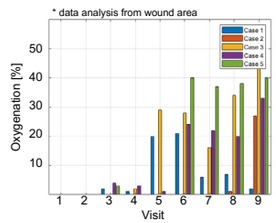
Case 5 (DFU): 58-year-old male patient with DFU located on the left midfoot lateral aspect. The treatment protocol included consistent wound debridement and dressing changes. Initially, the tissue oxygenation in the wound area was low (visits 1-3), but it showed a steady improvement, rising above 20% starting from visit 4. Tissue oxygenation in the peri-wound area consistently exceeded 50% throughout most visits. The wound exhibited notable progress, indicating a positive trajectory toward healing.



No chronic wound (NCW) group - No significant trend for change

Temperature:
- 28°C +/- 2°C
- Average slope: 0.6
- Average trend: Increasing

Tissue oxygenation:
- 83% +/- 16%
- Average slope: 3.5
- Average trend: Increasing



Chronic wound (DFU) group - Trend for improvement

Temperature:
- 29°C +/- 2°C
- Average slope: 0.2
- Average trend: Increasing

Tissue oxygenation:
- 15% +/- 16%
- Average slope: 6.4
- Average maximum slope: 20.1
- Average trend: Increasing

Conclusion

A compact imaging tool can accurately and non-invasively evaluate tissue health at the point of care to identify early intervention opportunities and collaborate towards improved outcomes. With these imaging insights readily accessible, healthcare professionals can assess healing progression. This study demonstrates how an innovative device can equip healthcare professionals with a more comprehensive understanding of wound healing potential. Implementing a widespread diabetic foot screening strategy in Canada such as CFCNs being deployed to the homes of older adults has the potential to save healthcare resources while preventing DFUs.

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DEVELOPMENT AND VALIDATION OF AN EVALUATION FRAMEWORK: RURAL IMPLEMENTATION OF WOUND CARE TECHNOLOGY

Ibukun-Oluwa Abejirinde[1,2], Ugonna Ofonagoro[1], Rebecca Johnson[3], Rebecca Brookham[3]

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PURPOSE: To describe the development and validation process of a comprehensive Monitoring and Evaluation (M&E) Framework for implementing Swift AI-enhanced wound care tools across Brightshores Health System. The framework is designed to reflect the rural wound care landscape and to ensure effective measurement of the project's impact on patient care, clinical outcomes, and healthcare efficiencies.

INTRODUCTION

Setting: Brightshores Health System is one of Ontario's largest rural multi-site hospitals, serving the Grey Bruce region (8600 km²; population of 175,000). Uniquely, the Grey Bruce region has the highest percentage of adults over 65 years of age in Ontario. Wound prevalence in the region is high, and this is coupled with limited care resources, and geographic barriers for patients to access care.

The Advanced Artificial Wound Care Network (AAWCN) is a collaborative project including partners such as Swift Medical, Brightshores Health System, Giishkaandago'Ikwe Health Services, the National Research Council of Canada, and the Centre for Technology Adoption for Aging in the North at the University of Northern British Columbia. The project focuses on improving wound care documentation and access through artificial intelligence (AI) powered assessment technology.

Technology: The project utilizes the Swift Skin and Wound (Swift Medical Inc., Toronto) technology, which offers AI-enhanced, non-invasive wound measurement, progress tracking, and a comprehensive dashboard to view patient wound history, data trends, and generate patient and population reports.

Gap: Swift technology has been utilized widely in urban settings. A need was identified to contextualize an evaluation framework that fit the rural wound care landscape. The purpose of this work is to describe the validation process used to inform and implement a local measurement and evaluation (M&E) framework.

METHODOLOGY

The development and validation of the Brightshores AAWCN project measurement & evaluation (M&E) framework involved a multi-step, iterative process with high stakeholder engagement and triangulation of data (Figure 1).

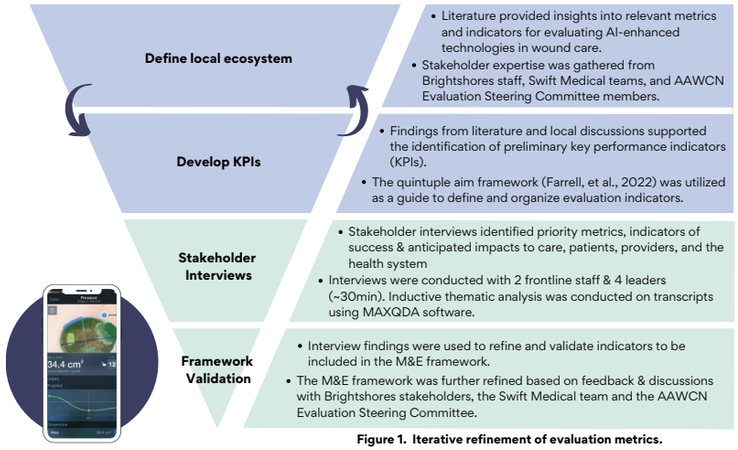


Figure 1. Iterative refinement of evaluation metrics.

FINDINGS

The validated M&E framework was comprised of 43 indicators, guided by the quintuple aim framework (patient experience=8; provider experience=8; cost implications=4; population health/clinical outcomes=16; equity= 7).

The process confirmed that some proposed KPIs were relevant and meaningful to stakeholders. However, many indicators were refined, added, or excluded as a result of this exercise. Below features two examples of stakeholder quotes which validated a proposed KPI, and added a new metric indicating project success.

Validated KPI - Staff Workload
"Success would also be weeding out what doesn't need to be seen in person so that clinician time is used very effectively." (Frontline Staff Interviewee)

Added - Improved Communication
"Improvement in communication between healthcare providers within Brightshores and also the community." (Frontline Staff Interviewee)

IMPLICATIONS & APPLICATIONS

This contextualized evaluation framework allowed for an understanding of the intricacies of local, rural wound care and facilitated a responsive validation and refinement of metrics that will inform decision-making by focusing on relevant and meaningful indicators of success. This process can can guide future evaluations of AI-based care interventions to ensure that metrics are responsive to local decision-making and health impacts.

TIMELINE

1	2	3	4	5
Non-Systematic Review of Lit Preliminary KPI Development	Baseline Data Collection	Stakeholder Interviews Feedback and Validation Discussions	On-Going Data Collection	Data-Informed Decision Making
August 2023	September 2023	April-May 2024	June 2024	March 2026

REFERENCES:

Farrell, T. W., Greer, A., Bennie, S., Hageman, H., & Pfeifle, A. (2022). Academic Health Centers and the Quintuple Aim of Health Care. Academic Medicine, 98(4), 563-568.

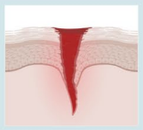
FUNDED BY: DIGITAL

Assessment and Management of Pressure Injuries: The Power of Mobile NIRS Imaging Technology

Stephanie Rintoul, Ari Collerman, Danielle Petruccelli, Leanne Tremain, Deborah Mings, Daniela Monachino, Denise Johnson, Simran Rakhra, Ted Scott, Leslie Gillies

Hamilton Health Sciences

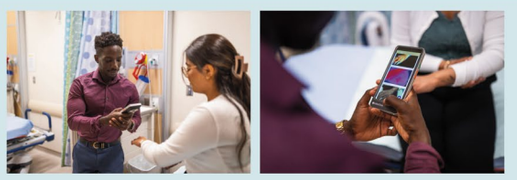
Introduction: Project Need



A pressure injury (PI) occurs when prolonged pressure on a bony part of the body, such as from lying on a mattress or sitting in a wheelchair, damages the skin and underlying tissue. When patients cannot shift their weight, blood flow to the area is reduced, leading to injury. Early signs include looking at the 4T's (Texture, Tone, Temperature and Twinge), but without treatment, these injuries can progress to deep wounds, sometimes exposing cartilage or bone. In severe cases, untreated PIs can lead to sepsis, a life-threatening response to infection. In Canada, the prevalence of PIs are rising, currently estimated at 26% (1), with evidence suggesting significant under-reporting. The most common methods for assessing PI risk in hospitals across North America are the Braden Scale and visual skin assessments. However, these tools have limitations, particularly for patients with dark skin pigmentation, who are 1.8 times more likely to develop later-stage PIs (2, 4). Visual skin assessments and the Braden scale are problematic when being used alone to assess the risk of patients developing PIs. The literature indicates that their ability to correctly identify patients who will develop a pressure injury (sensitivity) is only 51% for visual skin assessments and 78-83%, for the Braden scale (2). Given these challenges, this study aims to evaluate the sensitivity of the MIMOSA Pro compared to the Braden Scale in identifying early signs of PIs in pediatric and adult populations, particularly in individuals with dark skin tones, to ultimately reduce the incidence of severe PIs.

Project Aim & Overview

An Imaging device developed by Ontario-based start-up, MIMOSA Diagnostics Inc. is being studied at Hamilton Health Sciences (HHS) to determine its effectiveness in identifying early signs of PIs. HHS partnered with MIMOSA Diagnostics Inc. through the Coordinated Accessible National (CAN) Health Network, an organization that promotes Canadian innovation. This collaboration aims to assess the sensitivity of the MIMOSA Pro compared to the Braden Scale in ten units from various HHS pediatric and adult acute care hospitals. Patients will be evaluated using both tools for early detection of PIs, with data tracked through Epic.The study will focus on three areas: patient outcomes, ease of use, and cost savings. Objectives include determining if MIMOSA Diagnostics Inc.'s thermal and oxygen saturation imaging technology provides more sensitive early detection, integrating it effectively with HHS's clinical workflows and electronic health record, and evaluating its impact on patient care and costs, including its Value on Investment and Return on Investment.



Innovative Solution

Treating PIs can range from $63,000 to $130,000 (3), yet 30% of these injuries can be prevented with proper skin and tissue assessment, as well as thorough documentation. The MIMOSA Pro, a pocket-sized multispectral near-infrared spectroscopy (NIRS) imaging device with thermal imaging, is designed to enhance PI prevention efforts. In less than one second, the device captures temperature (°C), tissue oxygenation (StO_2), and a digital image, providing objective data that supports early intervention and documentation. MIMOSA Pro's predictive capabilities, along with its in-development melanin adjustment algorithm, aim to deliver equitable outcomes for diverse patient populations, addressing the challenges in detecting PIs in individuals with dark skin tones. The MIMOSA Pro can identify signs below the skin's surface that are not yet visible to the naked eye, capture the images, and document information into the hospital's secure health records system.

Implications & Applications

Integrating imaging into PI prevention protocols aims to enhance patient care by providing objective and consistent skin assessments. NIRS and thermal imaging address the limitations of subjective visual assessments and documentation challenges, especially in diverse patient populations. This project represents the beginning of testing new technology in Canada that has the potential to improve health equity for our patients. We are currently awaiting results, as preventing hospital-acquired PIs and sepsis remains a strategic priority for HHS, alongside HHS and MIMOSA Diagnostics Inc.'s commitment to equity, diversity, and inclusion.

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View the Poster

SOUTHLAKE REGIONAL HEALTH CENTRE

Lose the Brief

BPSO RNAO BEST PRACTICE SPOTLIGHT ORGANIZATION CANADA

A journey of reducing brief use in an acute care hospital setting

Ann Klein, RN, BScN, MCISc-WH, NSWOC, WOCC(C), Veronika Surowiec, RN, BScN, NSWOC, WOCC(C) & Marcia Westover, RN, BScN (Professional Practice Lead)

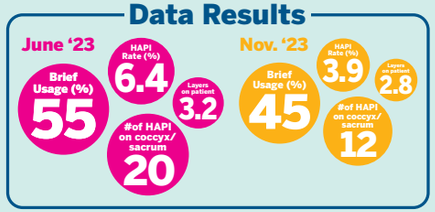
Goals

- Offer alternative solutions to decrease the use of adult briefs
- Reduce incidence of HAPI on the coccyx and sacrum
- Reduce the number of layers under patients
- Increase staff knowledge of alternative ways to manage incontinence
- Empowering patients to make their own choices on incontinence care

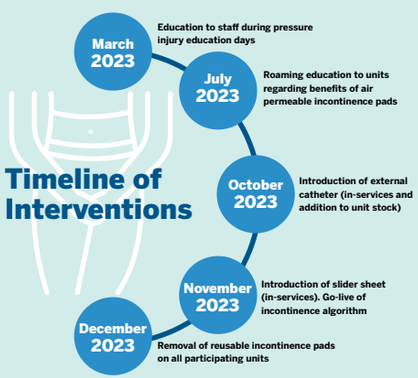
Outcomes

- Participating units had a 10% reduction in adult brief use
- The HAPI rate was 3.9%, indicating a 2.5% decrease from the initial prevalence rate
- The number of coccyx and sacral pressure injuries reduced from 20 to 12
- The average linen layers used reduced to 2.8 from 3.2

Data Results



Timeline of Interventions

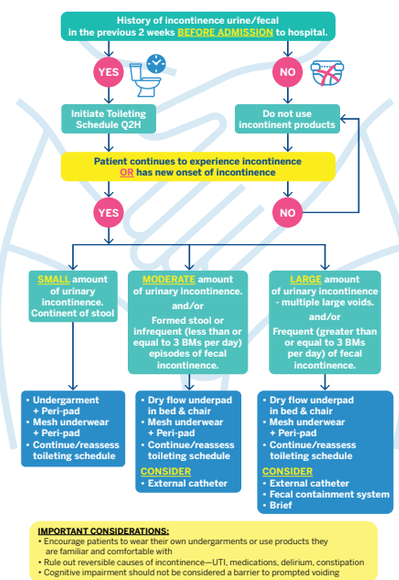


Introduction/Background

Literature has demonstrated that the elimination of briefs, a layer between a patient and a bed surface, results in a 20% reduction in pressure injuries.[1] In addition, the use of reusable incontinence pads in comparison to disposable incontinence pads increases the risk of hospital acquired pressure injuries (HAPI).[2] Incontinence associated dermatitis is an independent risk factor for pressure injury occurrence.[3]

Southlake Regional Health Centre (SRHC) is a 500 bed acute care hospital in Newmarket, Ontario. Pressure injury rates are tracked quarterly at SRHC. In June 2023 our HAPI rate was 6.4%, with 20 pressure injuries occurring on the coccyx or sacrum. At the time of the study, 55% of patients were wearing an adult incontinence brief and there was an average of 3.2 linen layers between patients and bed surfaces.

SOUTHLAKE REGIONAL HEALTH CENTRE Incontinence Algorithm



Actions taken

In response to these findings, the "Lose the Brief" initiative was developed. The objective was to offer alternative solutions to decrease the use of adult briefs.

External catheter
- Options for both male and female anatomy
- Extensive ongoing external catheter education supported by product representatives to front-line staff

Removal of reusable incontinence pads
- Obsolete due to the number of air loss surfaces
- Introduction of slider sheets as staff were using reusable incontinence pads to reposition patients; supported by occupational health due to staff injuries
- Increased stock of disposable air permeable incontinence pads
- In-services highlighting the increased effectiveness of disposable air permeable incontinence pads
- Slider sheet education provided by linen company

Reducing brief use
- Early socialization of staff to the notion of brief reduction
- Decreased stock of adult briefs
- Re-introduction of mesh panties with a peri-pad

Creation of an incontinence algorithm
- To support and guide staffs' decisions related to incontinence management solutions

Comprehensive Education
- In-services by product representatives
- Just in time unit education by wound care team and professional practice members
- Formal education during orientation and quarterly education days

Ongoing work needed

The project is an ongoing quality initiative that supports culture change associated with incontinence management.

Next steps will include:
- Change in admission documentation to include an incontinence assessment and algorithm
- Patient education regarding increased risk of pressure injuries with brief use
- Physician education on the external urinary management system (external catheter) as an alternative to indwelling catheters
- Expanding the project to our off-site rehabilitation facility and the emergency department

References:
1 Kayser, S. A., VanGilder, C. A., & Lachenbruch, C. (2019). Predictors of superficial and severe hospital-acquired pressure injuries: A cross-sectional study using the International Pressure Ulcer Prevalence™ Survey. International Journal of Nursing Studies, 89, 46–52. https://doi.org/10.1016/j.ijnurstu.2018.09.010
2 Francis, K., Fang, S. M., Cohen, B., Salter, H., & Hamel, P. (2017). Disposable versus washable absorbent Underpads for prevention of hospital-acquired incontinence-associated dermatitis and pressure injuries. Journal of Wound, Ostomy & Continence Nursing, 44(4), 378–379. https://doi.org/10.1097/WON.0000000000000337
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LOWER LIMB Preservation Pilot

CONTRIBUTORS:

Dr. Asem Saleh, Vascular Surgeon

Home and Community Care Support Services (HCCSS)

Spectrum and Bayshore Community Nursing Clinics

Submitted by:

Maryanne D'Arpino, RN, BScN, MScN, CHE,
Spectrum Health Care

AIM: Improve outcomes for patients with complex chronic lower extremity wounds.

BACKGROUND:
Lower extremity wounds and limb loss is a global medical and social problem that has burdened healthcare systems for years.

GLOBALLY

A limb is amputated every **30** seconds due to diabetes

ONTARIO

$400M diabetic foot ulcers

$1.6B cost of diabetes

TORONTO

Mean cost of DFU

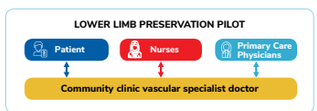
Up to 85% of amputations are preventable with early and longitudinal interventions.

PROCEDURE/METHOD:

COLLABORATIVE, MULTIDISCIPLINARY AND INTEGRATED APPROACH

Between June 2021 and July 2022, a year-long lower limb preservation initiative was conducted.

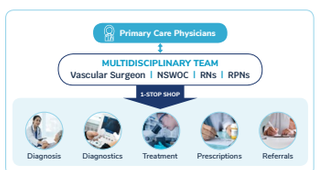
Through this model, patients, nurses, and primary care physicians all have access to a vascular specialist doctor, within the community clinic setting, reducing demand on hospital-based resources.



We enrolled 75 patients receiving Home and Community Care Services for lower extremity wounds in the Mississauga/Halton region.

Wounds were classified as venous ulcers, diabetic foot ulcers, arterial ulcers, and others. Patients requiring further diagnostics, treatment changes, deep tissue debridement, or specialist referrals were identified. Wound images, wound size, incidence of infections, and hospital admissions were collected.

Surveys were conducted with a subset of patients to collect subjective data on overall satisfaction and empowerment in their care.



Instead of a lengthy referral process to enable a patient to see a specialist with complex lower leg wounds were referred to our clinic where we have a multidisciplinary team in place (Vascular Surgeon, NSWOC, RNs, RPNs, in consultation with the patient's Primary Care Clinician).

This team provides on-the spot diagnosis, diagnostics and treatment (dopplers, biopsies, prescriptions, scripts for compression garments) and referrals for lab tests and medical procedures.

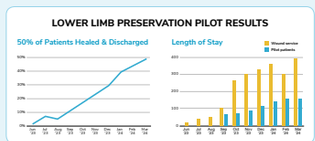
The result was a 1-stop shop for care with in-person collaboration between the Physician Specialist, Nurse and Patient to develop a care plan to bring a wound to closure.

FINDINGS/RESULTS:

LOWER LIMB PRESERVATION PILOT RESULTS

Those on the pilot – people who had been on service for years – their wounds healed! And they healed quickly!

Pilot patients had a significantly shorter length of stay on the pathway than typical wound service.

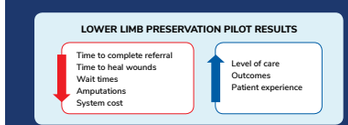


- A total of 45 patients were followed for the full year of our phase 1 trial, with wound healing observed in 41 patients as defined by discharge from Home and Community Care Services.
- Nine were readmitted for wound recurrences requiring further care and eventual discharge.
- Ten patients surveyed provided overwhelmingly positive feedback.

All 45 patients continue to follow-up on a regular basis to help identify recurrences and provide holistic care including medical optimization.

IMPLICATIONS/APPLICATIONS:

SCALE AND SPREAD THE MODEL



We propose an evidence-based, community-specific, integrated and patient-centered model for orchestrating limb-preserving care.

By leveraging collaborative tools, building atop existing infrastructure, and centralizing patient data securely and accessibly, we can empower patients and providers in their communities to improve outcomes.

A portable ultrasound wound debridement tool shows promise in ease of effective removal of non-viable tissue in a variety of complex wounds.

B. Chan, A. Lo, D. Jiang, G. McClure, V. Tsui, R. Bishop

Halton Healthcare
GEORGETOWN • MILTON • OAKVILLE

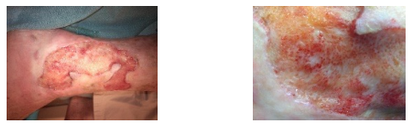
Aim: To evaluate a portable ultrasound wound debridement tool's ability to debride non-viable tissue on differing wounds in a community hospital. Outcomes evaluated include effectiveness, ease of use, and patient reported comfort. The device is a self-contained handheld debridement tool that has a 54 kHz ultrasound head surrounded by vibrating bristles to provide both micro and macro debridement (Curasonix ultrasound).

Background: Wound debridement and hygiene represents a key element in wound healing. Reducing non-viable tissue, bacteria and biofilms promote the wound healing process. Ultrasonic debridement is an effective way to reduce biofilm and remove non-viable tissue (Kataoka et al. 2020). Challenges in the use of ultrasonic wound debridement include availability of technology, cost, and ease of use in a variety of clinical environments.

Method: A 5 patient case series looked at individuals with a variety of lower extremity wound etiologies all requiring debridement of non-viable tissue. After informed consent, each patient received a one-time treatment with the Curasonix ultrasound debridement tool. The procedure included application of topical ultrasound gel to the wound bed. The ultrasound wound debridement tool was applied to the wound moving in both linear and circular motions for 5-15 minutes. 2 of the patients that had pain prior to starting the debridement received topical analgesic. Pre and post debridement photographs were taken to evaluate the effectiveness.

Case #1. 65-70 year old underwent a great toe fusion and postoperatively, the incision dehisced. A significant amount of non-viable tissue noted in the wound bed. Aggressive debridement was not desired as underlying hardware is present. Post debridement image shows an exposed blood vessel that was not injured with the application of this debridement tool demonstrating gentle but effective debridement.

Case #2. 75-80 year old with a chronic venous leg ulcer. Patient unable to tolerate optimal compression due to pain. Conservative sharp debridement has been limited due to pain. Topical analgesic applied prior debridement. Patient tolerated procedure well and debridement effective



Case #3. 65-70 year old with a dorsal foot wound secondary to ischemia and swelling secondary to CHF. Eschar removed leaving thick wet non-viable tissue present.

Case #4. 65-70 year old diabetic requiring 5th toe amputation. Initial post surgical wound required minor non-operative debridement. Debridement effective and did not cause pain.

Case #5. 75-80 year old with a dorsal foot wound developing after experiencing gross lower extremity edema. Debridement effective as without eliciting pain.

Findings/Results: The pre and post debrided wound beds were photographed and evaluated by team members. Each wound demonstrated visible reduction of non-viable tissue. Team members using the device reported it as being extremely easy to use. Patients did not report a significant increase in pain during the procedure.

Implications/Application: There seems to be promise with this portable ultrasound wound debridement tool to use on wounds requiring debridement -- it is easy to use, no patient reports of increasing pain with use, and may be a good alternative to traditional sharp debridement. Further investigation on the effects of this form of debridement on wound healing trajectory wound be beneficial.

Referrence:

Kataoka Y, Kunimitsu M, Nakagami G, Koudoun as S, Weller CD, Sanada H. Effectiveness of ultrasonic debridement on reduction of bacteria and biofilm in patients with chronic wounds: A scoping review. *Int Wound J*. 2021; 18: 176–186. https://doi.org/10.1111/iwj.13509

Curasonix Ultrasound tool provided by Sterasure Inc.

Emerging Insights and Impact of an Innovative Accredited Wound Care Champion Program

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Cape Breton University, School of Nursing[1]; Wounds Canada[2,] and the Registered Nurses' Association of Ontario[3]

Background

To help address the rising incidence of acute and hard-to-heal wounds, Wounds Canada Institute (WCI) and Registered Nurses' Association of Ontario (RNAO) co-developed the Accredited Wound Care Champion Program (AWCCP).[1-4] The AWCCP is targeted to regulated health-care providers who self-identify as advanced-beginners in their wound care knowledge and skills interested in becoming proficient practitioners.

Given that 30 to 50 per cent of health care involves wound care[5], health-care professionals across all sectors need a strong foundation in skin health and wound care to address this significant health issue.

Comprehensive, interprofessional, and competency-based continuing education is critical to keep health-care professionals up to date on evidence-informed best practices.

The overall goals of the AWCCP are to: identify persons at risk for wounds; implement appropriate preventative and treatment measures using a systematic, interprofessional, person-centred approach; and lead change to sustain excellence in wound care practices in their workplace across all health sectors

Ethics: Cape Breton University Research Ethics Board.

Funding: Funded by the Ontario Ministry of Health.

Ontario

Accreditation: The AWCCP is accredited through the University of Toronto, Dalhousie University and the Canadian Nurses Association.

Microcredentials: AWCCP is pending microcredentias from Nippissing University

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Study Objectives of the Accredited Wound Care Champion Program

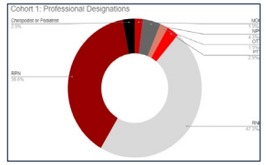
1. To evaluate an evidence-informed, interprofessional advanced-beginner → proficient level wound care education program for regulated health-care professionals[7-15]

2. To evaluate clinicians' knowledge and skills pre-, mid- and post-program, focusing on:
   - Practice change
   - Shifts in confidence levels
   - Learning Community (discussion forum)
   - Skills Labs and Practical Examination

Methods

Procedure/Method: A person with a hard-to-heal wound often experiences a range of biopsychosocial challenges requiring interprofessional team collaboration. Existing wound education, however, provides limited opportunity for integrated team wound care. To address this gap, the Wound Care Champion Program offers a comprehensive learning experience focused on clinical care and implementation science to advance practice.

The program was launched in February 2023 and since then has been offered to participants over three cohorts, including NP, MD, RN, RPN, OT, PT, Chiropody providers and more. (See *Cohort 1: Professional Designations* in graph below).This poster addresses the research findings related to Cohort One (graduates n =116)



Brief AWCCP Program Structure

- 43 highly interactive online modules
- 10 synchronous webinars and post-discussion board
- RNAO Best Practice Champions Blended Learning Series (2 online modules & 2 virtual workshops)
- 3 in-person Skills Labs (completed over two days)
- 2 robust assignments
- 1 Knowledge quiz
- 1 in-person Practical Examination
- Electronic resources focused on skin and wounds in clinical practice

Data Analysis: Results

Findings/Results: 116 regulated practitioners from multiple settings (acute, primary care, community, home care, long-term care and rehabilitation) graduated as a learning community within the premiere Ontario cohort of the AWCCP.

- **Practice change**
  - Pre-program survey data suggest moderate levels of confidence in wound care, highlighting opportunities to improve wound care knowledge and skill, and in-turn practitioner confidence.
- **Confidence levels**
  - Surveys at the mid-term and post-program, as well as through focus groups suggest shifts in self-reported levels of confidence in wound care in multiple areas.
  - A focus group is planned for graduates at the 2024 Wounds Canada national conference
- **Learning Community**
  - Learners participated in a Discussion Board called the "Learning Community"
  - Preliminary themes of teamwork and increasing confidence are emerging as over 1000 posts and replies are coded.
  - Respondents reported they were engaging in specific practice changes based on their learning, role modeling proficient levels of wound care, and beginning to take a leadership role to advance patient-centred, high-quality, cost-effective wound care in their organizations

Participant quotes:
"The hands-on parts were my favorite. Gave me an opportunity to ensure my techniques were correct and if I was doing anything wrong. I wish every nurse or health-care worker could have a hands-on skills lab day." – AWCCP participant

"My entire team should be in the program" " I think the WCCP should be offered to all clinicians working in skin and wound management" and 96.4% of those who completed the program agreed or strongly agreed. " AWCCP Participants"

Implications/ Application

- As an innovation in wound care education, the AWCCP offers an interprofessional learning community within which clinicians across the continuum of care are advancing their skin and wound care knowledge, skills, and practice.
- Data from Cohorts graduating in Winter 2025 will be analyzed in Spring 2025.
- Program evaluation is ongoing and will continue with current and future cohorts.

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Preparing Personal Care Providers to be Part of the Skin Health and Wound Care Team

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Cape Breton University, School of Nursing[1]; Wounds Canada[2,] and the Registered Nurses' Association of Ontario[3]

Research Background

To help address the rising incidence of acute and hard-to-heal wounds, Wounds Canada and Registered Nurses' Association of Ontario co-developed the Skin Health Program for Personal Care Providers (PCPs).

PCP's are an integral part of the care team in home and community care. The aim of the program is to enhance skin health excellence by augmenting the knowledge of PCP's related to their understanding of key aspects of patients' skin health, wound prevention and early detection and reporting of skin issues.

Ethics: Applied for and approved by Cape Breton University Research Ethics Board.

Funding: This work has been funded by the Ontario Ministry of Health.

Accreditation: The Skin Health for PCPs is pending micro-credentialing through Nippissing University, Ontario, Canada.

Research Primary Contact

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Study Objectives of the Skin Health Program for Personal Care Providers

1. To evaluate an evidence-informed skin health program for unregulated health-care professionals.
2. To evaluate participants' knowledge pre-, and post-program, focusing on:
   - Practice change
   - Shifts in confidence
   - Learning community (discussion forum)

The *Skin Health* program is a multifaceted, evidence-based program in which participants learn the importance of promoting skin health and wound management as well as how they can best contribute their learning as unregulated care providers with the goals to:

- Encourage an interprofessional, collaborative and person-centred approach to skin health and wound prevention.
- Provide PCPs with the knowledge, judgement and attitudes to identify patients at risk for skin breakdown and communicate appropriately to optimize skin health and prevent wounds.
- Apply practice change in the health of individuals and communities. (long-term and community care settings)

Specific topics include: skin structure and functions, common types of skin damage and risk factors for skin damage, how to carry out and report knowledge-based observations and related actions, and how to implement patient-centred strategies to maintain healthy skin and prevent skin damage.

Procedure/Method

Two-hundred (n=200) PCPs from home and community care engaged in program quality improvement surveys and a mixed methods research evaluation related to impacts and outcomes.

Preliminary Findings

Results indicated changes in knowledge and confidence associated with the program. Through evaluation surveys, learners have stated "*The program has also given me the confidence to provide more client and family-based teaching, in situations where skin integrity may be a concern.*"

From the demographic information we learned that many of the learners were internationally educated and employed in full time positions. The full-time status means the funded program was more likely contributing to longer term capacity building. The program also provided an opportunity to internationally educated staff to build networks in wound care.

Competencies

Based the input from key stakeholders including PCPs, and employers, in the program planning and delivery processes, a set of competencies clearly defining the role of PCPs as members of the wound care team was developed.

Graduates of the Skin Health program are prepared with the following competencies:

- Awareness of the need to adhere to agency/facility policies regarding their role, knowledge and judgment when describing common skin damage and issues that lead to pressure injuries, skin tears and leg ulcers
- Skills in identifying risk factors for skin damage (e.g., hydration, positioning)
- Ability to implement interventions to reduce risk in consultation with the care team
- Knowledge of how to protect skin and prevent skin damage while providing person-centred care
- Ability to observe signs of moisture-associated skin damage (MASD) and medical adhesive related skin injury (MARSI) and to report issues to a regulated health-care professional, while working collaboratively to support a care plan
- Ability to observe and report early signs of new or worsening skin damage specific to dryness, moisture, pressure, trauma, infection and dehydration

Implications and Discussion

Implications for practice: This program prepared PCP's to be part of the integrated, interprofessional Skin Health and Wound Care Team through competency attainment and improving self-reported confidence levels.
Implications for learners: This program is flexible and supported learner's educational needs, respects their learning style as a self-paced, online program that takes work-life balance into account.
Implications for education: This program meets the skin health needs of the clients, residents, care partners and families. In addition, organizations seeking evidence-informed programming for skin health can easily access the program.
Based the input from key stakeholders including PCPs, and employers, in the program planning and delivery processes, a set of competencies clearly defining the role of PCPs as members of the wound care team was developed.

References

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Support Surface Upgrade to a Medical Unit: Reduction of Healthcare Acquired Pressure Injuries

Rosemary Hill, RN CWOCN NSWOC WOCC(C), Christina Hagner RN MN, CNS-WOC, WOCC(C), Nicholas Salterio, MSc

Background

- In 2021, over 2/3 of our acute care mattresses were found to be greater than 10 years old.
- Senior leadership engaged with clinical experts (NSWOC, OT, PT) to review bids for replacing the mattress fleet.[1]

Intervention

- In 2023, the Baxter Centrella bedframe and Pro+ mattress was selected to replace ~1200 beds across our acute care sites.

*

Surface Features

- Customized, non-powered pressure redistribution.
- Microclimate management.
- Sloped heel section to offload heels.
- AI-compatible integration with electronic health care records.

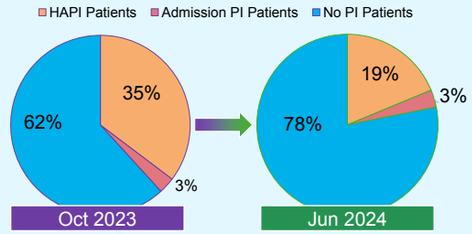
Bedframe Features

- Audible voice command bed alarms in different languages.
- AI-compatible integration with electronic health care records.
- Visual alarms at the foot of the bed.

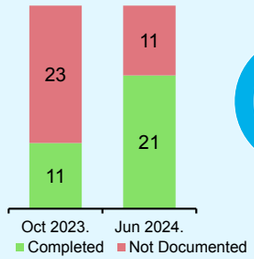
Prevalence Study Data

Healthcare Acquired Pressure Injuries

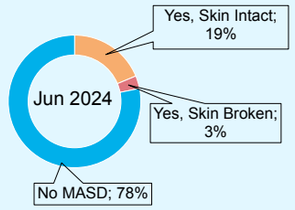
Patient PI Occurrence



Braden Assessment on Admission



MASD Patients



Discussion

As a result of 80% new support surfaces, there were 16% fewer patients with healthcare acquired pressure injuries (HAPI). Additionally, there were 47% fewer HAPI wounds post intervention.

HAPIs were 24 times more likely to occur within the first three weeks of hospital admission (p=0.0036). Inversely, MASD was 13 times more likely to occur after the first three weeks of hospital admission (p=0.008).

Interestingly, despite not intervening on education around risk assessments, we found Braden assessment documentation on admission increased by 32% after the initial prevalence study.

This is suspected to be a result of an organic shift in foundational nursing care by the unit, as increased attention was made to the new beds, specifically around reducing linen layers on the bed (to promote effective microclimate management).

Future Implications

These results should challenge clinicians to assess their current bedframe and mattresses, particularly in high-risk populations.

We have demonstrated choosing surfaces that offer advanced microclimate therapy, customized non-powered redistribution, including shear management results in patient comfort, but more importantly, reduction in healthcare acquired pressure injuries.

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*Centrella Pro+Surface, retrieved from https://www.hillrom.ca/en/products/pro-plus-surface/.

Indigenous Health | Vancouver CoastalHealth

New and Innovative CDO technology for Limb Salvage and Multiple Wound Etiologies

Rosemary Hill BSN CWOCN NSWOC WOCC(C)- VCH Coastal - Lions Gate Hospital
Michele Labbie RN, MN, NP, Westview Health Center, Stoney Planes AB

Alberta Health Services

Vancouver CoastalHealth

Aim

CDO is an adjunctive therapy that delivers 100% oxygen to the wound bed. Research shows its impact on diabetic foot ulcers[1,4], hard-to-heal wounds[3] and on pain[2]. Recent changes in technology have resulted in reducing the weight by 50%, increasing the maximum flow rate to 15 ml/hr, introducing a magnetic charging cable and adapter to enable easier connection and several new oxygen diffusion dressings. The aim of this study was to review new and innovative CDO technology, implement the therapy for limb salvage and difficult-to-heal wounds of various etiologies.

Procedure

CDO was applied to 5 different patients, complex wound etiologies primarily utilizing the oxygen diffusing non bordered dressing, and in each case treatment time ranged from several weeks to a maximum of seven months.

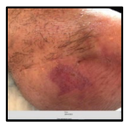
Case #1: 59 year old with a burn to below knee amputation (BKA) stump. Left Below Knee Amputation (2001) for CRPS. Ablation of nerves due to pain and burn sustained at site.
Case #2: 76 year old, with advanced chronic venous insufficiency (CVI) and recurrent venous leg ulcer to left ankle with persistent 9-10/10 wound pain.
Case #3: 88 year old with hypertension, CAD, cardiac dysrhythmia, CHF, chronic venous insufficiency and arterial insufficiency with a large chronic painful wound with mixed arterial and venous etiology.
Case #4: 60 year old Previous breast cancer survivor, had breast nipple sparing mastectomy and developed necrotic nipple.
Case #5: 53 year old DM, poorly controlled, HgA1c 14.8, high cholesterol, possible amputation.

Case #1

Results: Burn to below knee amputation (BKA). Stump had full closure.

November 29

January 25



Case #2

Results: : chronic venous insufficiency and recurrent ulcer with persistent wound pain. Pain was controlled with 80% closure.

January 17

June 19

Case #3

Results: Diabetes Type II, osteomyelitis preparing for an amputation. Wound closed with CDO

October 14

December 1

July 31

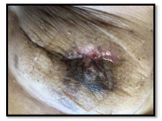
Case #4

Results: Nipple saved and wound closed.

November 27

December 23

January 25



Case #5

Results: Wound closed amputation prevented and pain controlled.

December 13

February 8

May 5

Implications

- Positive wound healing was established in each case with pain controlled.
- In two cases amputation was prevented. In other difficult-to-heal cases we were able to close or significantly reduce wound size and save the necrotic nipple.

Implications

- Multiple new features, dressings and improved charging have positively improved ease of use.
- CDO therapy can be used adjunctively in combination with best practice in hard-to-heal wounds to optimize wound healing and wound pain.
- This case series supports the findings of the 2022 Meta-analysis[4] **the use of topically applied oxygen therapy** as an adjunctive therapy to optimal standard of care in the treatment of Wagner 1 and 2 DFUs

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Narrative Review for Development of Nutrition Supplementation Framework for Wound Healing

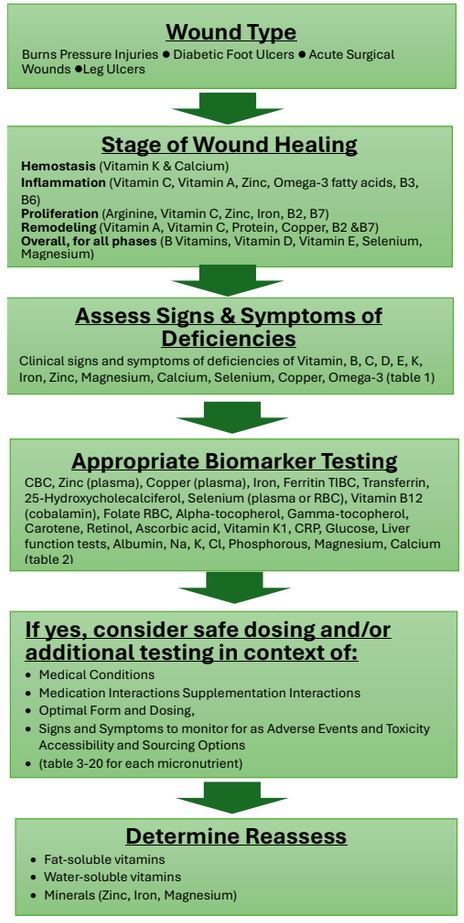
Alexandria Crowe-Naumik BScN, MN, MBA, RN(EC), Nurse Practitioner

Aim

The purpose of this narrative review is to synthesize existing research to develop a practical framework guiding the use of nutritional supplementation in wound healing with all the information in one reference.

Methods

A comprehensive literature search was conducted across multiple databases, including PubMed, Cochrane Library, Embase, and OVID, using keywords related to "wound healing," "nutritional supplements," "vitamin(s)," "mineral(s)," "protein," and "antioxidants." Studies were selected based on predefined inclusion and exclusion criteria, focusing on relevance, study design, and publication date. Key information, such as study design, types of wounds, types of supplements, dosages, outcomes measured, and findings, was extracted from the selected studies. The quality of the included studies was assessed using the McMaster University Health Evidence Quality Assessment Tool. The findings were synthesized into a narrative highlighting effective micronutrients, associated stages of healing, wound type considerations,



Results

The literature supports improved wound healing outcomes with the use of additional micronutrient supplementation, including vitamins A, B6, B9, B12, C, D, E, K, zinc, iron, selenium, magnesium, omega-3, and/or arginine (Seag, 2021; Berger, 2022; Brown,2010). When determining which nutrients are needed, it is important to consider the stage of wound healing and the type of wound (Brown, 2010). Clinical assessments for signs and symptoms of individual micronutrient deficiencies, along with biomarkers, will support safe and effective targeted dosing, with ongoing monitoring and reassessment recommendations (Seag, 2021; Edman, 2007). Synergy, medication interactions, and medical conditions must also be considered when using higher dose supplementation (Berger, 2022; Edman, 2007).

Discussion

This synthesis provides a comprehensive framework for clinicians to assess and address micronutrient deficiencies. The outlined approach supports the safe implementation of targeted supplementation, incorporating clinical assessments and biomarker monitoring to guide dosage and ongoing treatment adjustments. By integrating these evidence-based recommendations into wound care plans, clinicians can enhance the effectiveness of nutritional interventions, leading to improved healing outcomes

Reference

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Trillium Health Partners Better Together

Shieh vs Braden Scores: Evaluating Pressure Injury Risk Assessment Tools in the ICU Patient Population

Project Team: Allison Da Silva, Hetal Bambharoliya, Wendy Campbell, Ashar Siddiqui

Background & Aim

- Pressure injuries (PI) are a significant problem to patients' overall health and a burden to the healthcare system. Patients in intensive care units (ICU) are the highest risk population with prevalence rates ranging from 12-37%.[1]
- The Braden scale does not capture all potential risk factors and does not adequately reflect the risk factors in specific patient populations such as ICU[1,2]
- Additionally, the Braden Scale is scored based on a subjective nursing assessment. This can lead to inconsistency and measurement errors[2]. The Shieh score uses objective data to determine PI risk capturing many of these factors[3]
- The aim of this study is to evaluate if the Shieh score identifies very high-risk ICU patients sooner with more accuracy than current practice with the Braden scale, or in combination with the Braden scale

Research Question

- *Would the addition of the Shieh score have identified the patients who developed a stage 2 and above PI in ICU at a higher level of risk than the Braden score alone prior to the development of a PI?*

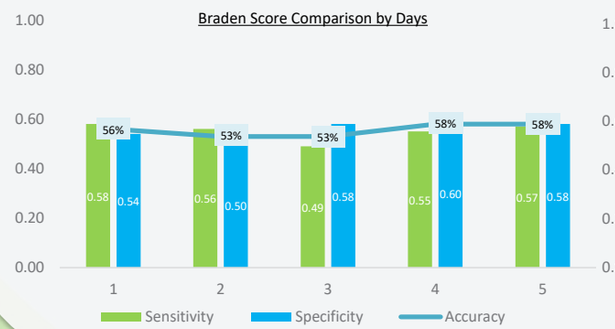
Methods

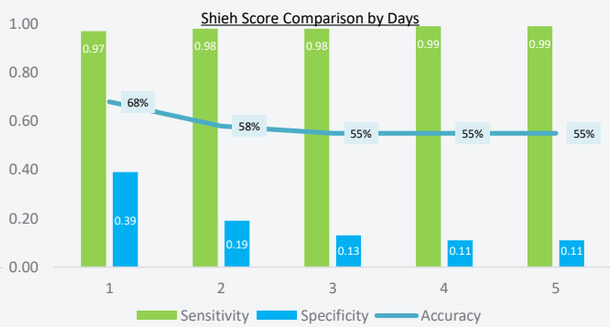
- A retrospective analysis was completed of 101 patients who developed a stage 2 or above PI in ICU from January 2022-December 2023, comparing Shieh score alone, Braden score alone, and combination of Braden and Shieh scores 5 days before PI development. This was compared to another 101 patients admitted to ICU during the same time period who did not develop a PI.

Shieh Score	
Criteria	
Age ≥60	Collected from Patient's story board on EPIC
Male sex	
Diabetes diagnosis	
GFR <30 mL/min	Collected from lab flowsheet (electrolytes and extended lytes)
Albumin of ≤20	
Use of IV norepinephrine	Collected from I/O flowsheet
Mechanical airway ventilation	Collected from assessment flowsheet (under chest/confusion assessment method)
Low level of consciousness for ≥48 h	
Low level of function of 1 or 2 for ≥24 h	Collected from daily care and safety flowsheet- mobility

Inclusion Criteria	Exclusion Criteria
Adults 18 years and older, admitted to the Trillium Health Partners' ICU (Mississauga and Credit Valley Hospital),for 5 days and/or more, without a PI on ICU admission who developed a PI while admitted to ICU	Patients who are missing any information of Shieh score criteria (Diabetes diagnosis, GFR, Albumin, Use of IV norepinephrine, Mechanical airway ventilation, Low level of consciousness for ≥48 h, Low level of function of 1 or 2 for ≥24 h) Patients who are admitted to THP's ICU for less than 5 days

- Shieh and Braden scores were calculated for the PI patients for the 5 days leading up to the PI. For non-PI patients, the Shieh and Braden scores were calculated for their first 5 days in ICU
- In this study, the cut-offs to be considered high-risk was ≥5 for the Shieh score, and ≤12 for the Braden score
- Since the patients' PI status was known, the overall accuracy, sensitivity, and specificity were calculated and compared between the Shieh score alone, Braden score alone, and combination of Shieh and Braden scores





Findings

- Shieh score has higher sensitivity and is better at predicting PIs in the ICU than the Braden scale, especially early on in the ICU admission
- The specificity of the Shieh score drops over the course of the ICU stay
- Overall accuracy is comparable between Braden and Shieh scores at each time point
- There was no difference in sensitivity, specificity, and overall accuracy between Braden alone vs. Shieh and Braden combined

5 day average	Braden	Shieh
Sensitivity	0.55	0.98
Specificity	0.56	0.18
Accuracy	55.6%	58.2%

Implications

- Shieh score has been shown to be a more effective tool to flag patients at risk of PI in the ICU earlier than the Braden scale
- Earlier detection of PI risk can lead to earlier PI prevention interventions for high-risk ICU patients, potentially preventing PI development
- Increasing the Shieh score cut-off for high-risk from 5 to 6-7 may be worth investigating for increased specificity in ICU patients

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A Step Forward: The Use of Decellularized Dermal Matrices for Delayed Diabetic Foot Ulcers

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INTRODUCTION

- Hard-to-heal wounds (HHWs), including diabetic foot ulcers (DFU), represent a considerable source of morbidity due to the population aging and the increasing of comorbidities: hence, the management of HHWs generate considerable health costs.[1]
- It is claimed that as much as half of chronic wounds fail to heal with current treatments.[2]
- HHWs fail to progress through the orderly phases of healing but remain in a self-perpetuating inflammatory stage, despite adequate wound management.[3]
- Extracellular matrix (ECM)-based scaffolds are decellularized tissues that can stimulate natural tissue regeneration capacity by providing native tissue-specific ECM signals, directing anti-inflammatory macrophages and activating constructive remodeling.[4]
- This novel ECM-based human tissue regenerative matrix* is devoid of cellular materials and comprised of intact collagen, elastin, proteoglycans, cytokines and growth factors.

CASE HISTORY

We present 3 case studies of DFUs. Participants were required to have a DFU, consent to having the matrix applied, and be willing to totally pressure offload after application.

- Participant #1 is a 55-year-old male with a history of Type 2 Diabetes, Diabetic Neuropathy, Stroke, Hypertension and Smoking
- Participant #2 is a 56-year-old male with a history of Type 2 Diabetes, Hypertension, Dyslipidemia, Bicuspid Aortic Valve Replacement, Osteomyelitis of the L5 Metatarsal Head in 2017 which resulted in reconstruction and skin grafting
- Participant #3 is a 67-year-old male with a history of Type 2 Diabetes, Diabetic Neuropathy, Osteomyelitis and recommended below knee amputation by an Orthopedic Surgeon

CLINICAL SITUATION

- Participant #1 wound measured 0.8x0.4cm to the plantar aspect of the 5th metatarsal head that was first documented in August 2023. Our team had trialed serial wound debridement, total contact casting, collagen matrix, silver impregnated foam and iodine-based dressings with no success in wound closure.
- Participant #2 wound measured 2.5x0.7x0.3cm to the lateral side of the left foot that was first documented in February 2020. Our team had trialed serial debridement, silver contact layer, collagen matrix, hydrofiber, total contact casting, and topical oxygen therapy with no success in wound closure.
- Participant #3 wound to his heel measured 1.7x1.6x0.2cm and another wound to the lateral side of his 5th metatarsal head measured 1x0.5cm. Wounds were first documented in October 2023. Our team trialed iodine- based dressings, silver foam, serial debridement and total contact casting with no success in wound closure.

ACTIONS TAKEN

- All participants had the decellularized dermal matrix applied on April 3rd, 2024. All wouds were prepped with conservative sharp wound debridement using a curette, creating a 100% friable wound bed with attached wound edges. Clients were seen weekly for cover dressing changes. No cleaning or debridement was done for 3 weeks with weekly cover dressing changes. After three weeks debridement was started on the lifting matrix edges and periwound callous.
- Participant #1 wound dressed with non-adherent silver contact layer, secured with steri-strips, covered with a foam dressing and secured with cloth tape. Pressure was offloaded with total contact casting and client committed to smoking cessation. After 2 weeks, the cast was discontinued due to client reported pain. The dressing was changed to a simple foam dressing and cloth tape. Offloading was continued with custom orthotics, decreased ambulation and decreased smoking from a pack a day to 3-4 cigarettes per week. The wound closed on May 21st, 2024.
- Participant #2 wound dressed with a foam dressing, a small amount of cloth tape, and gauze roll. Pressure was offloaded with a knee scooter, custom orthotics with insoles and decreased ambulation. No changes were made to the wound care or offloading until the graft released on May 29th, 2024 and topical oxygen therapy was restarted to improve his periwound skin.
- Participant #3 wound dressed with a foam dressing and cloth tape. Pressure was offloaded with total contact casting and decreased ambulation. The heel wound continued to have drainage and the matrix appeared macerated. The matrix was repositioned multiple times and steri-strips used to try to hold it in place. Total contact casting was stopped after 3 weeks and offloading switched to Darco shoe. Client was not complaint with decreased ambulation. Client showered, against instructions, and suffered some mental health and family challenges post application. The matrix lifted on the heel wound on May 14th, 2024 and the wound remains open. The wound to the 5th metatarsal head closed on May 14th and has remained closed.

RESULTS

Participant #1- April 3rd post debridement, April 3rd post application, April 10th, May 21st

Participant #2- April 3rd post debridement, April 3rd post application, April 17th, May 29th

Participant #3 Heel Wound- April 3rd post debridement, April 3rd post application, April 10th, May 7th, May 14th

Participant #3 5th Metatarsal- April 3rd post debridement, April 3rd post application, April 10th, May 14th

IMPLICATIONS FOR PRACTICE

- A new tissue regenerative scaffold* used here provided reduced inflammation, new ECM matrix stabilization and stimulation of the participant's cells to facilitate effective healing.
- This product may help to provide a more effective treatment for HHWs by providing key features missing in current treatments.
- Effective offloading is a key ingredient to successful therapy

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ACKNOWLEDGEMENTS

DERMGEN™ Decellularized Dermal Matrices were supplied as a free product trial by RegenMed under license from DeCell Technologies Inc.

Temporal and Geographic Variation in Diabetes-Related Foot Complication and Amputation Rates across Canada

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[3]Division of Vascular Surgery, University of Toronto, Toronto, Canada

Background

- Lower-extremity amputation (LEA) and foot complications are devastating yet preventable complications of diabetes
- Despite the increasing burden of diabetes, there are no contemporary data documenting diabetic foot complication (DFC) and amputation rates across Canada

Objectives

- To determine the temporal trends in national age- and sex-adjusted incidence rates of hospitalization for diabetes-related foot complications and lower-extremity amputation from April 1, 2011 to March 31, 2022
- To identify variation in hospitalization rates for DFC and LEA across Canadian provinces and territories

Methods

- Canadian adults > 20 years, excluding Québec
- Incident major (above-ankle), major or minor (toe or partial foot) LEA, and DFC (foot ulcer, gangrene, osteomyelitis) cases were extracted from Canadian Institute for Health Information's Discharge Abstract Database
- Population estimates from Statistics Canada used to calculate age- and sex-adjusted incidence rates
- Temporal trend analysis using regression analysis

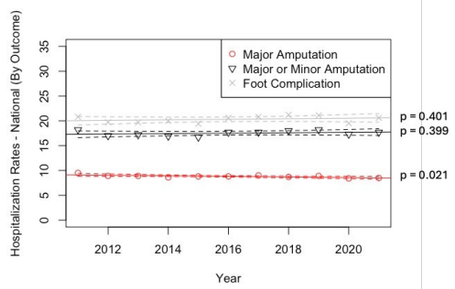
Results

Table 1. Demographic and clinical characteristics of patients hospitalized for DM-related amputations and foot complications

Characteristics	Major Amputation (N=20,886)		Major or Minor Amputation (N=41,634)		Foot Complication (N=48,526)	
Age						
20-34 years	308	(1.5%)	649	(1.6%)	870	(1.8%)
35-49 years	2,424	(11.6%)	5,058	(12.1%)	5,606	(11.6%)
50-64 years	7,930	(38.0%)	16,042	(38.5%)	17,268	(35.6%)
65-79 years	7,824	(37.5%)	15,388	(37.0%)	18,006	(37.1%)
≥80 years	2,400	(11.5%)	4,497	(10.8%)	6,776	(14.0%)
Male Sex	14,820	(71.0%)	30,443	(73.1%)	34,110	(70.3%)
Comorbidities						
PAD	18,782	(89.9%)	38,135	(91.6%)	46,054	(94.9%)
HTN	6,735	(32.2%)	12,670	(30.4%)	14,383	(29.6%)
DLP	873	(4.2%)	1702	(4.1%)	2,162	(4.5%)
CAD	3,072	(14.7%)	5218	(12.5%)	5,009	(10.3%)
CKD	7,660	(36.7%)	13,167	(31.6%)	13,269	(27.3%)

Results

Fig 1. National age- and sex-adjusted incidence rates of diabetes-related major, major or minor lower-extremity amputation and diabetic foot complication for 2011-2021 (per 100,000)



Outcome Event	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Mean
Major Amputation	9.5	8.9	8.9	8.6	8.8	8.8	9.0	8.7	8.9	8.4	8.5	**8.8**
Major or Minor Amputation	18.2	17.0	17.2	16.9	16.7	17.7	17.7	18.0	18.2	17.3	17.7	**17.5**
Foot Complication	20.8	19.7	19.7	20.0	19.4	20.6	20.8	21.2	21.1	19.5	20.6	**20.3**

Table 2. Provinces with decreasing incidence rates of diabetes-related major amputation for 2011-2021 (per 100,000)

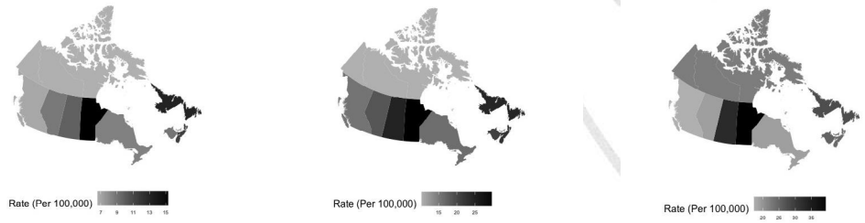
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Mean	β	95% CI
ON	9.8	8.9	9.5	8.6	8.9	8.9	8.7	8.7	8.6	7.9	8.0	**8.8**	**-0.14**	**(-0.21, -0.08)**
MN	18.7	15.5	15.1	16.3	17.8	14.3	17.7	14.2	15.0	15.3	14.2	**15.8**	**-0.25**	**(-0.56, 0.05)**
SK	11.1	10.6	10.2	10.1	10.2	11.6	10.6	8.2	9.8	10.0	10.2	**10.2**	**-0.10**	**(-0.28, 0.07)**

Conclusions

- Major lower-extremity amputations related to diabetes have decreased, but the burden of diabetic foot complications requiring hospitalizations has not
- Areas with high rates of diabetic foot complication and amputation including Manitoba, Newfoundland and Labrador, and Nova Scotia may benefit from structured diabetic foot screening and limb preservation initiatives
- Efforts to improve foot screening and limb preservation for people living with diabetes across Canada remain warranted

Fig 2. Variation in rates of amputation and foot complication related to diabetes across Canada from 2017 to 2021

(A) Major Amputation **(B) Major or Minor Amputation** **(C) Foot Complication**



Hypochlorous Acid Wound Solution Dissolves slough, penetrating it to Inactivate Bacterial Biofilms

Debashish Chakravarthy, PhD, **Rui Chen,** PhD, **Marcus Swan,** PhD, **Fergus Watson,** PhD, and **Steven L Percival,** PhD

INTRODUCTION

A wound bed is often covered with eschar, necrotic tissue and slough which all harbour microbial communities known as biofilms and inflammatory chemokines which unless removed can hinder the healing process. Hypochlorous acid (HOCl) is a relatively small uncharged molecule which can freely diffuse across the bacterial cell membrane and react readily with a wide range of biological molecules resulting in bacterial cell death. However, it is relatively non cytotoxic to mammalian cells for reasons associated with evolutionary biology. For many years, due to its inherent antimicrobial properties, HOCl based cleanser has been used as a preservative in wound irrigation solutions for wound bed preparation.

METHODS

An in vitro artificial wound eschar (AWE) and slough model was applied to study the penetration and antibiofilm efficacy of a HOCl based irrigating solution, referred to as a pure Hypochlorous Acid (pHA) solution*. AWE was prepared by homogenising collagen, fibrinogen and elastin in a phosphate buffer solution and then clotting with thrombin. The rate of penetration of pHA solution through AWE was measured electrochemically by monitoring the change of open circuit potential of a platinum sensor coated with an AWE layer upon exposure to pHA. The HOCl concentration penetrating to the electrode surface beneath was established using a calibration curve determined for the sensor in solution without the AWE layer. In conjunction, AWE layers were formed on top of 24 hour biofilms using Pseudomonas aeruginosa and Staphylococcus aureus. (Table 1). The antibacterial efficacy of pHA through AWE was evaluated after 24 hours exposure. Eschar breakdown was studied upon exposure to the cleanser fluid with collagenase and PBS as controls.

RESULTS

- pHA penetration through the AWE reduced the underlying biofilm, with the extent of penetration being inversely proportional to the AWE thickness. The penetrated irrigation solution achieved >6 log reduction on the 24 hour biofilm models with complete inactivation being achieved for S. aureus biofilms in ~1mm AWE. (Fig 1)
- Confocal microscopic images of the AWE-Biofilm model upon exposure to Vashe for 24 hours revealed an abundance of non-viable bacterial cells and disruption to the biofilm in comparison with the untreated biofilm models for both P. aeruginosa (Figure 2) and S. aureus (Figure 3).
- Traces of viable cells were present in the biofilm models covered by the thicker layers of AWE, more prominent for P. aeruginosa, than S. aureus (Figs 2 and 3).
- The HOCl/pHA based cleanser dissolved elastin from the eschar with no significant difference on the elastin dissolution level compared to collagenase (Figure 4).
- This response in log reduction shown above was emulated within the electrochemical measurements of Vashe penetrating through the various thickness layers of AWE. The data shows a rapid initial response in concentration followed by an inflection and a steady increase in concentration of time; the level of response is reduced as the thickness of the AWE layers increase. (Figure 5)

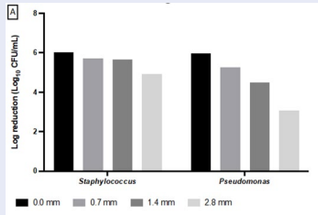


Figure 1. Log reduction (Log10 CFU/mL) of AWE-Biofilm model with various AWE thicknesses using pure Hypochlorous Acid (pHA) Cleanser Solution

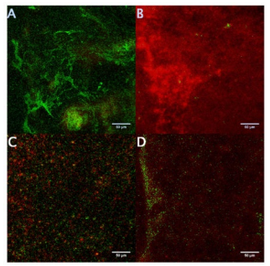


Figure 2. Microscopy images of the AWE-Biofilms, using P. aeruginosa, before (A) and after treatment with pHA for 0.7 mm (B), 1.4 mm (C) and 2.8 mm (D) thickness AWE. An abundance of viable (green) cells are present in the untreated control in comparison to the other which exhibit an increased volume of non-viable (red) cells; the greatest concentration being observed at 0.7 mm (n=3).

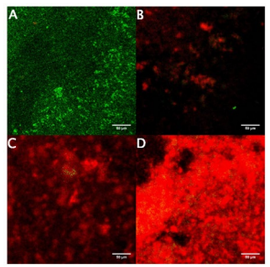
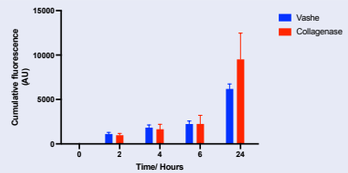


Figure 3. Microscopy images of the AWE-Biofilms, using S. aureus, before (A) and after treatment with pHA for 0.7 mm (B), 1.4 mm (C) and 2.8 mm (D) thickness AWE. An abundance of viable (green) cells are present in the untreated control in comparison to the other which exhibit an increased volume of non-viable (red) cells (n=3).

		AWE layer thickness			
Pseudomonas aeruginosa		**0.0 mm**	**0.7 mm**	**1.4 mm**	**2.8 mm**
	Mean Log CFU/ml	9.29	9.04	8.87	8.79
	Std. Deviation	0.10	0.04	0.09	0.31
		AWE layer thickness			
Staphylococcus aureus		**0.0 mm**	**0.7 mm**	**1.4 mm**	**2.8 mm**
	Mean Log CFU/ml	8.01	7.76	7.74	7.09
	Std. Deviation	0.04	0.11	0.16	0.04

Table 1. Descriptive statistics (Log10 CFU/mL) of the control AWE-Biofilm models at each of the varying thicknesses of AWE (n=3).

Figure 4. The cumulative fluorescence data obtained from the fAWE model upon exposure to pHA and collagenase for elastin-rhodamine (n=3).



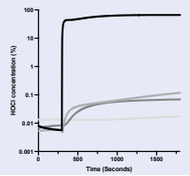


Figure 5. Concentration of HOCl (%) upon exposure to pHA as measured at the surface of the sensor beneath the various thicknesses of AWE (n=1).

DISCUSSION

The in vitro AWE model demonstrated that the rate and amount of HOCl in wound solution penetrated through the AWE layer was dependent on the thickness of AWE with strong antibiofilm potential following penetration through the AWE. It was also found that the HOCL solution had an effect in breaking down the AWE components, particularly elastin. This has potential effect in desloughing wounds.

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**Vashe Wound Solution, Urgo Medical North America, Fort Worth, TX*

Produced with support from Urgo Medical North America

How negatively charged fibers work in a dressing designed to support the debridement of wound slough

Debashish Chakravarthy, Ph.D

INTRODUCTION

Urgo Medical has developed UrgoClean®, a range of dressings composed of poly-absorbent fibres, whose unique feature is to ensure very strong adhesion in relation to the reconstituted fibrin during in vitro tests (see below).

On the Advanced Wound Care market, other products also used on wounds in the desloughing phase, such as alginates and hydrofibres, are also under the form of absorbent fibrous compresses with a gelling action when in contact with exudate, without however creating adhesion with the reconstituted fibrin during in vitro tests.

The aim of this study is to explain why UrgoClean® provides this adhesion and what physical and chemical phenomena are involved. Two physical and chemical phenomena are investigated: absorption + the physical and chemical interactions between the biomaterials.

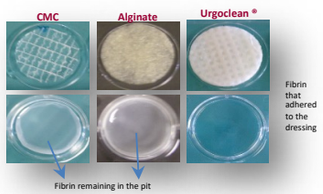
RESULTS

INTERACTION WITH A FIBRIN GEL RECONSTITUTED *IN VITRO*

- UrgoClean® shows a very strong affinity with fibrin gel reconstituted in vitro, taking the form of adhesion between the two materials.
- The other two CMC and alginate dressings did not show any adhesion in spite of gelification of the fibres and a similar absorption level.

The results of the slough/fibrin gel adhesion study are shown in Figure 1

FIG 1: Evaluation of the adhesion of dressings to a fibrin gel reconstituted in vitro



The dressing samples were applied to fibrin reconstituted in vitro (based on fibrinogen and human thrombin), and a weight was applied in order to simulate a dressing subjected to compression at a level of 40 mmHg.
The weight was removed after 30 sec. The final adhesion was evaluated after 24-hr incubation at room temperature. 5 samples were evaluated per dressing.
A representative image is shown here.

ELECTROSTATIC INTERACTIONS

The main physical and chemical interactions between biopolymers are:

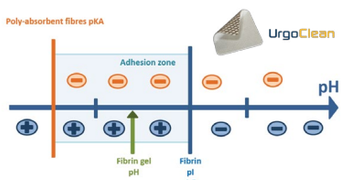
- Steric exclusion
- Hydrophobic interactions
- Hydrogen bonds
- Electrostatic interactions: the most intense interactions for biopolymers presenting an electrical charge in the environment where they are used. They attract or repel depending on whether the charged groups have the same symbol or the opposite symbol.

In this study, the materials carry ionic charges in an aqueous medium and are particularly sensitive to these electrostatic interactions.

HYPOTHESIS FOR ADHESION OF THE FIBRIN GEL:

- **UrgoClean® poly-absorbent fibres:** Ammonium polyacrylate which, throughout its chain, presents COO- and COOH groupings: Depending on the material's pKa, there is a higher density to a greater or lesser exent depending on the pH.
- **Fibrin:** A protein showing two types of charged groups due to its protein nature: NH+ and/or COO-: the protein's overall charge depending on the environment's pH is determined via its isoelectric point (pI), which is comparable to the nil charge point.

FIG 2



When pH < pI, there is a positive charge (NH+ groupings)

When pH > pI, there is a negative charge (COO- groupings)

There is a pH interval in which the fibrin exists in (+) form and the polyacrylate in (-) form: it is in this space that electrostatic interaction with a very high intensity is created, taking the form of the phenomenon of adhesion of the material to the fibrin gel.

DEMONSTRATION OF THE EFFECT OF THE ELECTROSTATIC INTERACTIONS WITH BIOMATERIALS WITH KNOWN ISOELECTRIC POINTS

Two gelling proteins with different isoelectric points make it possible to investigate whether the electrostatic interactions are indeed the predominant phenomenon in the adhesion.

FIG 3

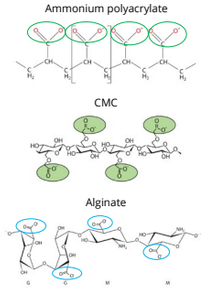
Protein A: pI = 6.5: adhesion **Protein B: pI = 5: No adhesion**

THE IMPORTANCE OF CAPILLARITY

Electrostatic adhesion requires the contact surface between the biomaterials to be as large as possible. This is done via capilliary absorption of the poly-absorbent fibres pad. Indeed, when the two materials are brought into contact, there is:

- No adhesion between two dry materials
- No adhesion between two wet materials
- Adhesion between a dry material and a wet material

FIG 4. Poly-absorbent fibers



THE IMPORTANCE OF THE CHARGE DENSITY

If you compare them to ammonium polyacrylate (UrgoClean® poly-absorbent fibres), the chemical structures of the CMC and of the alginate show a much lower density in terms of negative charges. The electrostatic interactions resulting from these materials' contact with a fibrin gel are consequently much weaker, and are insufficient to cause an adhesion phenomenon to the fibrin gel, with this being the case in spite of the equivalent capillary absorption capacities.

CONCLUSION

Two characteristics are required to create an interaction that is sufficiently strong to cause the phenomenon of adhesion by UrgoClean® poly-absorbent fibres to the fibrin in vitro :

- Very close contact between the fibrin molecules and the poly-absorbent fibres, due to the absorption and capillarity of the UrgoClean® pad.
- The implementation of very strong electrostatic interactions due to the high density of negative charges on the poly-absorbent fibres and the positive charge of the fibrin chains at the pH used for the implementation of the test.

These interaction characteristics and the clinical proof in the desloughing phase show a very specific method of action of the poly-absorbent fibres in relation to the fibrin. Future investigations will enable us to better understand these phenomena and to elucidate the method of operation of the range of UrgoClean® dressings in the desloughing phase, which is so unique.

The use of negatively charged desloughing dressing in pediatric patients

Debashish Chakravarthy, PhD, **Joachim Dissemond,** PhD, **Serge Bohbot,** MD

METHODOLOGY

- **Study design:** Prospective, non-interventional, multicentre study in Germany
- **Evaluated dressing:** UrgoClean Ag
- **Inclusion period:** Between September 2016 and September 2017
- **Follow-up:** Maximum duration of 4 weeks or a maximum of 3 documented visits
- **Number of active centres:** 81
  - Physicians: GPs and specialists
- **Number of patients analysed:** 2270, including 77 minors
  - 10 patients per centre (median value, IQR 5 – 25)
- **Follow-up:**
  - Intermediate visit: 11 ± 8 days (median 10 days, IQR 7 – 14)
  - Final visit: 22 ± 13 days (median 21 days, IQR 14 – 28)

PRODUCT DESCRIPTION

UrgoClean Ag is a supercharged poly-absorbent fibre dressing with TLC-Ag matrix (lipido-colloid technology with silver salts).

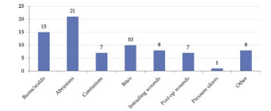
UrgoClean Ag provides a combined antimicrobial & complete cleaning action to fight against local infection.

Supports Debridement while managing exudates

RESULTS

Pediatric Patient Characteristics

- 77 patients including by 16 centres (mean number of patients per centre: 5 ± 7)
- Follow-up: 18 ± 8 days (intermediate visit: 9 ± 4 days)

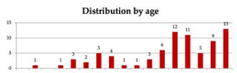


Wound infection status

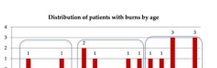
■ Verified wound infection
■ Clinical signs (at least 1/5)
■ Condition at risk

Demographics	n = 77	
Mean age	12.6 ± 3.8	[Min 2 – Max 17]
Sex Male / Female, n(%)	31 (40.3%) / 46 (59.7%)	

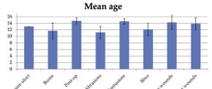
Distribution by age



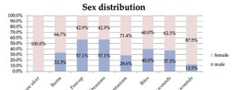
Distribution of patients with burns by age



Mean age

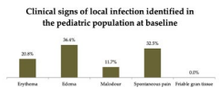


Sex distribution

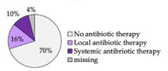


Clinical signs and conditions at risk of infection

Clinical signs of local infection identified in the pediatric population at baseline



Antibiotics therapy at baseline in the paediatric population



Conditions at risk of wound infection in the paediatric population	N = 77 (100.0%)
Contaminated or dirty wound	40 (51.9)
Critical wound surface or depth, possibly with direct contact with organ	12 (15.6)
Worsening or stagnating wound	10 (13.0)
Haematological or cancer affection	6 (7.8)
Immunosuppressive condition	4 (5.2)
Prolonged hospitalization (>3 weeks)/Post-surgical wounds	3 (3.9)
Extreme age/Very young patients	1 (1.3)

Patients' Anamnesis

- 36 patients (46.8%) with a comorbidity or a current treatment that could alter the wound healing process

Anamnesis	n = 77
Malnutrition	18 (23.4%)
Severe obesity	3 (3.9%)
Type I Diabetes	2 (2.6%)
Current infection (not wound-related)	5 (6.5%)
Immunodeficiency	4 (5.2%)
Respiratory insufficiency	1 (1.3%)
Systemic steroid treatment	1 (1.3%)

Possible multiple answers

Wound Characteristics

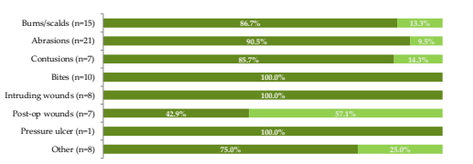
	Paediatric patients (N= 77)
Median wound duration, days (IQR)	5 (3-7)
Median wound area, cm² (IQR)	3.9 (1.6 ; 8.1)
Wound healing stage	
Granulation stage, n (%)	16 (20.8)
Debridement stage, n (%)	50 (64.9)
missing or implausible	*11 (14.3)*
Level of exudate	
High/moderate exudate, n (%)	37 (48.1)
Few/no exudate, n (%)	39 (50.7)
missing	*1 (1.3)*
Peri-wound skin condition score	
Healthy skin, n (%)	23 (29.9)

Wound Healing Outcomes

By the final visit:

- **85.7%** of the wounds **healed** (66/77) – Mean time to heal: 13 ± 8 days
- And **14.3%** had **greatly improved** (11/77)
- **Rate of Wound Area Reduction of the non-healed wounds** (n=11): **71.4% ± 17.7%** [min 25.0% - max 92.5%] Median value: 75.0% (IQR 67.7% - 80.6%)

Wound healing progression at the final visit in the paediatric population



- 2 burns not healed at the last visit (71 and 126 cm² at baseline, 15 and 17 years old), but 83.3% and 68.8% of RWAR
- Median RWAR of the 4 non healed post-op: 78.3% (IQR 59.9% ; 86.9%)

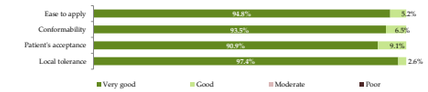
Wound Infection Outcomes

Progression of the wound infections and of the clinical signs of local infection in the pediatric population

- **All the verified wound infection were resolved by the final visit**
- **Reductions of all the clinical signs of local infection throughout the study period:** in particular
  - No more edema or malodour by the final visit
  - Erythema and spontaneous pain still reported in only one and two patients respectively.

Acceptability

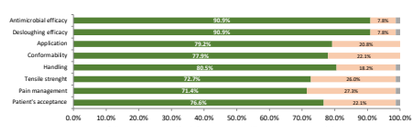
- **Dressing change per week:** 2 ± 1 [min 1; max 7]



- Dressing changes have been judged **painless in 75.3%** of the cases (n=58), associated with slight short pain in 20.8% of the cases (n=16), or with slight persistent pain in 2.6% of the cases (2.6%) (1 missing data).
- UrgoClean Ag has been judged **extremely useful in 92.2%** (n=71) of the cases and useful (n=4) in 5.2% of the cases (2 missing data).
- **UrgoClean Ag was very well accepted and tolerated in the paediatric population**

Comparison with Aquacel Ag Extra

Global assessment of UrgoClean capacities, compared to previous experience with Aquacel Ag Extra or Aquacel Ag+ Extra, in the pediatric population



- **According to the physicians' point of view and based on their experience, UrgoClean Ag capacities were judged better than Aquacel Ag Extra's in the management of wounds at risk or with clinical signs of local infection in paediatric population.**

CONCLUSION

These results, documented in a cohort of 77 minor patients treated in current practice, complete the clinical evidence on the good healing properties and good safety profile of the TLC-Ag dressing with poly-absorbent fibres in the management of wounds at risk or with clinical signs of local infection, regardless of the age of the patients.

UrgoClean Ag:
reduces the clinical signs of infection,
promotes wound healing in acute and chronic wounds at risk or with clinical signs of infection and is very well tolerated and accepted, rated highly by both clinicians and patients.

Based on their previous experiences with other antimicrobial dressings, the physicians involved in this study expressed their preference for this new dressing.

Produced with support from Urgo Medical North America

The stability of hypochlorous acid cleansers can vary significantly in a formulation specific way

Chakravarthy D, Ph.D

OBJECTIVE

- Hypochlorous Acid (HOCl) Based Cleansers are supported by many guidelines.
- HOCl as a molecule in a pure state only exists in a tight range of mildly acidic pH: 3-6, approximately.
- At higher or alkaline pH it turns into the much more cytotoxic hypochlorite anion, which is the main ingredient in bleach and Dakin's solution.
- The HOCl molecule is inherently unstable and stability is of particular concern when the product is packaged in a form that is convenient for use from a shelf readiness perspective.
- Formulation techniques that are sophisticated and complicated are required in order to provide the most concentrated product for the benefit of the patient over the entire shelf life of the product..
- Though cleansers may start life when manufactured, without the correct stabilization technique, HOCl cleansers will rapidly lose their power (measured as AFC value, or available free chlorine value, usually expressed in parts per million or ppm)
- We present the difference in age matched samples of two commercial cleansers, both of which start life at similar concentrations.

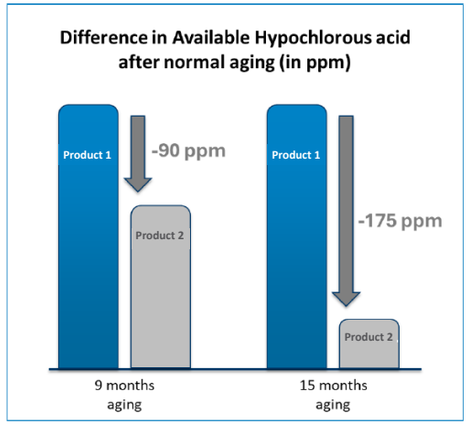
METHODS

Samples of products within their shelf life were analyzed by a third party independent laboratory. The HOCl value is expressed in ppm units.

RESULTS

- From the label the two products analyzed (Cleanser 1*, Cleanser 2**) had the similar ppm of HOCl.
- Both seem to have been created at approx. 300 ppm
- Formal stability studies were done under International Standards, at an independent laboratory
- Analytical results at 9 months of product age, and at 15 months of age (estimated, based on known and published shelf life of the product, the shelf life on the samples, and the date of the analysis. Only unopened bottles were analyzed using a single point analysis technique).
- Figure 1 shows the difference in AFC levels between the two products over time at controlled storage temperature of 25 degrees C

FIGURE 1



CONCLUSION

- Not all hypochlorous acid based cleansers are the same, as the nature of the formulation that is commercialized and used on patients clearly could matter.
- One of the products tested* is clearly superior in stability over time.
- This higher stability over time is likely to have patient impact in terms of clinical efficacy.
- HOCl's ability to influence factors in the wound that need to be controlled such as necrotic tissue levels, and bioburden/ extent of biofilm is clearly concentration dependent based on academic literature and other research in progress. This is happens to be be a common sense observation..
- This higher stability product is also supported by 18 published clinical studies, specific to the formulation that is commercially available.
- The higher stability over time, and the plethora of publications indicate that the more stable product, Product 1, is both a product more based in evidence and more prone to provide patient centric clinical value over its entire shelf life.

* Product 1 Vashe Wound Solution
** Product 2 BiHOCL Wound Solution

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Systematic Priority Setting of the IWGDF Recommendations to Inform Health Policymakers: A Q-Methodological Study

Dr. Kathleen Stevens, Dr. Ahtisham Younas, Dr. Zulfiqarali Abbas, Dr. James Hill, Dr. David Armstrong, Dr. Hermelinda Pedrosa, Dr. Beata Rakowska Dr. Harikrishna Nair, Dr. Vijay Viswanathan, Dr. Roberto Anichini, Alan Warner, Dr. Vildan Cakar, Dr. Kristien Van Acker, Ms. Mariam Botros, Ms. Georgia Krehbiel, Mr. Joel Alleyne

1 Introduction, Purpose, and Research Questions

- Diabetes is a disease with a widespread impact. The global burden of disease in 2021 was 529 million people with projections by 2050 to be greater than 1.31 billion (Ong et al., 2023).
- With the projected rise in the incidence and prevalence of diabetes, there will also be an increase in diabetic foot ulceration (DFU) and lower limb amputations (LLA).
- The **Limb Preservation Alliance (LPA)** is a global collaboration with a mission to influence health policy that supports the reduction of LLA related to diabetes worldwide.
- **The LPA advocates that the 2023 International Working Group on the Diabetic Foot (IWGDF) recommendations be integrated into health policy in all jurisdictions over the next ten years.**
- Currently, most jurisdictions and regions have limited or no health policies focusing on diabetes and foot health. Clear and comprehensive health policies must be developed, implemented, and sustained to decrease DFUs and LLAs. **To do this, policymakers must be provided with manageable information and clear direction regarding care priorities based on the best practice evidence and expert opinion.**

Study Purpose: To identify what diabetic foot experts determine as the priority IWGDF recommendations and timeline for policy implementation over the next ten years.

Research Questions:

1. What do diabetic foot experts determine are the priority IWGDF recommendations for policy implementation over the next ten years?

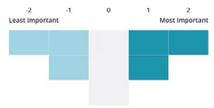
2. What do diabetic foot experts determine is the optimal timeline to implement each IWGDF recommendation? (e.g., over two years, over four years)

This poster presentation will focus on research question 1 and the recommendations identified as priorities by healthcare providers in select countries: Canada, the Caribbean, India, and the United States.

2 Q-Methodology

- Q methodology combines quantitative and qualitative methods to **identify and describe shared viewpoints.**
- Analysis of the data shows areas of **consensus** (i.e., similarities in priority setting of recommendations) and **disagreement** (i.e., differences in priority setting of recommendations) (Millar et al., 2022; Q Software).
- The results of a Q-methodology study can help policymakers discern priorities related to an area of health by providing manageable information. It is an approach that has successfully impacted policy in areas such as the environment, health, and hospital planning (Alderson et al., 2018).

The Q-sorting task required participants to rank *every one* of the 9 priority IWGDF recommendations for policy implementation in this sorting distribution from least to most important



Q Sample
- 9 IWGDF Recommendations

P-Sample Selection (P-Set)
- Providers with expertise in diabetes and foot health from all countries were invited to participate.

Q Sorts
- **Participants force ranked the 9 IWGDF statements from least to most important and completed open ended questions.**
- Intercorrelations among Q Sorts were determined.

Factor Analysis and Interpretation
- Principal Component Analysis and Varimax rotation completed to identify patterns and commonalities
- Results of the factor analysis was integrated with the answers to the open ended questions.

IWGDF Recommendations

1. **Education for persons with diabetes, carers and healthcare professionals.**
2. **Systems to detect all people who are at risk (e.g., annual foot examination).**
3. **Access to measures for reducing risk of DFU (e.g., podiatric care and footwear)**
4. **Ready access to prompt and effective treatment of any DFU or infection.**
5. **Rapid access to, or expertise in, endovascular and surgical bypass revascularisation procedures.**
6. **Access to modalities to off-load the ulcer.**
7. **Access to wound care (e.g., regular inspection, debridement, non-adherent dressings and dressings to control excess exudation).**
8. **Auditing of all aspects of services to identify and address problems and ensure that local practice meets accepted standards of care.**
9. **An overall structure designed to meet the needs of persons requiring chronic care rather than simply responding to acute problems when they occur** (IWGDF, 2023).

3 Results: Shared Viewpoints (SVPs) (note: Factors = individuals with SVPs)

Canada (n=88; Four SVPs generated)

SVP1: *Systemic Initiatives to Enhance Access to Prevention and Treatment Modalities, and Patient Education*
(n=9; Mostly Frontline RNs; experience 6-15 years)
Highest ranked policy recommendation: PR9

SVP2: *Prompt and Timely Access to Specialized Care is the Key*
(n=17; mostly frontline RNs, chiropodist, podiatrist & Orthotist; experience 5-35yrs)
Highest ranked policy recommendation: PR5

SVP3: *Treatment for All and Education for Hard-to-Reach Populations* (n=18; mostly frontline RNs, Orthotist, & physician; experience 5-36yrs**)**
Highest ranked policy recommendation: PR7

SVP4: *Upstream Approach to Prevention and Treatment Access*
(n=9; mostly frontline RNs and chiropodists; experience 6-37 yrs)
Highest ranked policy recommendation: PR3

India (n=30; Four SVPs generated)

SVP1: *Education for Patients and Providers is Fundamental*
(n=7; Mostly diabetologists, podiatrist, researcher (experience 4-35 years)
Highest ranked policy recommendation: PR1

SVP2: *A System that Provides Trifold Access for All – Wound care, Off-loading, Education*
(n=5; podiatric surgeon, diabetologist, surgeon (experience 1-25 yrs)
Highest ranked policy recommendation: PR7

SVP3: *A Responsive Structure that Supports Diagnosis and Meets Patient Education and Disease Management Needs*
(n=3; diabetologist, epidemiologist, physician, 18 mos - 23yrs**)**
Highest ranked policy recommendation: PR9

SVP4: *Risk Prevention: Educate, Screen, and Provide Basic Care*
(n=8; diabetologist; physicians; plastic surgeon; 2-40 yrs)
Highest ranked policy recommendation: PR2

United States (n=36; Four SVPs generated)

SVP1: *Rapid Access to Revascularisation Procedures and Education of All Providers re Advanced Treatments*
(n=4; Podiatrists and vascular surgeon; experience 11-23 years)
Highest ranked policy recommendation: PR5

SVP2: *Mitigate Risk with a Clinical Pathway that Supports Education, Detection, and Access*
(n=6; mostly podiatrist & an educator; experience 5-19yrs)
Highest ranked policy recommendation: PR2

SVP3: *Provide the Best Possible Care to Patients if They Need it: Wound Care, Off-Loading, Surgery*
(n=4; researchers, professor, industry partner; experience 5-50 plus yrs**)**
Highest ranked policy recommendation: PR7

SVP4: *Rapid Response Needed to Manage Wounds*
(n=7; mostly podiatrists; medical director; physical therapist experience 8-41 yrs)
Highest ranked policy recommendation: PR4

Caribbean (n=26; Two SVPs generated)

SVP1: *Addressing Patients' Needs Requires Personalized Care and Attention to the System Challenges to Address Access (Public and Private)*
(n=5; nurses, orthopedic surgeon, medical practitioners; experience 2-15 years)
Highest ranked policy recommendation: PR1

SVP2: *Clinical Pathway and Qualified Workforce are Primary*
(n=6; nurses, nutritionist, podiatrist, foot health practitioner; experience 6-30 plus yrs)
Highest ranked policy recommendation: PR9

4 Implications and Conclusions

- The study findings can provide direction to healthcare providers and policymakers related to prioritizing strategies to prevent DFU and LLA related to diabetes.
- The findings align with the existing literature and reinforce the need for foot health resources, improved access to care, education for practitioners and patients, and better communication pathways (Coffey, 2019; MacPherson et al., 2022).
- Interpretation of the findings suggests that there are consistencies related to some recommendations across countries (e.g., access, education, and system revisions). However, the variations and the qualitative comments reflect that each country has unique needs and highlights the importance of addressing recommendations and implementing policy, considering the local context.
- The focus now needs to be on effectively mobilizing these findings using evidence-based implementation science strategies, with the goal of integrating the priority recommendations into policy and practice.

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Barriers and facilitators to pressure injury prevention for adults in hospital: A qualitative study

Hurd CL.[1,2], Cole-Haskayne A.[2], Moore G.[2], Horlick S.[2], Manning J.[2], Ho CH.[2,3], Papathanassoglou E.[1], Pohar Manhas K.[1,2,4]

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Introduction

Background

Pressure injuries (PIs) are localized damage to the skin and underlying tissue, typically over a bony prominence, that develop from prolonged pressure in combination with friction and shear or from medical devices.[1] PIs are a significant hospital issue, with an estimated global prevalence of 12.8% and an estimated 16.7% in Alberta acute care hospitals.[2,3]

Alberta Health Services (AHS) introduced a care bundle initiative to enhance patient outcomes at 14 major acute care sites across Alberta by implementing best practices in eight topic areas, including PI prevention (PIP). To support effective implementation of PIP strategies, it is crucial to understand current practices and identify the barriers and facilitators to PIP from the perspective of healthcare teams across Alberta.

Aims

1. Identify barriers and facilitators to PIP for adult inpatients in acute care settings from the perspective of healthcare team members with diverse roles in Alberta.

2. Connect identified barriers and facilitators to a recognized implementation science theory (the Theoretical Domains Framework (TDF)).[4] This will enable the codesign of TDF-informed strategies for implementation that could overcome barriers and leverage facilitators.

Methods

Design

This study was conducted under a constructivist paradigm. The methodological framework was Interpretive Description.[5] We used the TDF during analysis, which is an implementation science framework that identifies determinants of behavior.

Participants

The study context was adult inpatient units (medicine, surgery, and critical care) in hospitals across Alberta, Canada, including urban, semi-rural, and rural sites. Healthcare providers were eligible to participate if they worked at least 0.3 FTE for the previous three months. Purposive and snowball sampling was facilitated by unit managers and clinical nurse educators

Data Collection

A semi-structured interview guide was co-designed by a team of health services researchers, nursing leaders, and a patient/family advisor. Semi-structured interviews were completed via Zoom in dyads comprised of one interviewer with clinical experience and one with research experience. All interviews were audio recorded, de-identified and confidentially transcribed verbatim. Interview conduct ceased upon theoretical saturation.

Data Analysis

Each transcript was independently coded by 2-3 researchers using NVivo 12 (QSR International, Denver, USA). Thematic data analysis was iterative and concurrent with data collection. The research team met to discuss emerging ideas after a tentative coding framework was developed from the initial open coding. These open codes were then deductively mapped to the TDF by two researchers, and inductively themed for sense-making. The research team met biweekly over three months of analysis to bridge the deductive and inductive approaches by building an overarching thematic conceptualization to synthesize the results.

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Results

- **22** participants (n=3 males):
  - Clinical Nurse Educators (n=4), Health Care Aides (n=2), Managers (n=2), NSWOCs (n=5), Nurses (n=8), Occupational Therapists (n=1)
- **3-35** years of experience
- **30-60 min** interviews

- Types of units represented:
  - Medicine (n=7), surgery (n=5) & critical care (n=3)
- Urban (n=14)
- Non-urban (n=8)

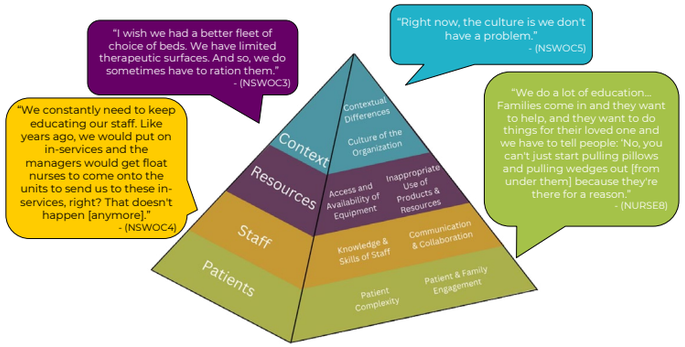

Figure 1: Thematic conceptualization (pyramid) with illustrative quotes from participants.

Theme & Subthemes	Barriers to PIP	Facilitators of PIP
Patients		
Patient complexity	• Skin integrity at admission • Older age	• Few comorbidities
Patient and family engagement	• Patient attitudes towards PIP • Complex patient and family interactions	• Patient and family education and engagement • Encouragement by healthcare team
Staff		
Knowledge and skills	• Lack of knowledge (e.g., inexperience, limited education) • Professional confidence • Uncertainty regarding where to find educational resources • Time to adjust to new workflows (e.g., implementation of electronic medical records [EMR])	• Expertise • Staff knowledge (e.g., risk assessment) • Opportunities for education and mentorship • Multidisciplinary teams
Communication and collaboration	• Lack of data • Lack of documentation • Difficulty accessing specialists in rural/remote locations	• White boards in patient rooms • Strong interpersonal skills • Use of photos and workflows in EMR
Resources		
Access and availability of equipment and devices to prevent PIs	• Limited support surfaces • Limited seating resources • Restricted access to Prevalon boots	• Prophylactic dressings and products • Air-based patient turning and repositioning device • Nutritional resources
Inappropriate use of products and resources	• Reusable soaker pads • Soap (e.g., dries skin) • Incontinence briefs	• De-adopt harmful practices (e.g., by removing and/or replacing inventory)
Context		
Contextual differences	• Transitions in care • Lack of resources in certain contexts	• Units that have prioritized PIP
Organizational culture	• Not recognizing PIP as an issue across the organization • Lack of readiness to change	• Making PIP an organizational priority • Establishing a culture of collecting and reporting PI data

Table 1: Examples of specific barriers and facilitators of PI prevention and management in each theme and subtheme

Themes & Subthemes	TDF Domain(s) that Subtheme Aligns to	Recommended Style of Implementation Strategy[6]
Patients		
Patient complexity	Belief about Consequences	Educating, Modeling and/or Persuading
Patient and family engagement	Social/Professional Role and Identity	Educating, Modeling and/or Persuading
	Belief about Capabilities	Educating, Modeling and/or Persuading
Staff		
Knowledge & skills	Knowledge	Educating
	Skills	Training
Communication and collaboration	Social/Professional Role and Identity	Educating, Modeling and/or Persuading
	Environmental Context & Resources	Training, Enabling, Environmental Restructuring and/or Restricting
Resources		
Access & availability of equipment & devices	Environmental Context & Resources	Training, Enabling, Environmental Restructuring and/or Restricting
Inappropriate use of products & resources	Knowledge	Educating
	Memory, Attention & Decision Process	Training, Enabling, Environmental Restructuring and/or Restricting
Context		
Contextual differences	Environmental Context & Resources	Training, Enabling, Environmental Restructuring and/or Restricting
	Social Influences	Modeling, Enabling, Environmental Restructuring and/or Restricting
	Goals	Educating, Modeling, Persuading, Enabling and/or Incentivizing
Organizational culture	Social Influences	Modeling, Enabling, Environmental Restructuring and/or Restricting

Table 2: TDF domains that each subtheme aligns to and the corresponding implementation strategies that are recommended.

Discussion & Conclusions

This study identified many barriers and facilitators to PI prevention and management in acute care across the four themes of patients, staff, resources, and context from the perspective of diverse members of the healthcare team.

Especially across the themes of context and resources, many of the barriers and facilitators appear to be specific to frontline patient care but may arise from **processes or constraints at the organizational level**. This includes how **resource allocation** decisions are made; the need for **valid, reliable data** and reporting on PIs; and the need for **clear prioritization of and messaging** around PI prevention across the organization.

Limited **access to specialized staff** (E.g., NSWOCs) and **high vacancy rates** in nursing and allied health positions, was reported to be a barrier to PI prevention in semi-rural and rural settings. Facilitating **ongoing education, mentorship and upskilling** in in wound management may address some of the barriers in the staff theme.

Engaging patients and families was achieved though education, which should be **tailored** to the patient and provided in **multiple formats** including face-to-face PI education, daily engagement with clinicians, and accessible and interactive educational resources delivering simple and succinct messages .

Further investigation into the underlying causes of these barriers and facilitators will be essential to inform implementation strategies for PI prevention activities in acute care settings.

Patient-centred Approaches to Pressure Injury Prevention and Management in Acute Care: A Scoping Review

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Introduction

Background

Pressure injuries (PIs) are are damage to the skin and underlying tissue that result in pain, prolonged recovery, increased risk of mortality, and reduced quality of life.[1] PIs are typically preventable events, yet an estimated 1 in 6 patients in Alberta acute care sites have a PI.[2]

Efforts to reduce rates of PIs may be insufficient because approaches are often not patient- and family-centred, meaning they do not meaningfully engage the patient and/or family and prioritize their perspective.[3] For example, many interventions are not adapted to patients' context or health literacy. Patient-centered approaches may improve PI prevention , but the various approaches to enhance patient- and family-centred PI prevention and the efficacy of the approaches has not been thoroughly reviewed.

Purpose

The purpose of this scoping review was to identify and summarize existing evidence on patient- and family-centered approaches to the prevention and management of PIs in acute care settings including the strategies that have been used and their efficacy.

Methods

Search Strategy

The search strategy was developed with a medical librarian based on the Participants, Concept and Context framework[4] from the Joanna Briggs Institute. The search was formulated around: 1) Pressure ulcers or injuries; 2) Patient or family-centred care; and 3) Acute care settings.

Five databases were searched (Figure 1). A grey literature search included ProQuest, the James Lind Alliance, Healthcare Excellence Canada, and pressure injury-specific organizations.

Screening, Extraction & Quality Assessment

Screening was completed by two independent reviewers, based on the following:

Inclusion Criteria:

- population: adult inpatients and/or their family
- setting: acute care hospital
- any interventions, strategies, or approaches that are targeting PI prevention or management using patient-centered principles;
- published in 2013 or later;
- published in English.

Exclusion Criteria:

- studies focused on pediatric populations;
- protocol papers, case reports, conference proceedings, abstracts, opinion papers, letters to the editors, or editorials.

Extraction and quality assessment were completed by two independent reviewers and any disagreements were resolved by consensus. Quality was appraised using the Mixed Methods Appraisal Tool, version 2018.[5]

Data Synthesis

The synthesis of results was completed separately for qualitative and quantitative studies, resulting in a numerical summary and qualitative thematic analysis, respectively. Results from mixed and multiple methods studies were incorporated into the most relevant synthesis.

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Results

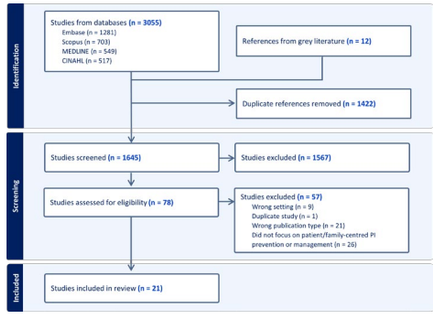

Figure 1. PRISMA Flow Diagram
The flow diagram illustrates the number of articles at each phase of the screening process. A total of 21 studies were included in the review.

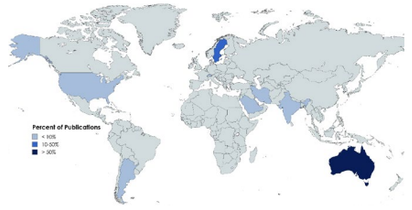

Figure 2. Map of Study Locations
A heat map showing the percent of articles included in the review from each country. A large majority of publications originated from Australia (n=13).

	Patients	Staff	Women
Min	9	10	32%
Max	50441	23	83%
Median	68	20	58%

Table 1. Participant Demographics
The minimum, maximum and median number of patients and nurses and the minimum, maximum and median percent of women the sample of included studies.

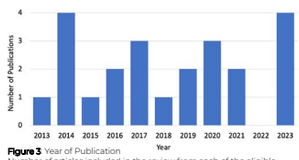

Figure 3. Year of Publication
Number of articles included in the review from each of the eligible publication years.

Care Bundles

Overview: Care bundles (n=10 studies) were the most reported intervention. They include a variety of interventions that can be combined to prevent and manage PIs in acute care. All care bundles included an aspect of engaging patients and/or families in PI prevention.

Quantitative results: significant increase in patient and family participation (p<0.001), reduced hospital-acquired PIs.

Education

Overview: Education (n=3 studies) included pamphlets, manuals and video-based materials that provided an overview of PI risk factors and activities that patients and families could engage in to reduce the risk of PI while in hospital.

Quantitative results: One study reported a lower incidence of PIs in the intervention group, as compared to a usual care group. Patients reported increased knowledge of the risks, causes and prevention of PIs.

Technology

Overview: Technology (n=3 studies) included movement sensors, pressure mapping devices and moisture scanning devices. The technology was used to provide patient-specific feedback and education to promote prevention activities.

Quantitative results: significant protective effect against PIs (OR = 0.33, 95% CI [0.12, 0.90], p = 0.031). Use of movement sensors resulted in more time compliant with repositioning protocols than control group (67% vs 54%; p<0.001).

Figure 4. Most Common Interventions
The most common interventions are described with an overview of the quantitative and qualitative results.

Awareness & Knowledge
- Improve awareness of PIs at admission to hospital
- Providing information in multiple formats
- Understanding PI prevention leads to participation

Participation & Action
- Patients desire to be involved in care decisions, self-determination
- Many factors may limit participation (E.g., pain, cognitive impairment)
- Participating in care motivated patients to continue with PI prevention activities

Healthcare Professional Involvement
- Enhanced dialogue between nurses and patients resulted in increased participation in PI prevention activities
- Personal contact and human interaction reported to be valuable
- Many enablers and barriers to collaborative care (E.g., waiting for staff)

Figure 5. Qualitative Results
Three themes were apparent across studies with quantitative results: 1) Awareness and Knowledge, 2) Participation and Action, and 3) Healthcare Professional Involvement.

Discussion & Conclusions

The heterogeneity of interventions and outcomes limits the ability to draw comparisons between intervention type.

Few studies included sufficient detail about factors such as sex, gender, and socioeconomic status of patients and family members, limiting the ability to draw conclusions about how these factors impact PI prevention and management.

Three main approaches to patient- and family-centred PI prevention and management were apparent in the literature including care bundles, educational interventions, and technology-based interventions.

All the interventions were show to **effectively engage patients and families** and result in **reduced rates of hospital-acquired PIs**, suggesting they are promising practices for engaging patients and families in PI prevention and management in acute care settings.

Amniotic Allograft Membrane on a Chronic Foot Ulcer: A Case Study

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Introduction

Diabetes mellitus is a chronic disease marked by numerous life-threatening complications, one of which is a foot ulcer which often stems from peripheral arterial disease, inadequate glycemic control, neuropathy, or insufficient foot hygiene[1]. The consequences of diabetic foot ulcers include infection, hospitalizations, decreased functional ability, amputation, and increase mortality[1,2].

Amniotic membrane (amnion) allograft, derived from human placenta, is used as a treatment for chronic wounds. Amnion contains many growth factors and chemotactic molecules that support wound healing by facilitating cell migration and promoting repair[3,4].

Objective

As part of our ongoing implementation of amnion in our hospital, this case study aims to continue demonstrating the use of hydrated amnion allograft on diabetic foot ulcers, showcasing the remarkable efficacy and accelerated healing observed in our patients.

Method/Procedure

Medical Background

A 60-year-old male was admitted to an acute care hospital in Toronto, Ontario, with a University Texas Grade 3D diabetic foot ulcer located on his right heel that had been present for over five months, despite being treated with conventional dressings and optimizing his health. The patient underwent a six-week course of antibiotics and angioplasty to manage the associated osteomyelitis and prevent an amputation. Additionally, the patient experienced a rupture of the right Achilles tendon, necessitating immobilization with a boot. Following stabilization, he was transferred to a rehabilitation hospital in Toronto, Ontario, where weekly applications of amnion were administered to the wound from October to November 2023.

Procedure

The Clinical Nurse Specialist or Nurse Practitioner in Wound Care meticulously cleansed and debrided the wound bed to eliminate necrotic tissue and promote optimal healing conditions. A hand-held fluorescence imaging device was used to visualize bacterial burden and guide the cleansing, debridement, and measurement of the wound. The amniotic membrane was then thawed and applied to the wound bed, followed by the application of a foam dressing for protection. The dressing remained undisturbed for one week while offloading was optimized.

Results

	Week 0	Week 1	Week 2	Week 3	Week 4
Photograph					
Measurement	2.13cm^2	0.47cm^2	0.58cm^2	0.16cm^2	Wound closed
Percentage of Wound Closure		**78%**	**73%**	**92.5%**	**100%**

Discussion

- The results of this study showed expedited wound healing with amnion. Wound measurements decreased by more than half after the first application, and wound closure was achieved after only four weeks.
- The wound remained closed until patient was discharged home seven and a half weeks later.
- Communicating with unit staff and the interprofessional team on amnion application was crucial, to ensure that the wound remained undisturbed and that proper offloading was employed.
- The use of a hand-held fluorescence imaging device was helpful in guiding wound hygiene and tracking progress.

Summary

This case study highlights the effectiveness of using amnion for wound closure on a chronic diabetic foot ulcer. With the use of conventional dressing and optimizing patient's health, there were no significant changes to the wound over the the course of five months. However, with the use of amnion, there was a 78% reduction in wound size in the first week, and closure was achieved in four weeks. This finding supports the Ontario Health Technology assessment report on the use of cellular and acellular skin substitutes to encourage the healing of diabetic foot ulcers[5]. The application of amnion represents an advanced therapeutic modality for wound healing.

Acknowledgements

The wound care team acknowledges the Tissue Bank for developing the amnion allograft in-house and for transporting the product. Additionally, we would also like to acknowledge the support of our Senior Director of Academic Practice and Education in Nursing.

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Ontario Health atHome

Ontario Health atHome
Beyond Dressings: A Nurse Practitioner's Comprehensive Care for a Non-Healing Wound in Home Care

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South West Regional Wound Care Program

Introduction

Nurse practitioners (NP) in Ontario are equipped with an expanded scope of practice including conducting comprehensive assessments to diagnose medical conditions, ordering and interpreting diagnostic tests and prescribing both pharmacological and non-pharmacological interventions[1].

There is a scarcity of nurse practitioners specialized in wound care within Ontario's home care sector, where more than 80% of chronic wounds are managed[2]. Chronic wounds are steadily increasing in Canada, presenting significant economic burden and impact on quality of life[2].

Purpose

This case study highlights the nurse practitioner's integration of advanced practice and wound care expertise to promote healing in a patient with a 15-month necrotic toe wound by conducting comprehensive assessments and addressing underlying barriers to recovery.

Procedures

Case Background

A 48-year-old female patient sustained trauma to her left great toe in April 2022 after striking it on furniture. Despite initial wound care, it deteriorated, resulting in a partial amputation of the distal phalanx and toenail in September 2022.

Following surgery, the patient was referred to the community nursing clinic for post-op wound care. The amputation site quickly developed eschar prompting the treatment focus to autolytic debridement with various wound dressings. During the treatment period, the patient did not undergo vascular assessment of her lower extremities, exploration of barriers to healing, or wearing offloading footwear. As a result, no evidence of wound healing occurred for over a year.

The patient's past medical history is unknown as the patient does not have a primary care provider. There is a family history of type 2 diabetes.

Key Takeaways

Holistic and comprehensive assessments: Nurse practitioners with wound care expertise play an essential role in the early identification and management of the underlying comorbidities and patient-centered concerns affecting wound healing.

Beyond dressings: Clinicians must not limit their focus on topical wound dressings as they alone are insufficient for effective wound healing.

Health care system: Integration of specialized nurse practitioner in home care settings is cost effective and reduces gaps in access for nursing and patients, especially for patients that are without a primary care provider.

Improved patient outcomes: Addressing underlying conditions, such as, Type 2 diabetes, tobacco use disorders, peripheral vascular disease, osteomyelitis, and dyslipidemia led to an optimization in the patient's overall health and a reduced risk of complications, such as sepsis and amputation(s).

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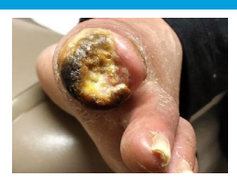
December 2023 – First Visit	January 2024 – Follow-up Assessments	May 2024 – Follow-up Assessment	June 2024 – Recovery
			
Assessment of factors affecting wound healing: Undiagnosed underlying medical conditions, nutrition status, infection, pain, medications, patient-centered concerns, local wound factors **Diagnostic exams and imaging:** Laboratory tests, x-ray, arterial ultrasound of lower extremities **Treatment plan:** Change to dry wound dressings, offloading footwear, referral to vascular surgery, smoking cessation therapy, pain management, complete disability medical forms	**Interpretation and diagnoses of barriers to wound healing:** Type 2 diabetes, peripheral arterial disease and critical limb ischemia, dyslipidemia, osteomyelitis **Treatment plan:** Treatment of diabetes and referral to outpatient diabetes program, six weeks of antibiotics, disability medical forms completed and mailed, attend first vascular surgery appointment	Vascular surgery was completed in April 2024 (angioplasty and multiple stenting and bypasses) and follow up assessment in May 2024 finally showing progression in wound healing The patient has successfully quit smoking and is receiving disability support	Wound is 81% closed and demonstrating positive healing trajectory for the first time since September 2022 The patient will continue ongoing outpatient management of her diabetes and associated conditions, particularly with a focus on preventing future diabetic foot ulcers

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Complex Head and Neck Cancer Wounds Healing Through Amniotic Membrane: A Case Series

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Introduction

Numerous factors predispose patients undergoing surgical treatment for head and neck (H&N) cancer to wound complications[1]. These wounds often do not respond well to conventional treatments. For H&N oncology patients requiring adjuvant radiation therapy, the goal is to initiate treatment within 6-8 weeks post-surgery [2,3]. However, impaired wound healing can significantly delay this timeline. The need for advanced wound therapies to expedite healing and promote wound closure is critical for these patients. One promising solution is the use of amniotic allografts derived from donated placenta.

Amniotic membrane (amnion) used in wound healing was first documented over a century ago[4] and its use has increased considerably in recent years to treat a variety of wounds. It contains essential growth factors that promote tissue regeneration and cytokines that reduces inflammation, pain, and scar tissue formation[5]. Amniotic membrane application commenced in September 2021 at Sinai Health (SH), initially beginning with five pilot patients. The success of these initial patients has led to an expansion of this modality in healing various difficult-to-heal wounds.

Objective

This retrospective case series aims to detail the use of amnion in promoting wound healing among thirteen H&N cancer patients who underwent complex surgical procedures.

Method

The application of amnion for H&N patients was led by a Wound Care Clinical Nurse Specialist (CNS-WC) and a Wound Care Nurse Practitioner (NP-WC) and carried out in collaboration with the H&N surgeons, unit CNS and SH Tissue Bank. A retrospective case series tracked thirteen H&N patients treated with amnion.

A wound care consult for amnion was ordered by the H&N team for a post-operative wound that was not responsive to traditional approaches. A detailed patient history, chart review and wound assessment was conducted by our CNS-WC or NP-WC to validate a patient's candidacy for amnion treatments. A collaborative approach with the H&N surgeons was implemented to confirm that there were no contraindications to the therapy (e.g., untreated infection, known malignancy). Once patients were deemed suitable for amnion therapy, informed consent was obtained, and wound photographs were taken using a handheld fluorescent imaging device. This allowed for real-time assessment of bacterial burden to guide wound cleansing, as well as accurate measurement of wound size.

Results

Case examples include weekly wound photographs, wound size, and percentage of wound closure. Complete closure was achieved in 90% of patients, with an average of five to seven weekly amnion applications

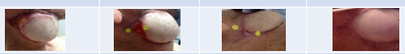
Case 1: Left buccal mucosa squamous cell carcinoma resected/reconstructed and complicated by left neck dehiscence. Amnion was applied on POD #9 post wound debridement. By week 7, commenced radiation therapy.

Amnion Week	0	1	2	3	4	5	6	7	8
Surface area (cm²)						-		-	
	14.97	9.5	5.77	4.38	3.11	-	2.35	-	1.07
% Wound Closure		37	61	71	79		84		93

Case 2: Oral-mandible squamous cell carcinoma. Post-operative care involved antimicrobial packing. On POD #26, amnion and negative pressure wound therapy (NPWT) were initiated. By week 5, commenced radiation therapy, though new nodules were observed.

Amnion Week	0	1	2	3	4	5
Surface area (cm²)						
	0.93	0.96	-	0.91	-	Closed
% Wound Closure		-3		2		

Case 3: Right oropharynx squamous cell carcinoma resection with right pectoral flap donor site. POD #37, applied amniotic membrane.

Amnion Week	0	1	2	3
Surface area (cm²)				
	5.93	2.38	< 1	Closed
% Wound Closure		60	99	

Case 4: Recurrent right oral cavity squamous cell carcinoma. On POD #17, amnion was applied with NPWT. NPWT was discontinued at week 3, with continued amnion applications.

Amnion Week	0	1	2	3	4	5
Surface area (cm²)						
	5.48	4.7	1.95	1.02	< 1	Closed
% Wound Closure		14	64	84	99	

Discussion

This case series demonstrates that the application of amniotic membrane effectively reduces wound size, accelerates closure, and improves quality of life for H&N cancers patients. The combined use of NPWT and amnion shows significant potential as a dual approach for promoting wound closure.

In H&N oncology patients, the use of amnion alongside adjunct therapies resulted in complete wound closure within an average of five to seven weeks. This treatment can facilitate achieving the target time to adjuvant radiation where delays have been demonstrated to have significant impacts on patient survival[2,3]. Of the thirteen patients treated with amniotic membrane, eight also received NPWT. Although each case varies in the number of required weekly amnion applications, each provides valuable insights to refine future application processes.

Conclusion

Early intervention in managing complex surgical H&N wounds are essential for patients to continue to receive life-saving treatment. To establish amniotic membrane as part of the standard of care for chronic, hard-to-heal wounds, further research is needed to provide consistent scientific data across various wound etiologies. To date, SH has treated over 70 patients, involving more than 30 physicians, and has provided external access to its amniotic membrane. Raising broader awareness of its impact on complex H&N wounds will help drive adoption of this innovative treatment approach.

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